



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

As required by  
the Washington State Administrative Procedures Act  
Chapter 34.05 RCW

CONCISE EXPLANATORY STATEMENT  
AND  
RESPONSIVENESS SUMMARY  
FOR THE AMENDMENT OF  
*CHAPTER 173-218 WAC*  
*UNDERGROUND INJECTION CONTROL PROGRAM*

**AND**  
*CHAPTER 173-407 WAC*  
*CARBON DIOXIDE MITIGATION PROGRAM, GREENHOUSE GASES EMISSIONS*  
*PERFORMANCE STANDARD AND SEQUESTRATION PLANS AND PROGRAMS FOR*  
*THERMAL ELECTRIC GENERATING FACILITIES*

06/17/2008  
Publication: 08-02-017

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CHAPTER 173-218 WAC  
Underground Injection Control Program

**AND**

CHAPTER 173-407 WAC  
Carbon Dioxide Mitigation Program, Greenhouse Gases Emissions Performance  
Standard and Sequestration Plans and Programs for Thermal Electric Generating  
Facilities

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**Concise Explanatory Statement  
Proposed Rule Language for the Amendments to  
Chapters 173-218 and 173-407 WAC**

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## ACRONYMS AND ABBREVIATIONS

AKART	All known, available, and reasonable methods of prevention, control, and treatment
AOP	Air Operating Permit
API	American Petroleum Institute
AQP	Air Quality Program
CAA	Clean Air Act
CCS	Carbon Capture and Sequestration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CEM	Continuous Emission Monitors
DOE	Department of Ecology
E2SHB	Engrossed Second Substitute House Bill
EPA	Environmental Protection Agency
EPS	Emissions Performance Standard
EFSEC	Energy Facility Site Evaluation Council
ESSB	Engrossed Substitute Senate Bill
GHG	Greenhouse Gas(es)
GSU	Geologic Storage Unit
IOGCC	Interstate Oil and Gas Compact Commission
MWh	Megawatt Hour
NOC	Notice of Construction

PSE	Puget Sound Energy
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
UIC	Underground Injection Control
USDW	Underground Sources of Drinking Water
WAC	Washington Administrative Code
WQP	Water Quality Program
WSPA	Western States Petroleum Association

## CONCISE EXPLANATORY STATEMENT

### *I. Introduction*

◆ **Identify the reasons for adopting this rule** (RCW 34.05.325(6)(a)(i)):

The purpose of this rule amendment is to adopt, as directed in Chapter 80.80 RCW, a greenhouse gases (GHG) emissions performance standard (EPS) for baseload electric generation.

The Legislature passed Chapter 80.80 RCW in 2007 with the intent to establish statutory goals for statewide reductions in GHG emissions. The Legislature also intended Chapter 80.80 RCW to authorize immediate actions in the electric power generation sector for the reduction of GHG emissions. To accomplish this, the legislation directed the Department of Ecology, in coordination with the Energy Facility Site Evaluation Council (EFSEC), to adopt a GHG EPS by rule. The rule applies to all baseload electric generation for electric utilities entering into long-term financial commitments on or after July 1, 2008. The revisions to Chapter 173-407 WAC include:

- Addition of Parts II and III to implement and enforce the GHG EPS as directed in Chapter 80.80 RCW;
- Modification of the chapter title to reference the GHG EPS rule; and
- Minor corrections to existing rule language in Part I that implements Chapter 80.70 RCW.

The Air Quality (AQP) and Water Quality Programs (WQP) used a joint rule-making process to share resources and expertise and avoid duplication of efforts. The AQP was responsible for developing rules to implement and enforce the EPS. These rules are located in Chapter 173-407 WAC, Carbon Dioxide Mitigation Program, Greenhouse Gases Emissions Performance Standard and Sequestration Plans and Programs for Thermal Electric Generating Facilities. The legislation allows for sequestration of emissions by permanent injection in geologic formations or by other means approved by Ecology. Chapter 173-407 WAC contains criteria for methods of sequestration other than geologic. As explained below, Chapter 173-218 WAC, Underground Injection Control Program (UIC), contains criteria for geologic sequestration.

The WQP amended Chapter 173-218 WAC to allow injection of carbon dioxide for sequestration in geologic formations. Prior to this rule adoption, Chapter 173-218 WAC did not contain specific standards for UIC wells used for injection of carbon dioxide. The revisions to Chapter 173-218 WAC include:

- Permit requirements for injecting carbon dioxide in UIC wells for permanent geologic sequestration.
- Requirement for operator to obtain and be in compliance with their state waste discharge permit or waste discharge general permit.
- Well construction standards.
- A monitoring program designed to identify movement of stored CO<sub>2</sub> beyond the target formation.
- Closure and post-closure requirements.

◆ **Identify the adoption date of rule and effective date of rule.**

The adoption date of the rule is June 19, 2008, as required in RCW 80.80. The effective date is 31 days after the rule is filed with the Code Reviser.

***II. Describe Differences Between Proposed and Final Rule***

◆ **Describe the differences between the text of the proposed rule as published in the Washington State Register and the text of the rule as adopted, other than editing changes. State the reasons for the differences (RCW 34.05.325(6)(a)(ii)):**

The Administrative Procedure Act (Chapter 34.05 RCW) requires Ecology to provide reasons for differences in the proposed rule text published in the Washington State Register with the CR-102, and the text of the rule as adopted. This section of the Concise Explanatory Statement fulfills this requirement.

The changes are shown below in the order that they appear within the rule text. Deletions appear as red strikethrough text and additions appear as green underlined text. The reason for each change, as well as the source of the change, is given. Minor editing changes (i.e. punctuation or grammatical corrections) are not included.

**Chapter 173-218 WAC – Underground Injection Control Program**

1. WAC 173-218-030, Definitions:

"**Caprock**" means geologic confining ~~layer~~formation(s) that has sufficiently low permeability and lateral continuity to prevent the migration of injected carbon dioxide and other fluids out of the geologic containment system.

Reason: Clarification in response to comments, W-18, W-24, W-25. Layers changed to formations to include all potential geologic settings, in response to comment W-25.

2. WAC 173-218-030 Definitions:

**"Geologic containment system"** means the geologic ~~layers~~formations that both receive the injected carbon dioxide (CO<sub>2</sub>) and contains or sequesters it within the system's physical boundaries. The containment system is a three-dimensional area with defined boundaries that includes one or more geologic formations.

Reason: Layers changed to geologic formations to include all potential geologic settings, in response to comment W-25.

3. WAC 173-218-030 Definitions:

**"Geologic sequestration of carbon dioxide"** means the injection of carbon dioxide, ~~usually from human activities like burning coal or oil,~~ into subsurface geologic formations to permanently prevent its release into the atmosphere ~~for a defined length of time.~~

Reason: Clarification in response to comments W-16, W-18 & W-24.

4. WAC 173-218-030 Definitions

**"Monitoring zone(s)"** means the geologic ~~layers~~formations, identified in the application for a geologic sequestration project, where chemical, physical and other characteristics are measured to establish the location, behavior and effects of the injected carbon dioxide in the subsurface and to detect leakage from the geologic containment system. At a minimum, a monitoring zone must be established beneath the ground surface but outside of the geologic containment system to detect leakage of injected CO<sub>2</sub> except where other monitoring is approved by the director.

Reason: Clarification in response to comments W-18, W-24 & W-25. Layers changed to geologic formations to include all potential geologic settings, in response to comment W-25.

5. WAC 173-218-115(1)(b)(i) geologic formation

The aquifer contains "naturally nonpotable ground water" as defined in WAC 173-200-020(18) and is beneath the lowermost geologic formation containing potable ground water within the vicinity of the geologic sequestration project area;



Reason: Clarification. Geologic was added before the word formation in response to comment W-25,

6. WAC 173-218-115(2)(c)(vi)(H) permit application

An evaluation of the potential displacement of in situ ~~water~~fluids and the potential impact on ground water resources, if any; and

Reason: Clarification in response to comment W-25

7. WAC 173-218-115(2)(c)(viii) permit application

A review of the data of public record for all wells within the geologic sequestration project boundaryarea which penetrate the geologic containment system including the primary and/or all other caprocks and those wells that penetrate these geologic ~~layers~~formations within one mile of the ~~boundary of the~~ geologic sequestration project boundaryarea, or any other distance deemed necessary by the department. This review shall determine if all abandoned wells have been plugged in a manner that prevents the movement of CO<sub>2</sub> or associated native fluids away from the geologic containment system;

Reason: Clarification in response to comment W-24. Layers changed to geologic formations to include all potential geologic settings, in response to comment W-25.

8. WAC 173-218-115(2)(c)(xi) permit application

The evaluation and data quality shall be sufficient to establish with a high degree of confidence that the geologic containment system has sufficient capacity, injectivity and other geologic characteristics to permanently sequester CO<sub>2</sub> ~~for the lifetime of the project.~~

Reason: Clarification removed “lifetime of the project” in response to comments W-1, W-3, W-4, W-10 & W-25.

9. WAC 173-218-115(2)(d) permit application

The predicted extent of the injected CO<sub>2</sub> plume ~~throughout the lifetime of the project~~ determined with modeling tools acceptable to the department ~~established modeling tools~~ that use all available geologic and reservoir engineering information, and the projected response and storage capacity of the geologic containment system. The assumptions used in the model and a discussion of the uncertainty associated with the estimate shall be clearly presented

Reason: Clarification of acceptable modeling in response to comments W-18 & W-24. Removed “lifetime of the project” in response to comments W-1, W-3, W-4, W-10 & W-25.

10. WAC 173-218-115(2)(m) permit application

A mitigation and remediation plan that identifies trigger thresholds and corrective actions to be taken prior to a containment system failure, if ground water quality in the monitoring zone or above is degraded, or if carbon dioxide is released to the atmosphere. The mitigation and remediation plan must conform to the standards set by WAC 173-218-115(8) and must be approved by the department before injection begins

Reason: Clarification in response to comment W-25.

11. WAC 173-218-115(3)(a) geologic sequestration well standards

Casing materials and cement must be designed and tested to withstand the reactive fluids and expected conditions encountered during ~~the lifetime of~~ the geologic sequestration project, including the post-closure period.

Reason: Removed “the lifetime of” in response to comments W-1, W-3, W-4, W-10, W-25, V-10.

12. WAC 173-218-115(3)(e) geologic sequestration well standards

Wells must be logged with appropriate geophysical methods which include ~~at a minimum~~: Cement bonding and evaluation logs, and casing inspection logs. In addition a standard suite of ~~“state-of-the-art”~~ wireline logs shall be run on each well to document physical properties of the well, the well integrity and any potential leakage points. ~~At a minimum~~ The wireline logging suite must include: Gamma ray, resistivity, temperature, formation pressure, both p- and v-sonic and neutron-density. The Department may approve alternate logging suites that provide equivalent information or allow the use of improved methods as new technologies are developed.

Reason: Clarification in response to comments W-18 & W-24.

13. WAC 173-218-115(4)(a)(i) Permit terms and conditions

That the geology, including geochemistry, of the site and all proposed plans developed for the permit application will:

Reason: Clarification in response to comment W-25.

14. WAC 173-218-115(4)(c) Permit terms and conditions

The permit shall include an injection pressure limitation and a maximum working pressure in the geologic containment system, calculated from information provided in the application, that assures that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone or caprock. In no case shall the injection pressure initiate fractures in the caprock or cause the movement of injected fluids or formation fluids into shallower aquifers. Controlled artificial fracturing of the injection zone of the geologic containment system may be allowed with a plan that has been approved by the department.

Reason: Clarification in response to comment W-25.

15. WAC 173-218-115(7)(a)(vii) financial assurance

Other financial instruments or performance security acceptable to the department.

Reason: In response to comment W-24 added this element allowing Ecology to review and approve other appropriate financial assurance mechanisms that currently may not be available.

**Chapter 173-407 WAC – Carbon Dioxide Mitigation Program,  
Greenhouse Gases Emissions Performance Standard and  
Sequestration Plans and Programs for Thermal Electric  
Generating Facilities**

1. WAC 173-407-090 Severability.

~~WAC 173-407-090 Severability. The provisions of this regulation are severable. If any provision is held invalid, the application of that provision to other circumstances and the remainder of the regulation will not be affected.~~

Reason: In the CR-102 Ecology moved this section and proposed it as a new section 400. The proper method was to decodify section 090 and recodify as section 400. This corrects the error.

2. WAC 173-407-110 Definitions to Part II.

The following definitions ~~are applicable for the purposes~~ apply when these terms are used in the provisions of Part II and Part III of this chapter.

Reason: The change “and Part III” is added in response to comments from W-5 and W-27 to clarify that the definitions also apply to Part III. Other clarifying changes were made by Ecology staff.

3. WAC 173-407-110 Definitions to Part II.

"Baseload electric generation" means electric generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least sixty percent. For a cogeneration facility, the sixty percent annual capacity factor applies to only the electrical production intended to be supplied for sale. For purposes of this rule, designed means originally specified by the design engineers for the power plant or generating units (such as simple cycle combustion turbines) installed at a power plant; and intended means allowed for by the current permits for the power plant, recognizing the capability of the installed equipment or intent of the owner or operator of the power plant.

Reason: The additional text related to design and intent is added in response to a request by commenter W-23 to clarify the meaning of this phrase. The clarification is in line with Ecology’s understanding of the language as used in the law and as we have used it within the proposed rule.

4. WAC 173-407-110 Definitions to Part II.

"Electric generating unit" (EGU) is the equipment required to convert the thermal energy in a fuel into electricity. In the case of a steam electric generation unit, ~~it is comprised~~ the EGU consists of all equipment ~~from involved in~~ involved in fuel delivery to the plant site, ~~through an~~ as well as individual boilers, any installed emission control equipment, and ~~ending with the generation of electricity in a dedicated~~ any steam turbine/generators dedicated to generating electricity. Where a steam turbine generator is supplied by two or more boiler units, all boilers contributing to that steam turbine/generator comprise a single electric generating unit. All combustion units/boilers/combined cycle turbines that produce steam for use in a single steam turbine/generator unit are part of the same electric generating unit.

Examples:

(a) For an integrated gasification combined cycle combustion turbine plant, the EGU consists ~~it is comprised~~ of all equipment ~~from involved in~~ involved in fuel delivery to the unit, as well as all equipment used in the fuel conversion and ~~through the~~ combustion processes, any installed emission control equipment, and all equipment used for ~~ending with~~ the generation of electricity.

(b) For a combined cycle natural gas fired combustion turbine, ~~it is~~ the EGU begins at the point where natural gas is delivered to the plant site

and ends with the generation of electricity from the combustion turbine and from steam produced and used on a steam turbine.

(c) An EGU also includes ~~F~~ fuel cells fueled by hydrogen produced (1) in a reformer utilizing nonrenewable fuels or (2) by a gasifier producing hydrogen from nonrenewable fuels.

Reason: Clarification by Ecology staff. The meaning and intent of the section is not changed.

5. WAC 173-407-110 Definitions to Part II.

"Renewable resources" means ~~a~~ electricity generation facilities fueled by renewable fuels plus electricity generation facilities fueled by:

- (a) Water;
- (b) Wind;
- (c) Solar energy;
- (d) Geothermal energy; or
- (e) Ocean thermal, wave, or tidal power.

Reason: Clarification by Ecology staff. The meaning and intent of the section is not changed.

6. WAC 173-407-110 Definitions to Part II.

"Electricity from unspecified sources" means electricity that is to be delivered in Washington pursuant to a long-term financial commitment entered into by an electric utility whose sources or origins of generation and expected average annual deliveries ~~of electricity~~ cannot be ascertained with reasonable certainty.

Reason: The additional text "entered into by an electrical utility" is added in response to a request by commenter W-23 to clarify that "electricity from unspecified sources" can apply to both a consumer-owned utility and an electrical company. While Ecology believes that the existing definition does not exclude investor owned utilities, we are adding the proposed language to avoid any uncertainty or confusion that may exist.

Other clarifying changes in this paragraph were made by Ecology staff.

7. WAC 173-407-110 Definitions to Part II

"Upgrade" means any modification made for the primary purpose of increasing the electric generation capacity of a baseload electric generation facility or unit. ~~Upgrade includes the installation, replacement or modification of equipment that increases the heat input or fuel usage as specified in existing generation air quality permits in effect as of July 22, 2007.~~ Upgrade does not include:

- (a) Routine or necessary maintenance;
- (b) Installation of emission control equipment;
- (c) Installation, replacement, or modification of equipment that improves the heat rate of the facility; or
- (d) Installation, replacement, or modification of equipment for the primary purpose of maintaining reliable generation output capability that does not increase the heat input or fuel usage as specified in existing generation air quality permits as of July 22, 2007, but may result in incidental increases in generation capacity.

Reason: The text is deleted in response to a suggestion by commenters W-8 and W-9 that the sentence is confusing and is not needed. Based on comments received, we modified the definition to have a structure more like that of the law. This change does not change the determination that a change that increases fuel input would trigger the need to comply with the emission performance standard.

8. WAC 173-407-120 Facilities subject to the greenhouse gases emissions performance standard for Part II.

- (1) This rule is applicable to all baseload electric generation facilities and units and baseload electric cogeneration facilities and units that:
  - (a) Are new and are permitted for construction and operation after June 30, 2008, that utilize fossil fuel or nonrenewable fuels for all or part of their fuel requirements.
  - (b) Are existing and that commence operation on or before June 30, 2008, when the facility or unit's owner or operator engages in an action listed in subsection (3) or (4) of this section.
- (2) This rule is not applicable to any baseload electric generation facility or unit or baseload electric cogeneration facility or unit that is designed and intended to utilize a renewable fuel to provide at least ninety percent of its total annual heat input.
- (3) A baseload electric generation facility or an individual electric generating unit at a baseload electric generation facility is required to meet the emissions performance standard in effect when:
  - (a) The new baseload electric generation facility or new electric generating unit at an existing baseload electric generation facility is issued a notice of construction approval or a site certification agreement;
  - (b) The existing facility or a unit is upgraded; or
  - (c) The existing facility or a unit is subject to a new long-term financial commitment.
- (4) A baseload electric cogeneration facility or unit is required to meet the emissions performance standard in effect when:
  - (a) The new baseload electric cogeneration facility or new baseload electric cogeneration unit is issued a notice of construction approval or a site certification agreement;

- (b) The existing facility or unit is upgraded; or
- (c) The existing facility or unit is subject to a change in ownership.
- (5) A new baseload electric generation facility or unit or new baseload electric cogeneration facility or unit becomes an existing baseload electric generation facility or unit or baseload electric cogeneration facility or unit the day it commences commercial operation.

Reason: The word “new” is added to WAC 173-407-120(5) as suggested by commenter W-9 to increase clarity of when an existing facility is required to meet the GHG EPS.

Commenter W-9 also noted that “cogeneration facilities and units” was used interchangeably with “baseload cogeneration facility or unit”. We have edited this section, as well as the remaining sections in the rule, to consistently use “baseload electric generation facility” and “baseload electric cogeneration facility”. We also edited the rule to ensure consistent use of “facility” and “unit”.

9. WAC 173-407-130 Emissions performance standard under Part II.

- (1) Beginning July 1, 2008, all baseload electric generation facilities and units and baseload electric cogeneration facilities and units subject to WAC 173-407-120 are not allowed to emit to the atmosphere ~~total~~ regulated greenhouse gases at a rate greater than one thousand one hundred pounds per megawatt-hour, annual average.

Reason: Commenter W-9 recommended adding “subject to WAC 173-407-120 to ensure that certain regulatory requirements in sections -130 to -240 apply to “all baseload electric generation and cogeneration facilities and units.” Commenter W-9 recommended changing “total” to “regulated” to be consistent with the definition of regulated greenhouse gases and noted that that “cogeneration facilities and units” was used interchangeably with “baseload cogeneration facility or unit”. Ecology agreed with these clarifications.

10. WAC 173-407-130 Emissions performance standard under Part II.

- (3) All baseload electric cogeneration facilities and units in operation on or before June 30, 2008, and operating exclusively on natural gas, waste gas, a combination of natural and waste gases, or a renewable fuel, are deemed to be in compliance with the emissions performance standard until the facility or unit is subject to a new ownership interest or is upgraded. For purposes of WAC 173-407-130, exclusive use of renewable fuel shall mean at least ninety percent of total annual heat input by a renewable fuel.

Reason: In response to Commenter W-7, new text in Subsection 3 clarifies that the reference to operating exclusively on renewable fuels in WAC 173-407-130(3) is intended to be consistent with WAC 173-407-120(2).

11. WAC 173-407-140 Calculating greenhouse gases emissions and determining compliance for baseload electric generation facilities under Part II.

WAC 173-407-140 Calculating greenhouse gases emissions and determining compliance for baseload electric generation facilities under Part II. (1) The owner or operator of a baseload electric generation facility or unit that must demonstrate compliance with the emissions performance standard in WAC 173-407-130(1) shall ~~demonstrate compliance annually, using the data identified below~~ collect the following data:

(a) Fuels and fuel feed stocks.

(i) All fuels and fuel feed stocks used to provide energy input to the baseload electric generation facility or unit.

(ii) Fuel usage and heat content, which are ~~is~~ to be monitored, and reported as directed by WAC 173-407-230.

(b) Electrical output in MWh as measured and recorded per WAC 173-407-230.

(c) Regulated greenhouse gases emissions from the baseload electric generation facility or unit as monitored, reported and calculated in WAC 173-407-230.

(d) Adjustments for use of renewable resources. ~~The owner or operator of a baseload electric generation facility or unit may adjust its greenhouse gases emissions to account for the usage of renewable resources.~~ If the owner or operator of a baseload electric generation facility or unit adjusts its greenhouse gases emissions to account for the use of renewable resources, greenhouse gases emissions are reduced based on the ratio of the annual heat input from all fuels and fuel feed stocks and the annual heat input from use of nonrenewable fuels and fuel feed stocks. Such adjustment will be based on records of fuel usage and representative heat contents approved by ecology.

(2) By January 31 of each year, the owner or operator of each baseload electric generation facility or unit subject to the monitoring and compliance demonstration requirements of this rule will:

(a) Use the data collected under subsection (1) above to c Calculate the pounds of regulated greenhouse gases emissions emitted per MWh of electricity produced during the prior calendar year by dividing the regulated greenhouse gases emissions by the total MWh produced in that year; and

(b) Submit that calculation and all supporting information to ecology.

Reason: Clarification by Ecology staff. The meaning and intent of the section is not changed. To be consistent, similar changes were made to WAC 173-



407-150, Calculating Greenhouse Gases Emissions and Determining Compliance for Baseload Electric Cogeneration Facilities Under Part II, but are not listed in the Responsiveness Summary.

12. WAC 173-407-200 Requirement for and timing of sequestration plan or sequestration program submittals under Part II.

(2) A sequestration program for a source that begins sequestration on or before the start of commercial operation is required to be submitted when:

Reason: Clarification by Ecology staff. This text was added to clarify when this section is applicable and to be consistent with the wording in the introduction in Subsection (1) of WAC 173-407-200.

13. WAC 173-407-220 Requirements for nongeologic permanent sequestration plans and sequestration programs under Part II.

In order to meet the emissions performance standard, all baseload electric generation facilities or individual units that are subject to this rule, and must use nongeologic sequestration of sequester greenhouse gases to meet the emissions performance standard, will submit sequestration plans or sequestration programs for approval to EFSEC or ecology, as appropriate.

(1) Sequestration plans and sequestration programs must include:

(a) Financial requirements. As a condition of plant operation, e~~E~~Each owner or operator of a baseload electric generation facility or unit or baseload electric cogeneration facility or unit utilizing ~~other~~ nongeologic sequestration as a method to comply with the emissions performance standard in WAC 173-407-130 is required to provide a letter of credit ~~as a condition of plant operation~~ sufficient to ensure successful implementation, closure, and post-closure activities identified in the sequestration plan or sequestration program, including construction and operation of necessary equipment, and any other significant costs.

...

(1)(a)(ii) Closure and post-closure financial assurances. The owner or operator shall establish a closure and a post-closure letter of credit to cover all closure and post-closure expenses respectively. The owner or operator must designate ecology or EFSEC, as appropriate, as the beneficiary to carry out the closure and post-closure activities. The value of the closure and post-closure accounts s shall cover all costs of closure and post-closure care identified in the closure and post-closure plan. The closure and post-closure cost estimates s shall be revised annually to include any changes in the sequestration project and to include cost changes due to inflation. The obligation to maintain the account for

closure and post-closure care survives the termination of any permits and the cessation of injection. The requirement to maintain the closure and post-closure accounts is enforceable regardless of whether the requirement is a specific condition of the permit.

(1)(b) The application for approval of a sequestration plan or sequestration program shall include (but is not limited to) the following:

...

(1)(c) In order to monitor the effectiveness of the implementation of the sequestration plan or sequestration program, the owner or operator shall submit a detailed monitoring plan that will ensure detection of ~~be able to detect~~ failure of the sequestration method to place the greenhouse gases into a sequestered state. The monitoring plan will be sufficient ~~to detect losses of sequestered greenhouse gases at a level of no greater than twenty percent of the leakage rate allowed in~~ to provide reasonable assurance that the project meets the definition of permanent sequestration. The monitoring shall continue for the longer of twenty years beyond ~~either~~ the end of placement of the greenhouse gases into a sequestration containment system, or twenty years beyond the date upon which it is determined that all of the greenhouse gases ~~has~~ have achieved a state at which ~~it is~~ they are now stably sequestered in that environment.

(1)(d) If the sequestration plan or sequestration program fails to sequester greenhouse gases as provided in the plan or program, the owner or operator of the baseload electric generation facility or unit or baseload electric cogeneration facility or unit is no longer in compliance with the emissions performance standard.

(2) **Public notice and comment.** Ecology must provide public notice and a public comment period before approving or denying any sequestration plan or sequestration program ~~plan~~.

(a) Public notice. Public notice shall be made only after all information required by the permitting authority has been submitted and after applicable preliminary determinations, if any, have been made. The applicant or other initiator of the action must pay the cost of providing public notice. Public notice shall include analyses of the effects on the local, state and global environment in the case of failure of the sequestration plan or sequestration program ~~plan~~. The sequestration plan or sequestration program must be available for public inspection in at least one location near the proposed project.

(2)(b)(i) The public comment period must be at least thirty days long or may be longer as specified in the public notice.

Reasons: Changes in the first paragraph WAC 173-407-220 and in Subsection (1)(a) were made by Ecology staff to clarify that this section applies only to nongeologic sequestration, as described in the section title and that this section applies to both sequestration plans and sequestration programs. “Baseload electric” is added in response to commenter W-9.

Clarifying changes in (1)(a)(ii) are made in response to suggestions from commenter W-25.

Several commenters expressed concern about the use of “twenty percent” in WAC 173-407-220(1)(c). Ecology agrees that this leak detection rate should be determined at the time of the permit issuance and is deleting the reference to twenty percent and adding the “reasonable assurance” text. The other text changes are made to clarify poorly written text in the proposed rule.

Clarification by Ecology staff in (2)(b)(i) are to make it clear that the minimum length of a comment period is 30 days but that a longer comment period may be specified in the public notice.

Ecology staff added references to sequestration plan and or sequestration program throughout this section, as appropriate, to clarify that this section applies to both sequestration plans and sequestration programs.

#### 14. WAC 173-407-230 Emissions and electrical production monitoring, recordkeeping and reporting requirements under Part II.

(1)(b) Useful thermal energy output: ~~Determine~~ Quantity of energy supplied to nonelectrical production uses ~~through~~ determined by monitoring ~~of~~ both the energy supplied and the unused energy returned by the thermal energy user or uses. The required monitoring ~~This~~ can be accomplished through:

(i) Measurement of the mass, pressure, and temperature of the supply and return streams ~~of the mass pressure and temperature~~ of the steam or thermal fluid; or

...

(c) Regulated greenhouse gases emissions.

(i) The regulated greenhouse gases emissions are the emissions of regulated greenhouse gases from the main plant exhaust stack and any bypass stacks or flares. For baseload electric generation facilities or units and baseload electric cogeneration facilities or units utilizing CO<sub>2</sub> controls and sequestration to comply with the greenhouse gases emissions performance standard, direct and fugitive CO<sub>2</sub> emissions from the CO<sub>2</sub> separation and compression process are included.

(ii) Carbon dioxide (CO<sub>2</sub>).

(A) For baseload electric generation facilities or units and baseload electric cogeneration facilities or units subject to WAC 173-407-120, producing 25 MW or more of electricity, CO<sub>2</sub> emissions will be monitored by a continuous emission monitoring system meeting the requirements of 40 CFR ~~Part Sections~~ 75.10, and 75.13 and 40 CFR Part 75 Appendix F. If allowed by the requirements of 40 CFR Part 72, a facility may estimate CO<sub>2</sub> emissions through fuel carbon content monitoring and methods meeting the requirements of 40 CFR ~~Part Sections~~ 75.10 and 75.13 and 40 CFR Part 75 Appendix G.

(B) For baseload electric generation facilities or units and baseload electric cogeneration facilities or units subject to WAC 173-407-120 producing less than 25 MW of electricity, the owner or operator may either utilize a continuous emission monitoring system meeting the requirements of 40 CFR ~~Part Sections~~ 75.10, and 75.13 and 40 CFR Part 75 Appendix F, or through use fuel carbon content monitoring and methods meeting the requirements of 40 CFR ~~Part Sections~~ 75.10, and 75.13 and 40 CFR Part 75 Appendix G.

(C) When the monitoring data from a continuous emission monitoring system does not meet the completeness requirements of 40 CFR Part 75, the baseload electric generation facility operator or operator will substitute data according to the process in 40 CFR Part 75.

(D) Continuous emission monitors for CO<sub>2</sub> will be installed at a location meeting the requirements of 40 CFR Part 75, Appendix A. The CO<sub>2</sub> and flow monitoring equipment must meet the quality control and quality assurance requirements of 40 CFR Part 75, Appendix B.

(iii) Nitrous oxide (N<sub>2</sub>O).

(A) For baseload electric generation facilities or units or baseload electric cogeneration facilities or units subject to WAC 173-407-120 producing 25 MW or more of electricity, N<sub>2</sub>O emissions shall be determined as follows:

(I) For the first year of operation, N<sub>2</sub>O emissions are estimated by use of emission factors as published by the Environmental Protection Agency, the federal Department of Energy's Energy Information Agency, or other authoritative source as approved by ecology for use by the facility.

(II) For succeeding years, N<sub>2</sub>O emissions will be estimated through use of generating unit specific emission factors derived through use of emissions testing using ecology or Environmental Protection Agency approved methods. The emission factor shall be derived through testing N<sub>2</sub>O emissions from the stack at varying loads and through at least four separate test periods spaced evenly throughout the first year of commercial operation.

(B) For baseload electric generation facilities or units or baseload electric cogeneration facilities or units subject to WAC 173-407-120 producing less than 25 MW of electricity, the annual N<sub>2</sub>O emissions will be estimated by use of emission factors as published by the Environmental Protection Agency, the federal Department of Energy's Energy Information Agency, or other authoritative source as approved by ecology for use by the facility.

Reason: Clarification by Ecology staff. The meaning and intent of this section was not changed. Similar edits were made to subsection (1)(c)(iv) and (v), but are not repeated here.

15.WAC 173-407-300 Procedures for determining the emissions performance standard of a long-term financial commitment and addressing electricity from unspecified sources and specified sources under Part II.

(2) For each year of a long-term financial commitment for electric power, the regulated greenhouse gases emissions from specified and unspecified sources of power are not to exceed the emissions performance standard in WAC 173-407-130(1), in effect on the date the long-term contract is executed. The emissions performance standard for a long-term financial commitment for electricity that includes electricity from specified and unspecified sources is calculated using a time-weighted average of all sources of generation and emissions in the years in which they are contributing electricity and emissions in the commitment. Each source's proportional contribution to emissions per each MWh delivered under the contract is added together and summed for each year and divided by the number of years in the term of the commitment.

(3) An extension of an existing long-term financial commitment is treated as a new commitment, not an extension of an existing commitment.

(4) Annual and lifetime calculations of greenhouse gases emissions.

(a) The ~~time-weighted~~ annual average emissions shall be calculated, for every year of the contract, using the formula in subsection (5) of this section. The calculation of the pounds of greenhouse gases per megawatt-hour is based upon the delivered electricity, including the portion from specified and unspecified sources, of the total portfolio for the year for which the calculation is being made.

(b) The average greenhouse gases emissions per MWh of the power supply portfolio over the life of the long-term financial commitment is compared to the emissions performance standard. The calculation of the pounds of greenhouse gases per MWh is based on the expected annual delivery contracted or expected to be supplied by each specified and unspecified source's portion of the total portfolio of electricity to be provided under the contract for the year for which the calculation is being made.

(c) Default values adopted in this procedure shall be used for each source unless actual emissions are known or specified by the manufacturer. A default greenhouse gases emissions value of an average pulverized coal plant per WAC 173-407-300 (5)(b) shall be used for unspecified sources in the procedure.

(5) The ~~time-weighted~~ annual average calculation shall be performed using the regulated greenhouse gases emissions factors as follows:

(a) For a specified source, utilize the manufacturer's emissions specification or the measured emission rate for a specified generator. When there is no available information on greenhouse gases emissions from a specified source, utilize the following:

(i) Combined cycle combustion turbines that begin operation after July 1, 2008 = 1,100 lbs/MWh or as updated by rule in 2012 and every five years thereafter.

(ii) Steam turbines using pulverized coal = 2,600 lbs/MWh minus the amount of greenhouse gases permanently sequestered by the facility on an annual basis divided by the MWhs generated that year.

(iii) Integrated gasification combined cycle turbines = 1,800 lbs/MWh minus the amount of greenhouse gases permanently sequestered by the facility on an annual basis divided by the MWhs generated that year.

(iv) Simple cycle combustion turbines = 1,800 lbs/MWh minus the amount of greenhouse gases permanently sequestered by the facility on an annual basis divided by the MWhs generated that year.

(v) Combined cycle combustion turbines that begin operation before July 1, 2008 = 1,100 lbs/MWh.

(b) Electricity from unspecified sources = 2,600 lbs/MWh.

(c) Renewable resources = 0 lbs/MWh.

#### Example Calculation

$$EPS = \frac{(F_1 MWh \times T_1) + (F_2 MWh \times T_2) + (F_3 MWh \times T_3) + \dots + (F_n MWh \times T_n)}{Total\ Hours}$$

$$AE = \frac{(F1 \times MWh1) + (F2 \times MWh2) + (F3 \times MWh3) + \dots + (Fn \times MWhn)}{Total\ MWh}$$

where:

<u>AE</u>	=	<u>Average Emissions in lb/MWh</u>
<u>EPS</u>	=	<u>Emissions performance standard</u>
F	=	<u>Regulated greenhouse gases emissions factor in lb/MWh</u>
	=	<u>Regulated greenhouse gases emissions factor in lb/MWh</u>
<u>MWh</u>	=	<u>Total MWh purchased or generated by the utility's own generation capacity during the year</u>
T	=	<u>Percentage of time used for that source</u>
<u>Total Hours</u>	=	<u>Total MWh from all source types for that year</u>
<u>MWh</u>	=	<u>hours that power was available to customers in the year (8,760 or less)</u>

Reason: Commenters W-5, W-20, W-21, W-22 and W-27 noted inconsistencies within the formula and proposed revisions to the formula as well as minor text changes to be consistent. In response to these comments, Ecology revised the formula to be mathematically consistent with the text in WAC 173-407-300(4). Our revision will result in the same lb/MWh value as the negotiated calculation that came out of the stakeholder process, and was used for the economic analysis. The change in the formula results in no large scale changes to terms elsewhere in this section of the rule.

16.WAC 173-407-320 Relationship of ecology and the governing boards of consumer-owned utilities under Part II.

(1) RCW 80.80.070(2) requires the governing boards of consumer-owned utilities to "review and make a determination on any long-term financial commitment by the utility, pursuant to this chapter and after consultation with the department, to determine whether the baseload electric generation to be supplied under that long-term financial commitment complies with the greenhouse gases emissions performance standard established under RCW 80.80.040." During this consultation process, ecology shall ~~ensure that~~ assist the governing boards ~~are utilizing~~ with the utilization of the method in WAC 173-407-300 to determine whether the long-term financial commitment for baseload electric generation meets the emissions performance standard. Ecology's assistance will be limited to that assistance necessary for the board to interpret, clarify or otherwise determine that the proposed long-term financial commitment for baseload electric generation will comply with the emissions performance standard.

Reason: Commenter W-21 recommended these changes to clarify that the governing board ensures compliance with the emissions performance standard. Ecology agrees that the suggested changes clarify the intent.

### ***III. Summarize Comments – Responsiveness Summary***

- ◆ **Summarize all comments received regarding the proposed rule and respond to comments by category or subject matter. You must indicate how the final rule reflects agency consideration of the comments or why it fails to do so (RCW 34.05.325(6)(a)(iii)):**

Comments received on the proposed rule are shown below. They are organized by rule section. There is a separate index table for written comments and verbal testimony received. You can find the responses to each comment by going to the page numbers referenced in the tables.

<b>Written Comments</b>			
<b>Comment #</b>	<b>Name</b>	<b>Organization</b>	<b>Page #</b>
W-1	Sandra Cannon		52, 53, 72, 80, 89, 93, 110, 112, 117, 120
W-2	Josh Johnson		73
W-3	Christopher Howard		52, 54, 72, 80, 89, 93, 110, 112, 117, 118, 120
W-4	Scott Parker DDS		20, 52, 54, 73, 75, 76, 80, 89, 93, 108, 110, 112, 117, 120
W-5	Carole J. Washburn	Washington Utilities and Transportation Commission	85, 127, 129
W-6 (also see V-5)	Norm Osterman		54, 73, 93, 99, 110, 112, 120
W-7	Gary Sitzman	Kimberly-Clark Corp.	99, 102, 103, 104, 105
W-8	Michael Tompkins	Georgia-Pacific	100, 102, 103, 104, 113
W-9	Ken Johnson	Weyerhaeuser	86, 93, 97, 99, 101, 102, 104, 105, 106, 107, 113
W-10	Dan Clark	Coal Plant Working Group	52, 54, 72, 80, 89, 93, 110, 112, 117, 120
W-11	Tom Wood	United Power	81, 114
W-12	Steve Crookshank	American Petroleum Institute (API)	21, 22, 43, 63, 64
W-13	April Westby	Spokane Clean Air Agency	77, 100, 108
W-14 (also see V-4)	Doug Morton	Blue Mountain Audubon Society	22, 54, 117, 118, 121
W-15	Dan Clark	Walla Walla 2020	54, 89, 93, 110, 112, 117
W-16	Fred Eames	CCS Alliance	23, 24, 36, 40, 43, 46, 58, 61, 64, 66, 68
W-17	Don Brookhyser	Cogeneration Coalition of Washington	77, 78
W-18	Michaeleen Mason	Western States Petroleum Association (WSPA)	24, 25, 32, 36, 38, 40, 42, 44, 46, 50, 52, 55, 58, 64
W-19	Brad Riordan		63, 75, 89, 108, 112, 117, 121, 131
W-20	Mark Anderson	CTED	26, 79, 81, 119, 121, 129
W-21	Kent Lopez	Wa. Rural Electric Cooperative Association	129, 130
W-22	Michael Early	Industrial Customers of NW Utilities	128, 129
W-23	Tom DeBoer	Puget Sound Energy	87, 88, 92, 96, 98, 127
W-24	Robert VanVoorhees and Sarah Wade		26, 34, 37, 38, 39, 40, 42, 44, 47, 50, 53, 55, 59, 70
W-25	Carrie Dolwick		27, 35, 38, 39, 41, 42, 48, 49, 50,



<b>Written Comments</b>			
<b>Comment #</b>	<b>Name</b>	<b>Organization</b>	<b>Page #</b>
			51, 55, 56, 57, 61, 65, 67, 68, 70, 71, 80, 89, 94, 98, 110, 112, 117, 118, 119, 122, 129, 131, 132
W-26	Sally Benson/Peter Cook		95
W-27	Dave Warren	Wa. PUD Association	85, 128, 129, 130, 132
W-28	Julian Powers		28, 73, 123, 133

<b>Verbal Testimony</b>			
<b>Comment #</b>	<b>Name</b>	<b>Organization</b>	<b>Page #</b>
<b>Lacey Hearing 4/8/08</b>			
V-1	Carrie Dolwick	NW Energy Coalition	123
V-2	Jessica Coven	Climate Solutions	29, 94, 117
V-3	JP Kemmick	Cascade Climate Network	29, 73
<b>Spokane Hearing 4/10/08</b>			
V-4	Doug Morton	Blue Mountain Audubon Society	30, 55, 93, 117, 118, 124
V-5	Norm Osterman	Coal Plant Working Group	55, 93, 110, 112, 117, 124
V-6	Jenna Bicknell		84, 93, 117
V-7	Brad Riordan		31, 75, 89, 93, 112, 117, 124
V-8	Bart Haggin		74, 79
V-9	Buell Hollister		31
V-10	Kitty Klitzke	Futurewise and The Lands Council	31, 48, 58, 95, 111, 125
V-11	John Osborn	Sierra Club – Upper Columbia River Group	31, 32, 74, 80, 94

**Chapter 173-218 WAC – Underground Injection Control Program**

**GENERAL COMMENTS:**

**Comment W-4**

These new sequestration testing standards should be meaningful to actually prove that it will be environmentally safe and permanent. This means that actual scrubbed and captured CO2 from an existing coal plant should be used for testing rather than pure, food-grade CO2. This scrubbed and captured CO2 would have more realistic levels of contaminants that would affect the properties of the chemical reaction with basalt and therefore would provide a much more realistic and accurate sequestration test. Pure gases react differently than contaminated gases. Using a pure gas to prove a theory and then switching to a

contaminated gas is a classic "bait and switch" technique. It is illegal to "bait and switch" in business and shouldn't be allowed for sequestration either.

This scrubbed and captured CO<sub>2</sub> should be required for the sequestration testing and the equivalent of an entire days production volume should be required to be injected underground everyday for a minimum of 5 days in a row. This would simulate the efficacy of true production levels of sequestration ....anything less is meaningless. To assure there are no latent problems, the DOE must monitor these production level tests for a year before allowing any plant construction. This would add credibility to the testing and hopefully forestall a possible environmental nightmare for DOE.

*Ecology Response:*

Ecology will work with project operators to develop appropriate pilot studies that will provide data that we can use to predict the future success of a full scale project. Pilot studies, by necessity, require some conditions that are not identical to an actual operating facility. We hope that a pilot study will be completed for every site prior to the large capital investment of building an actual power plant, so there must be some factors that will not be quite the same as plant in full operation. With a scientifically sound pilot study, we will be able to model the behavior and effects that we can expect to encounter during full scale operation.

Ecology does not currently have an application for any pilot studies or full scale power facilities using geologic sequestration. When a pilot study or facility does apply for a permit we will work closely with the operator to ensure that the test provides the information that Ecology will need to issue a permit. Water quality permits require public notice and comment. Interested parties will have the opportunity to provide input and suggestions on any pilot studies during the required public comment period.

**Comment W-12**

In early 2008, API participated in a multi-stakeholder workgroup to develop regulatory recommendations for the U.S. Environmental Protection Agency on geologic sequestration of CO<sub>2</sub>. The ad-hoc CO<sub>2</sub> Workgroup is a multi-stakeholder effort comprised of representatives from state UIC and oil and gas agencies, environmental non-governmental organizations (i.e. Ground Water Protection Council and Environmental Defense), oil and gas exploration, production and service companies, national laboratories, academia, and public power companies.

API encourages WDOE to consider these recommendations (attached to the email). In many cases the recommendations of the workgroup closely follow the language of the current CFR for the Underground Injection Control (UIC) program (40CFR 144,145, and 146). This was considered not only practical but advisable as it avoids the need to acquire additional authorities to implement a regulatory program and recognizes the existence of a framework for the

application of a regulatory scheme that has a nearly forty year record of demonstrated success.

API recognizes that the timeline for developing these amendments is driven by the legislative mandates. Nevertheless, API is concerned that by developing these rules before EPA releases its proposed rule this summer, the two sets of rules could be inconsistent and instead of facilitating the deployment of geologic storage, could actually deter it.

**AND**

**Comment W-12**

In closing, API encourages Washington DOE to work closely with EPA in developing the WDOE amendments to ensure consistency between the sets of regulations. This will help to foster a more certain regulatory environment which in turn will help facilitate the deployment of geologic sequestration activities.

**Ecology Response:**

Ecology has reviewed the API recommendations. The proposed Washington rules for Geologic Sequestration of Carbon Dioxide parallel many of the suggestions. In addition Ecology has borrowed from the concepts recommended by the Interstate Oil and Gas Compact Committee and US EPA's federal UIC regulations. There are also some key differences required by the laws of the State of Washington.

The Washington State Legislature directed Ecology to adopt rules for Geologic Sequestration by June 30, 2008. We hope to meet the deadline established in legislation. Ecology has provided USEPA with each of our drafts as the rules have been developed and attempted to get meaningful feedback and comments from the USEPA. USEPA has indicated that they will not be commenting on Washington's rules, so we must move forward without them. If there are conflicts between Washington's geologic sequestration rules and the so far unreleased federal rules, Ecology may amend the geologic sequestration rules, after USEPA has adopted their final rules. USEPA estimates that they will have final rules adopted no sooner than 2010.

**Comment W-14**

We are worried about the impact on our aquifers with the injection of greenhouse gasses into our subterranean basalt, We want to know for certain that, if storage does occur, it will be at 99% or more for at least a thousand years (i.e permanently). We want to be assured that monitoring will be performed by non industry sources and not just until the plant is terminated.

We are particularly concerned about the validity of sequestration as a science and not as an art. It must work 100% of the time. No loss of sequestered greenhouse gasses must be allowed to escape into the atmosphere. The science

of basalt sequestration is unproven. The current studies being considered by Battelle are very preliminary and the lead researcher Peter McGrail said repeatedly at a Port of Walla Walla meeting that his preliminary study can in no way be used to predict the successes or failures of coal plant sequestration. In other words we are years and many studies away from adopting this technology for prevention of atmospheric greenhouse emissions. We urge you to consider this and to require peer reviewed replicable studies before authorizing any future fossil fuel based energy production facilities. Currently industry involvement in our IGCC plant sequestration plant renders any data generated suspect. Who will be the final arbiter of the integrity of sequestration studies? Who will monitor the sequestration process and who will monitor the success of its long term permanence? As new technology evolves will current plants be required to adopt them immediately or will they be grandfathered into their formative levels at the time of licensing?

If sequestration is proven a viable safe and effective permanent repository of greenhouse gasses, they should be used initially on existing polluting plants to reduce their carbon footprints. Remember that SB 6001 was created to reduce our emissions, not encourage more.

*Ecology Response:*

The rules for the geologic sequestration of carbon dioxide include a requirement for permanent sequestration as directed by the Washington State Legislature. In addition these rules are focused upon protecting the quality of our ground water resources and aquifers. Ground water monitoring is required for any project to show that the Geologic Containment System is effectively sequestering any injected carbon dioxide. Monitoring in Washington's water quality permit program is completed by the industry. Ecology does spot checks and sometimes collects duplicate samples to detect any bias or falsification.

**Comment W-16**

The commenting members of the CCS Alliance recommend that the proposed amendments to Chapter 173-218 be modified to encourage deployment of CCS technologies. Some of the provisions proposed under the guise of protecting human health and the environment may in fact discourage such protection by discouraging CCS development.

ESSB 6001 on the whole will make it more difficult to build new fossil fuel-fired generation in the State of Washington, and may affect the value of existing fossil generation assets. It will discourage acts - e.g., upgrades that may increase power from existing units, or dispositions - that trigger the requirement that existing baseload meet the greenhouse gas emissions performance standard. We provide the comments below to make the State aware that especially given this context, it will need to be particularly sensitive to whether the CCS regulations promote capital formation and availability of risk management mechanisms for CCS projects. Those matters are not only important to

economic interests, but also to the State's interest in maintaining affordable and reliable electricity.

CCS is a technology that policy makers - including the U.S. Environmental Protection Agency and many in Congress - want to encourage. It is expensive, not vital to production of the commodity, and has a poorly understood risk profile. It is under consideration because it may provide societal benefit and play a critical role in meeting the ambitious goals set by the State of Washington to address climate change. As such, a regulatory scheme should promote its construction and safe operation and avoid discouraging it.

*Ecology Response:*

Ecology is required to follow the legislative direction provided in ESSB 6001. This comment is directed toward ESSB 6001. Ecology has considered this comment and concluded that it is outside of our regulatory authority.

**Comment W-16**

The CCS Alliance is concerned about potential liability for CO<sub>2</sub> storage developers, owners, operators, investors and others under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA) and similar State laws related to environmental damage or contamination.

Unless owners and operators know the limits on their liability, and investors and lenders can be assured of a return on their investment, the needed capital will not be mobilized and private insurance carriers will be unwilling to provide sufficient insurance coverage. The CCS Alliance therefore requests, to the extent that the Department of Ecology has the authority to do so, that it clarify that CERCLA and RCRA and similar State laws will not apply to CO<sub>2</sub> injections pursuant to the UIC program if the injections are done in compliance with the proposed regulations.

*Ecology Response:*

This comment suggests changing the state's liability laws. Changing the liability laws of Washington State is beyond the scope of Ecology's current legal authority.

**Comment W-18**

Carbon dioxide is the exclusive GHG addressed with no allowance for equivalencies to cover other GHGs. Consideration should be given to allowing the geologic sequestration of six of the specified greenhouse gases.

*Ecology Response:*

There is research and data available upon which to establish rules for the geologic sequestration of carbon dioxide. Ecology does not have sufficient scientific information to develop rules for the geologic sequestration of the other

gases at this time. Permanent Geologic Sequestration involves not just an injection reservoir, but also geochemical reactions that permanently sequester the injected material. Ecology may develop rules for the permanent geologic sequestration of other materials at some time in the future when adequate scientific data is available.

**Comment W-18**

In summary, although WSPA understands WDOE's desire to bring about the orderly implementation of geologic sequestration requirements, we believe that the current approach (i.e., the proposed amendments to WAC Section 173-218) will not achieve the desired result and will actually cause more problems than it solves. These proposed amendments will have a major impact on affected facilities — they are not merely "administrative" changes.

This rule amendment process is being unnecessarily rushed. WDOE should delay the final rule to allow for relevant federal standards to be better established and to fully understand the technical criteria associated with proposed greenhouse gas sequestration. WDOE's current proposal appears to borrow various sections from existing regulations (e.g., water discharge permits, old UIC regulations, etc.). Some sections and detailed requirements do not appear technically appropriate with respect to the proposed environmentally beneficial activities. As a result, the proposed rule has the potential to impede State and Federal objectives to reduce greenhouse gases in the atmosphere without necessarily providing additional protection of the environment.

The American Petroleum Institute ("API") recently participated in a multi-stakeholder workgroup to develop regulatory recommendations for the U.S. Environmental Protection Agency on geologic sequestration of CO<sub>2</sub>. The ad-hoc CO<sub>2</sub> Workgroup is a multi-stakeholder effort comprised of representatives from state UIC and oil and gas agencies, environmental non-governmental organizations (i.e. Ground Water Protection Council and Environmental Defense), oil and gas exploration, production and service companies, national laboratories, academia, and public power companies.

WSPA encourages WDOE to review and consider these recommendations before finalizing any State rule. In this way, WDOE can help facilitate greenhouse gas sequestration activities while protecting the environment and promoting consistency with other state and federal regulations.

**Ecology Response:**

The Washington State Legislature directed Ecology to adopt rules for Geologic Sequestration by June 30, 2008. We hope to meet the deadline established in legislation. Ecology has provided US EPA with each of our drafts as the rules have been developed and attempted to get meaningful feedback and comments from the US EPA. US EPA has indicated that they will not be commenting on Washington's rules, so we must move forward without them.

Ecology has reviewed the API recommendations. The proposed Washington rules for Geologic Sequestration of Carbon Dioxide parallel many of the suggestions. In addition Ecology has borrowed from the concepts recommended by the Interstate Oil and Gas Compact Committee and US EPA's Federal UIC regulations. There are also some key differences required by the laws of the State of Washington.

The comment suggests that Ecology delay our rules to promote consistency with other state and federal rules. There are no other state or federal rules directly addressing the geologic sequestration of carbon dioxide. There must be a first and the Washington State Legislature has directed that Washington will lead the way, so that other states and the federal government may follow. If there are conflicts between Washington's geologic sequestration rules and the so far unreleased federal rules, Ecology may amend the geologic sequestration rules, after USEPA has adopted their final rules. USEPA estimates that they will have final rules adopted no sooner than 2010.

**Comment W-20**

1. As said in our December, 2007 comments, we approve of the approach taken by Ecology to locate CO<sub>2</sub> sequestration requirement in the rule regulating UIC wells, and as far as we understand the requirements they appear technologically sophisticated and appropriate. We hope that Ecology received extensive comments from engineering experts who could speak to the technological details in ways we can not. We want appropriate protections in the rule, but are hoping the requirements are also reasonable and would allow actual sequestration should energy producers desire to develop resources that would require CO<sub>2</sub> capture and sequestration. We cannot say whether this is so.
2. It was difficult to read this rule in reference to drafts, because there have been many additions and rearrangements from what we saw last December. It would have been helpful to have a document that explained the changes: what was removed, added, and rearranged, and why.

**Ecology Response:**

Technical comments have been received from sources in scientific research, the oil and gas industry, the Department of Natural Resources, Ecology and others. Ecology has attempted to include these technical comments whenever possible. The legislature provided a very tight timeline for this rule development; unfortunately this timeline and Ecology's attempts to meet it, resulted in this commenter's feeling that it was difficult to follow along with the process.

**Comment W-24**

Carbon dioxide is the exclusive GHG addressed with no allowance for equivalencies to cover other GHGs. Consideration should be given to allowing the geologic sequestration of carbon from any of the six normally specified greenhouse gases.

Ecology Response:

There is research and data available upon which to establish rules for the geologic sequestration of carbon dioxide. Ecology does not have sufficient scientific information to develop rules for the geologic sequestration of the other gases. Permanent Geologic Sequestration involves not just an injection reservoir, but also geochemical reactions that permanently sequester the injected material. Ecology may develop rules for the permanent geologic sequestration of other materials at some time in the future when adequate scientific data is available.

**Comment W-25**

We commend Ecology on several key provisions that further the purposes of the legislation and provide for sound regulation of sequestration. We believe the suggestions below are not substantive but could be used to clarify the existing draft rules.

Specifically, although we later suggest a minor addition to the definition of caprock (to account for the fact that it should also prevent the migration of fluids other than CO<sub>2</sub>), we believe that the use of the term throughout the proposed rule is correct and in fact absolutely necessary. Our knowledge and experience in sequestration, as well as the vast majority of the literature, discussions and assumptions are based on injection in sedimentary rocks with low permeability caprocks acting as seals and trapping the CO<sub>2</sub>, alongside other mechanisms like residual trapping. Geologic sequestration without a caprock that relies on other mechanisms such as mineralization or adsorption is no more than an experimental area of research at the moment, and is entirely likely to remain so for years to come. The volumes that have been "injected" in such schemes (coal seams, basalts) are tiny compared to the multiple millions of tons that are injected worldwide each year for sequestration and/or EOR. We believe it would be inappropriate for the state to rely on such methods to reduce power plant emissions. We support further research, but sequestration should be based on tried and tested methods, and regulated accordingly. Injecting CO<sub>2</sub> underground and hoping for the best is not appropriate. The caprock concept is used throughout the rule in establishing containment, monitoring and assurance. Omitting it would constitute a major and substantive change in the structure of the rule.

The rule also correctly calls for the following two crucial plans and programs to be developed and approved by the department prior to injection: a monitoring program/plan, and a mitigation & remediation plan. These are crucial, workable and prudent provisions that encourage best practices, good site selection, incentivize prevention over remediation, and are in both the developers' and the public interest. We strongly support the provisions as drafted by the department and urge for the careful balance that the current wording strikes to be maintained.



Similarly, the approach of not defining the post-closure period of as a set number of years is entirely justified. No two sites or projects are likely to be the same, and the end of the post-closure period should be based on measured and verified project performance, not an arbitrary figure. Only by examining the specifics of an injection operation and by establishing confidence in the behavior of the CO2 plume and its state of trapping should the end of the post-closure period be signaled. We therefore stand behind the provision as drafted and urge that it be preserved. Likewise, the financial assurance provisions are absolutely necessary (we suggest a few minor modifications) to incentivize responsible behavior and to ensure that the state and the taxpayers are not left with liabilities from improperly manages sites. These provisions are integral to the administration and enforcement of the regulations.

Additionally, no concerns against all the above provisions were raised in a substantial way during the stakeholder committee meetings. Changing these provisions now would constitute a substantive change to the proposed rule - not a minor change - as it would alter the intent, philosophy and also necessitate re-drafting in other parts of the rule in order to counterbalance and accommodate the changes, essentially causing the thread to unravel on what were provisions that enjoyed reasonable consensus during the stakeholder meetings. We therefore strongly urge Ecology to preserve its thoughtful wording and provisions on the above key topics.

We also have concerns about the use of the term AKART as referenced in three different areas relating to how other contaminants will be treated. We will address those in the three subsections below.

*Ecology Response:*

Thank you for the support. The specific comments referenced have been addressed in the appropriate specific comments section.

***Comment W-28***

(2) Sequestration had been addressed by both Norway (put CO2 at the bottom of the sea) and Australia (put CO2 in very deep mines which are no longer active). Both gave up on so sequestering CO2 years ago, as I understand, although it was technically possible with some reservations but was not justified economically or environmentally. Some US experts have predicted that a workable, low risk, financially acceptable system is at least a decade off. Therefore, it sounds to me like you are laying the groundwork to grant waivers for a decade or more. If true, this is ABSOLUTELY NOT a responsible position.

*Ecology response:*

The Washington State Legislature directed Ecology to develop rules for the permanent sequestration of carbon dioxide. Permits for the geologic sequestration projects may be issued as soon as these rules become effective.

Ecology plans to meet the requirements for greenhouse gas emissions provided in legislation.

**Comment V-2**

This few meeting concerns on behalf of ourselves and the Natural Resources Defense Council with the geologic sequestration and we believe that a limit to the concentrations or percentage of contaminants which is allowed to be injected with CO<sub>2</sub> should be set along or instead of AKART. We believe that thorough regulation is necessary at this time because of the potential risks to human health and species. Injected CO<sub>2</sub> and any impurities it may contain have the potential to endanger or adversely affect human health. Additionally, it is essential that commercial carbon sequestration projects in Washington follow established best practices and not be experimental in nature if the technology is to gain public trust and contribute meaningfully to mitigating greenhouse gas emissions at scale. We also believe detailed site characterization is necessary with the high level of uncertainty of the technology on a commercial scale in Washington's unique and complex geology. Finally we see that throughout the rules, the term "lifetime of the project" is used several times but is not defined and we suggest that the "lifetime of the project" should be defined as when a closure certificate is granted.

**Ecology response:**

Washington State statute, *Water Pollution Control* in RCW 90.48.010, requires the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state. Ecology has included this legislative requirement in all water quality regulations and refers to it as AKART. AKART is required for all permits that authorize discharges to the waters of the state, including underground waters. Setting numeric limits for contaminants would have to be done for each individual contaminant, based upon its chemical properties, environmental risks and available treatment technologies. It is not possible to identify every possible contaminant or to set specific numeric limits for them all. AKART is the legislatively set standard for water quality protection in Washington. By completing an AKART analysis as part of the permitting process an operator will be required to address each of the contaminant expected for their individual sequestration project. Ecology will include appropriate requirements to address any contaminants in the permit for a project.

Many have commented that the phrase "lifetime of the project" is unclear, confusing and may be inconsistently used. "Lifetime of the project" has been removed throughout the final rule.

**Comment V-3**

As rules and regulations for sequestration are finalized, I want to remind you that first in point there is no such thing as clean coal. Clean coal has guarded its erroneous name for its unfounded claims that the carbons emitted from such

plants can be buried deep within the ground and sequestered from entering our atmosphere. This technology is still unproven and financially unviable. Besides those facts, the environmentally degrading way in which coal is extracted from this earth is ignored and the quality of life of the individuals impacted by this form of energy production is disregarded. Coal acquisition is one of the most destructive processes we currently use to fulfill our energy consumption and involves blowing up entire mountain ranges, digging up massive swaths of land, and destroying fragile eco systems all while harming the lives of the local residents.

*Ecology Response:*

The Washington State Legislature directed that Ecology develop rules for the Geologic Sequestration of Carbon Dioxide. The comments appear to be outside of the scope of this rule.

**Comment V-4**

The science of basalt sequestration is unproven. The current studies being considered by Battelle are very preliminary and the lead researcher, Peter McGrail said repeatedly at a Port of Walla Walla meeting that his preliminary study can in no way be used to predict the successes or failures of coal plant sequestration. In other words, we are years and many studies away from adopting this technology for prevention of atmospheric greenhouse emissions. We urge you to consider this and to require peer review replicable studies before authorizing any future fossil fuel based energy production facilities. Currently industry involvement in our IGCC plant sequestration plant renders any data generated suspect.

Who will be the final arbiter of the integrity of sequestration studies? Who will monitor the sequestration process, and who will monitor the success of its long-term permanence? As new technology evolves, will current plants be required to adopt them immediately, and will they be grandfathered into their formative, in at their formative levels at the time of licensing. If sequestration is proven a viable, safe and effective permanent repository of greenhouse gases, it should be used initially on existing polluting plants to reduce their carbon footprints. Remember that SB 6001 was created to reduce our emissions, not encourage more.

*Ecology Response:*

The rules for the geologic sequestration of carbon dioxide include a requirement for permanent sequestration as directed by the Washington State Legislature. In addition these rules are focused upon protecting the quality of our ground water resources and aquifers. Ground water monitoring is required for any project to show that the Geologic Containment System is effectively sequestering any injected carbon dioxide. Monitoring in Washington's water quality permit program is completed by the industry. Ecology does spot checks and sometimes collects duplicate samples to detect any bias or falsification.

**Comment V-7**

Definition of Permanent Sequestration and Lifetime of Project versus Closure Certificate:

Permanent is an ambiguous word open to interpretation constantly. Please change the language in WAC 173-218-115 where the phrase “for a lifetime of the project” is used to read “a thousand years for the containment and sequestration of greenhouse gases the methods employed must meet approved standards to contain at least 99 percent of greenhouse gases for at least 1,000 years.” The term lifetime of the project is not defined in the above and should be defined as “when a closure certificate is granted.”

**Ecology Response:**

The Washington State Legislature required Ecology to develop rules for permanent sequestration. Many have commented that the phrase “lifetime of the project” is unclear, confusing and may be inconsistently used. “Lifetime of the project” has been removed throughout the final rule.

**Comment V-9**

What assurances that this sequestration is going to be reliable, that this carbon dioxide is going to be secured?

**Ecology Response:**

Permits must be for permanent sequestration. Performance monitoring will be required to verify that the injected CO<sub>2</sub> does not migrate out of the geologic containment system.

**Comment V-10**

We are in no way trying to endorse the idea of carbon sequestration. We don't feel that it has been proven. It is definitely an “if.” But, considering that climate change is a huge crisis, we do want to say that we agree that developing rules for sequestration of carbon dioxide is a very important way to ensure efforts to sequester greenhouse gas emissions are done in a safe and permanent way. And, that the intent of the law was not to create rules so strict, (I'm talking about 6001 here, sorry about that) that it would outlaw carbon sequestration if and when it becomes safe and reliable and technically feasible.

**Ecology Response:**

Ecology has developed rules for permitting the geologic sequestration of carbon dioxide in a way that protects the environment, including the protection of the quality of our ground water resources.

**Comment V-11**

I would like to make several points. The first is the paucity of the science as it relates to sequestration. The, I think when we make critical decisions, then we need to have the adequate scientific basis. I happen to work as a hospitalist at the Veteran's Hospital where I have been for 22 years. And, not unlike in the

caring for patients, when we make decisions that affect eco-systems and communities, we need to have a solid base as a science for proceeding forward in developing options and implementing them. My concern is that in the science of trying to sequester pollutants in deep aquifer is, we would be basically be moving forward without a solid basis.

A second issue in that has become clear and the Sierra Club and challenge to water rights as it relates to Washington State University and the consolidation of water rights, the characterization of aquifers is challenging and so it is not only just a matter of the science of polluting, or placing pollutants in deep aquifers, it is also being able to adequately characterize those aquifers. In the absence of adequate science, I think it is incumbent upon governments which have a moral duty to protect the common good, to adhere to the precautionary principle.

Ecology Response:

The Washington State Legislature required Ecology to develop rules for permanent sequestration. Ecology has developed rules to allow the geologic sequestration of carbon dioxide in a way that protects the environment, including the quality of our ground water resources.

**Comment V-11**

I would be concerned that we need to develop regulations that adequately protect the public and the public purse, and assure that liability lies with the polluting industry.

Ecology Response:

The Washington State Legislature required Ecology to develop rules for permanent sequestration. Ecology has developed rules to allow the geologic sequestration of carbon dioxide in a way that protects the environment, including the quality of our ground water resources. Comments have been received suggesting that Ecology should limit industry's liability or provide some liability pool. Ecology does not have the authority to change or limit the liability laws of the State

**SECTION 030 Definitions:**

**Definition of "Caprock"**

**Comment W-18**

1. The proposed rule contains a definition of "caprock" which is used in conjunction with "geologic containment system", although the definition of that term does not use the term caprock, but refers instead to "geologic layers." "Caprock" is used once in the IOGCC Model General Rules and Regulations, but is not defined in that document. The IOGCC Model Rules call for the evaluation of the CO2 Storage Project application to include: "A geologic and hydrogeologic evaluation of the GSU, including an evaluation of all existing information on all geologic strata overlying the GSU including the immediate

caprock containment characteristics and all designated subsurface monitoring zones."

The WDOE definition of "caprock" might be interpreted to require the presence of a caprock in the "geologic containment system" with the capability to "prevent the migration of injected carbon dioxide out of the geologic containment system."

By contrast, the UIC program uses the term "confining zone," which is defined to mean "a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone." In addition the definition of the confining zone refers to "capable of limiting fluid movement above an injection zone."

To avoid confusion, WDOE should drop the term from its proposed rule and rely on the definition of "geologic containment system." Indeed, the provision in which caprock appears, WAC 173-218-115, is potentially confusing as written. This provision would require a permit applicant to provide:

An evaluation of all existing information on all geologic strata overlying the geologic containment system including the immediate caprock containment characteristics as well as those of other caprocks if included in the containment system and all designated subsurface monitoring zones.

This language leaves some doubt about whether the caprock(s) referenced is intended to be part of the containment system or an additional requirement. We understand that the intent is to have one or more caprocks included within the containment system. EPA's UIC program provisions use the terms "confining zone" and "confining bed" rather than containment system and caprock to address essentially the same types of requirements.

*Confining bed* means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

*Confining zone* means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.

The recommendation should be for WDOE to either adopt the UIC program terminology or define "caprock" as:

"Caprock" means geologic ~~confining~~ layer(s) that has sufficiently low permeability and lateral continuity to ~~prevent~~ **limit** the migration of injected carbon dioxide ~~out of~~ **within** the geologic containment system.

**AND**

**Comment W-24**

The proposed UIC rule contains a definition of "caprock" which is used in conjunction with "geologic containment system", although the definition of that term does not use the term caprock, but refers instead to "geologic layers." "Caprock" is used once in the IOGCC Model General Rules and Regulations (September 2007), but is not defined in that document. The IOGCC Model Rules call for the evaluation of the CO<sub>2</sub> Storage Project application to include: "A geologic and hydrogeologic evaluation of the **GSU**, including an evaluation of all existing information on all geologic strata overlying the GSU including the immediate caprock containment characteristics and all designated subsurface monitoring zones." The Department's proposed definition of "caprock" might be interpreted to require the presence of a caprock in the "geologic containment system" with the capability to "prevent the migration of injected carbon dioxide out of the geologic containment system." By contrast, the UIC program uses the term "confining zone," which is defined to mean "a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone."

To avoid confusion, the Department should be considering dropping the term "caprock" from its proposed rule and rely on the definition of "geologic containment system." Indeed, the provision in which caprock appears, section WAC 173-218-115(2)(c)(iii)(A), is potentially confusing as written. That provision would require a permit applicant to provide:

An evaluation of all existing information on all geologic strata overlying the geologic containment system including the immediate caprock containment characteristics as well as those of other caprocks if included in the containment system and all designated subsurface monitoring zones.

This language leaves some doubt about whether it intends the referenced caprock(s) to be part of the containment system or an additional requirement. We understand that the intent is to have one or more caprocks included within the containment system. EPA's UIC program provisions use the terms "confining zone" and "confining bed" rather than containment system and caprock to address essentially the same types of requirements.

*Confining* means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

*Confining zone* means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.

We recommend that the Department either adopt the UIC program terminology or define "caprock" as

"Caprock" means geologic ~~confining~~ layer(s) that has sufficiently low permeability and lateral continuity to ~~prevent~~ **limit** the migration of

injected carbon dioxide out of **within** the geologic containment system.

Consistent with this, the following provisions should be revised as indicated:

WAC 173-218-115 (2)(c)(iii)(A): "(A) An evaluation of all existing information on all geologic strata overlying the ~~geologic containment system~~ **injection zone** including the immediate caprock containment characteristics as well as the ~~presence of other caprock~~ **if layers** included in the geologic containment system and all designated subsurface monitoring zones;" and

WAC 173-218-115 (4)(a)(i)(B): "(B) The caprock and other features of the geologic containment system have the appropriate characteristics to ~~prevent migration of~~ contain the carbon dioxide, other contaminants and nonpotable water."

WAC 173-218-115 (2)(c)(ix): "The proposed maximum bottom hole injection rate and injection pressure to be used at the ~~geologic containment system~~ injection zone." And: "The ~~geologic containment system~~ injection zone shall not be subjected to injection pressures in excess of the calculated fracture pressure..."

**AND**

**Comment W-25**

The caprock should also be capable of preventing migrations of brines, hydrocarbons and other fluids that might have a tendency to migrate as a result of the injection. Therefore we suggest replacing the definition with,

*"Caprock" means geologic confining layer(s) that has sufficiently low permeability and lateral continuity to prevent the migration of injected carbon dioxide and other fluids out of the geologic containment system.*

**Ecology Response:**

"Caprock" as defined in the rule is intended to describe a geologic formation that will protect the existing ground water quality of aquifers outside of the geologic containment system from degradation caused by the escape of carbon dioxide or other formation fluids. In most cases a caprock will be required to meet the permit performance standard of preventing migration. In rare circumstances permits may be issued under WAC 173-218-115(4)(a)(i)(B) where other features of the geologic containment system have the appropriate characteristics to prevent migration.

Some of the suggested changes to the definition of caprock would weaken the intended definition as a formation that will prevent migration; therefore these changes have not been made.



The phrases “Confining bed” and “Confining zones” are not used in the Washington UIC regulations (Ch 173-218 WAC).

In response to comments the definition of “caprock” is changed to:

“**Caprock**” means geologic confining formation(s) that has sufficiently low permeability and lateral continuity to prevent the migration of injected carbon dioxide and other fluids out of the geologic containment system.”

### **Definition of “Geologic Sequestration of Carbon Dioxide”**

#### **Comment W-16**

The department’s proposed regulations define “geologic sequestration of carbon dioxide” as “injection of carbon dioxide, usually from human activities like burning coal or oil, into subsurface geologic formations to prevent its release into the atmosphere for a defined length of time.”

It is unclear what a “defined length of time” is expected to be, or through what process the length of time is expected to be defined, as no such process is described in the proposal. In some cases, the CO<sub>2</sub> may be recovered for beneficial purposes. In other cases, it will be intended to be stored permanently.

The words “to prevent its release into the atmosphere for a defined length of time” in the above definition raise a potential concern. We do not read that phrase to suggest that anything less than 100 percent retention of CO<sub>2</sub> within the injection formation constitutes geologic sequestration; however, the department should take care to avoid interpreting the phrase in such manner, as this interpretation may unduly limit the applicability of the practice. The State would be better served by defining “geologic sequestration of carbon dioxide” as “injection of carbon dioxide into subsurface geologic formations to minimize its release into the atmosphere and drinking water during the period of injection, closure, and post-closure” (in conjunction with a defined post-closure period, as recommended above).

Finally, it is unnecessary to state the source of the CO<sub>2</sub>, whether it be from industrial or natural sources.

**AND**

#### **Comment W-18**

The proposed definition of geologic sequestration of carbon dioxide refers to a requirement “to prevent its release into the atmosphere for a defined length of time.” Although it is not immediately clear what is intended by “length of time,” we understand that this terminology has been adopted to address the use of the term “permanent” in the authorizing legislation and recognizes that it will be necessary to use a defined length of time when using models to address site characterization, area of review and validation issues. It should be read in conjunction with reference to the other provisions that establish the relevant time periods, such as WAC 173-218-115 (2)(b)(i), which requires a current site map showing:

The boundaries of the geologic sequestration project which shall be calculated to include the area containing ninety-five percent of the injected CO<sub>2</sub> mass one hundred years after the completion of all CO<sub>2</sub> injection or the plume boundary at the point in time when expansion is less than one percent per year, whichever is greater, or another method approved by the department.

This provision appears to be an appropriate means for addressing the requirements of the legislation.

**AND**

**Comment W-24**

The proposed definition of geologic sequestration of carbon dioxide refers to a requirement "to prevent its release into the atmosphere for a defined length of time." Although it is not immediately clear what is intended by "length of time," we understand that this terminology has been adopted to address the use of the term "permanent" in the authorizing legislation and recognize that it will be necessary to use a defined length of time when using models to address site characterization, area of review and validation issues. It should be read in conjunction with reference to the other provisions that establish the relevant time periods, such as WAC 173-218-115 (2)(b)(i), which requires a current site map showing:

- (i) The boundaries of the geologic sequestration project which shall be calculated to include the area containing ninety-five percent of the injected CO<sub>2</sub> mass one hundred years after the completion of all CO<sub>2</sub> injection or the plume boundary at the point in time when expansion is less than one percent per year, whichever is greater, or another method approved by the department;

This provision appears to be an appropriate means for addressing the requirements of the legislation.

**Ecology Response:**

The comments indicate that the definition of geologic sequestration of carbon dioxide needs to be clarified. The meaning of the phrase "for the lifetime of the project" has been questioned, with comments suggesting different meanings. The Washington State legislature required that these rules be written for "permanent sequestration."

Some commented: "In some cases, the CO<sub>2</sub> may be recovered for beneficial purposes...." These cases would not be "permanent sequestration" and are not covered under this rule amendment.

Comments correctly indicate that the source of the carbon dioxide is not important to the intended meaning, so reference to human sources has been removed.

In response to comments the definition has been changed to: "**Geologic sequestration of carbon dioxide**" means the injection of carbon dioxide, into subsurface geologic formations to permanently prevent its release into the atmosphere.

### **Definition of "Geologic Sequestration Project Boundary"**

#### **Comment W-18**

"Geologic sequestration project boundary" is defined to mean "a three dimensional boundary defined in permit that encloses all surface and underground facilities of the geologic sequestration project and extending vertically to the overlying ground surface." This provision is appropriate if it is interpreted to mean a bounding of the containment system as it is intended to be interpreted.

**AND**

#### **Comment W-24**

"Geologic sequestration project boundary" is defined to mean "a three dimensional boundary defined in permit that encloses all surface and underground facilities of the geologic sequestration project and extending vertically to the overlying ground surface." This provision is appropriate if it is interpreted—as we understand it is intended to be interpreted—to mean a bounding of the containment system rather than a precise location.

**AND**

#### **Comment W-25**

##### Geologic sequestration project boundary

The definition should be extended to include the actual plume extent, as it is later used for well and fault identification, and in order to avoid ambiguity.

##### Ecology Response:

The boundary is intended to include all surface and underground facilities, including the geologic containment system, monitoring zone(s) and surface facilities described in the permit. The proposed phrase "actual plume extent" would not stop at the edge of the geologic containment system but would include unanticipated leakage and migration beyond the geologic sequestration project boundary. This section has not been changed.

### **Definition of "Monitoring zone(s)"**

#### **Comment W-18**

"Monitoring zone(s)" is defined to mean "the geologic layers, identified in the application, where chemical, physical and other characteristics are measured to establish the location, behavior and effects of the injected carbon dioxide in the subsurface and to detect leakage from the geologic containment system. At a minimum, a monitoring zone must be established beneath the ground surface

but outside of the geologic containment system to detect leakage of injected CO<sub>2</sub>."

This establishes a minimum requirement for monitoring fluids within at least one subsurface formation, which may not be necessary in all cases. The Director should be able to determine what is necessary to conduct monitoring of this type. This problem can be alleviated by providing the Director with authority to specify in the permit when, and in what formations, such monitoring would need to be conducted, if at all.

**AND**

**Comment W-24**

"Monitoring zone(s)" is defined to mean "the geologic layers, identified in the application, where chemical, physical and other characteristics are measured to establish the location, behavior and effects of the injected carbon dioxide in the subsurface and to detect leakage from the geologic containment system. At a minimum, a monitoring zone must be established beneath the ground surface but outside of the geologic containment system to detect leakage of injected CO<sub>2</sub>." This establishes a minimum requirement for monitoring fluids within at least one subsurface formation, which may not be necessary in all cases and should not be mandatory in all cases. The Department should be able to determine what is necessary to conduct monitoring of this type. This problem can be alleviated by providing the Department with authority to specify in the permit when, and in what formations, such monitoring would need to be conducted, if at all.

**AND**

**Comment W-25**

In order to allow for other objectives of monitoring, e.g. confirming or refining modeling predictions, we believe the definition should be modified as below, *"Monitoring zone(s)" means the geologic layers, identified in the application, where chemical, physical and other characteristics are measured to, at a minimum, establish the location, behavior and effects of the injected carbon dioxide in the subsurface and to detect leakage from the geologic containment system. At a minimum, a monitoring zone must be established beneath the ground surface but outside of the geologic containment system to detect leakage of injected CO<sub>2</sub>.*

**Ecology Response:**

Direct monitoring of subsurface water quality to detect leaks or water quality impacts is required in most cases. It is possible that rare circumstances exist where this direct monitoring may not be appropriate.

Comments suggest that there should be an option for the director to approve alternative monitoring plans. This would allow Ecology to approve monitoring

methods that may not have been considered or may not be currently available. In response to comments the definition has been changed to:

"Monitoring zone(s)" means the geologic formations, identified in the application for a geologic sequestration project, where chemical, physical and other characteristics are measured to establish the location, behavior and effects of the injected carbon dioxide in the subsurface and to detect leakage from the geologic containment system. At a minimum, a monitoring zone must be established beneath the ground surface but outside of the geologic containment system to detect leakage of injected CO<sub>2</sub> except where other monitoring is approved by the director.

## **SECTION 040 UIC well classification including allowed and prohibited wells:**

### **WAC 173-218-040(5)(a)(xiii) Class 5 Wells**

#### **Comment W-18**

Section WAC 173-218-040(5) (a) (xiii) should be amended to include injection wells used for testing geologic reservoir properties for potential "geologic sequestration."

**AND**

#### **Comment W-24**

For consistency and to avoid potential problems, section WAC 173-218-040(5)(a)(xiii) should be amended to include injection wells used for testing geologic reservoir properties for potential "geologic sequestration."

#### **Ecology Response:**

Injection wells for testing geologic sequestration reservoir properties may use Class V wells of section WAC 173-218-040(5)(a)(viii) or (xv) when the injection is included in a geologic sequestration pilot study permit under WAC 173-218-115(4)(b). No changes to this section have been made.

### **WAC 173-218-040(5)(a)(xv) Class 5 Wells:**

#### **Comment W-16**

Under the proposed regulations, injection wells used to inject carbon dioxide for geologic sequestration will be considered Class V wells. This is in keeping with guidance issued by the U.S. Environmental Protection Agency (EPA) in March 2007.

The EPA has announced its intent to issue proposed CCS rules in July of this year. Final rules may be issued in 2009 or 2010. The agency has indicated that because of unique features of CCS - including the low viscosity of supercritical CO<sub>2</sub>, its high buoyancy, and injection volumes that could dwarf those for other

well classes - it is likely to propose that CCS injection wells be regulated as a new class or subclass (e.g., as a new Class VI).

Under the federal Underground Injection Control program, States wishing to take lead implementation and enforcement responsibility must have in place regulations no less stringent than federal regulations. By adopting regulations now that regulate CCS wells under a Class V regime, Washington may invite a conflict with future federal standards. Washington cannot today know what the to-be-proposed EPA regulations will provide. When EPA's regulations take effect, applicants should clearly know whether the EPA or the Washington regulations apply, and whether the State or the EPA will have primary implementation and enforcement authority. In the interest of having one clearly applicable regulatory regime, Washington would be best served by applying existing Class V regulation to CCS wells, to be modified to be equal to or no less stringent than new federal regulations for CCS wells upon their adoption. If Washington decides to enact a new regulatory regime that may present conflicts with federal regulations, it should provide that it will incorporate by reference any new federal standards applicable to CCS injection wells.

**AND**

**COMMENT W-25**

SUBSECTION (xv) It is unclear in the rules how monitoring wells or wells used to produce CO<sub>2</sub> for re-injection will be permitted. We suggest grouping them under the same class as CO<sub>2</sub> injection wells. This subsection could read, *Injection, monitoring or other wells used to inject carbon dioxide for, or in the context of, geologic sequestration.*

Ecology Response:

Comments suggest that USEPA may establish a new UIC Class VI Well designation for Geologic Sequestration. USEPA has not released draft rules and has not stated their intent to establish a new class of wells, though they have discussed the possibility. The laws of the State of Washington do not allow Ecology to adopt automatically updated standards based upon unknown future actions of USEPA. The Washington State Legislature has instructed Ecology to adopt rules for Geologic Sequestration by June 30, 2008. Ecology may amend these rules if needed once USEPA has adopted final rules. USEPA estimates that they may adopt final rules no sooner than 2010.

Monitoring and other wells not used for CO<sub>2</sub> injection are regulated under the *Minimum Standards for Construction and Maintenance of Wells*, Ch 173-160 WAC. If these wells are used for the injection or re-injection of CO<sub>2</sub>, they will be injection wells regulated under this section. Any wells associated with a geologic sequestration project including monitoring wells, injection wells or wells used for CO<sub>2</sub> recovery for re-injection, must be addressed in the permit documents for a

geologic sequestration project issued under WAC 173-218-115. No changes to this section have been made.

**WAC 173-218-040(5)(b)(v)(A) Class 5 Wells:**

**Comment W-18**

Section WAC 173-218-040(5)(b)(v)(A) should be amended to insert "or (xv)" following "(a)(x)." This is appropriate because geologic sequestration streams may include some levels of hazardous constituents that are better left in the injected stream than removed for alternative treatment or disposal.

**AND**

**Comment W-24**

Section WAC 173-218-040(5)(b)(v)(A) should be amended to insert "or (xv)" following "(a)(x)." This is appropriate because geologic sequestration streams may include some levels of hazardous constituents that are better left in the injected stream than removed for alternative treatment or disposal.

**Ecology Response:**

The proposed change has not been made. All known, available and reasonable methods of prevention, control and treatment (AKART) must be used to remove contaminants from the injected CO<sub>2</sub>. Geologic sequestration of carbon dioxide shall not be used for the disposal of non-CO<sub>2</sub> contaminants that can be removed with known treatment technologies. If alternative treatment and disposal methods for hazardous constituents are available, they must be used. Geologic Sequestration may not be used for hazardous constituent disposal simply because it is the lowest cost disposal option.

**SECTION 090 Specific requirements for Class V wells to meet the nonendangerment standard:**

**No Comments**

**SECTION 115 Specific requirements for Class V wells used to inject carbon dioxide for permanent geologic sequestration:**

**WAC 173-218-115(1)(b)(i), geologic formation**

**Comment W-25**

\* SUBSECTION (1)(b)(i) We believe this subsection should not include the term formation and instead should refer to a "geologic layer" as below,

The aquifer contains "naturally non-potable ground water" as defined in WAC 173-200-020(18) and is beneath the lowermost geologic layer containing potable ground water within the vicinity of the geologic sequestration project area;

Ecology Response:

The comment suggests that “geologic layer” should be used instead of “formation”. Geologic layer may work in areas with flat lying rock formations such as undisturbed sedimentary geologic settings, but could be problematic in more complex areas where the geologic containment system is formed by non-sedimentary geologic processes. The *Webster’s II* dictionary definition of the word “Formation” identified as *Geol.* is “The primary unit of lithostratigraphy,…” In order to clarify the use of formation, this section has been changed adding “geologic” to “formation”. In addition, “layers” has been changed to “geologic formations” through out the rule.

**WAC 173-218-115(1)(b)(ii), Waste Discharge Permit**

**Comment W-12**

API also has several specific areas of concern with the proposed rules. For example, API is very concerned with the proposal to require CO<sub>2</sub> injection well operators to obtain "waste discharge permits." Identifying CO<sub>2</sub> as a "waste" will not accelerate the deployment of geologic sequestration and does not appear consistent with the EPA's public statements regarding the potential regulatory approach to CO<sub>2</sub> and geologic sequestration.

**AND**

**Comment W-16**

Washington is an associate member of the Interstate Oil and Gas Compact Commission (IOGCC). In September 2007, the IOGCC issued model State guidelines and regulations for CCS wells. As a general matter, Washington’s proposed regulatory regime goes far beyond the regulatory structure proposed by the IOGCC, and is directly contrary to one of its key recommendations, which is the treatment of CO<sub>2</sub> as a commodity rather than a waste.

The IOGCC, led by States with familiarity with underground injection of CO<sub>2</sub> for enhanced oil recovery, concluded that:

although contaminants and pollutants such as H<sub>2</sub>S, NO<sub>x</sub>, SO<sub>2</sub> and other emission stream constituents should remain regulated for public health and safety and other environmental considerations, CO<sub>2</sub>, which is generally considered safe and non-toxic and is not now classified at the federal level as a pollutant/waste/contaminant, should continue to be viewed in a manner that allows beneficial uses of CO<sub>2</sub> following removal from regulated emission streams. The Task Force strongly believes that treatment of geologically stored CO<sub>2</sub> as a waste using waste disposal frameworks rather than resource management frameworks will diminish significantly the potential to meaningfully mitigate the impact of CO<sub>2</sub> emissions on the global climate through geologic storage.



Though the concept of treating CO2 as a commodity in States where it has few or no markets may seem foreign, the notion that it is not necessary to regulate it as a waste remains clear.

**AND**

**Comment W-18**

Carbon dioxide injection well permits for GS are identified as "waste discharge permits." The regulations should cross-reference the permitting requirements as applicable to geologic sequestration wells without labeling them as waste wells. The difficulty with calling them waste wells is that there may be those who argue that this language could be interpreted to cause problems for geologic sequestration wells injecting below the lowermost USDW because such wells might be considered to be Class I wells, which are banned in Washington State.

**AND**

**Comment W-18**

Section WAC 173-218-115(a) should be amended to clarify that applicants for geologic sequestration permits must obtain permits that include provisions comparable to those included in "waste discharge permits" but that such permits are not waste discharge permits. WDOE is reluctant to take this approach over concern that geologic sequestration should be considered waste disposal, but this approach risks undercutting the program if it can be argued that geologic sequestration wells then become Class I wells, which are banned in Washington. All such questions should be resolved by unequivocally excluding Class V geologic sequestration well permits from being waste discharge permits.

**AND**

**Comment W-24**

Carbon dioxide injection well permits for GS are identified as "waste discharge permits." The regulations should cross-reference the permitting requirements as applicable to geologic sequestration wells without labeling them as waste wells. The difficulty with calling them waste wells is that there may be those who argue that this language could be interpreted to cause problems for geologic sequestration wells injecting below the lowermost underground source of drinking water (USDW) because such wells might be considered to be Class I wells, which are banned in Washington State.

**AND**

**Comment W-24**

Section WAC 173-218-115(a) should be amended to clarify that applicants for geologic sequestration permits must obtain permits that include provisions comparable to those included in "waste discharge permits" but that such

permits are not waste discharge permits. The Department should not be reluctant to take this approach over concern that geologic sequestration should be considered waste disposal. That consideration does not affect the provisions of the proposed rule one way or another, but this approach of using "waste permits" risks undercutting the program if it can be argued that geologic sequestration wells then become Class I wells, which are banned in Washington. All such questions should be resolved by unequivocally excluding Class V geologic sequestration well permits from being waste discharge permits.

Ecology Response:

Comments suggest Geologic Sequestration Projects for Carbon Dioxide should not be permitted through the *State Waste Discharge Permit Program* of Ch 173-216 WAC but through some other permitting program that does not currently exist in Washington.

The Washington Legislature instructed Ecology to develop rules for permanent geologic sequestration. Storage of CO<sub>2</sub> as a commodity to be recovered for later beneficial use is not permanent geologic sequestration and is not covered under this rule amendment. Wells used to inject CO<sub>2</sub> for enhanced oil recovery are Class II UIC wells. This rule amendment does not change the status or regulation of Class II injection wells associated with enhanced oil recovery.

Permanent geologic sequestration is the injection of CO<sub>2</sub> which will not be recovered. The *State Waste Discharge Permit Program* in WAC 173-216-030, defines "Waste Materials" to include any unrecovered materials. Waste discharge permits are required under Ch 173-216 WAC, and *Water Pollution Control*, Ch 90.48 RCW, for the injection of waste materials into underground waters of the state.

Some have referred to permanent geologic sequestration as "permanent storage"; permanent storage is no different than proper disposal; as an example it can also be said that garbage is permanently stored in a lined solid waste landfill.

*Water Pollution Control*, Ch 90.48 RCW, requires that any commercial or industrial operation obtain permits for the discharge of waste materials into the waters of the state, including underground waters. The injection of CO<sub>2</sub> into subsurface aquifers is expected to change the quality of the water in the receiving aquifer by lowering the pH, making it more acidic. Acidic ground water will increase the concentrations of minerals leached from the rock formations, degrading the quality of the water in the receiving aquifer. *Water Pollution Control*, Ch 90.48.020 RCW defines pollution to include any contamination or other alteration of the physical, chemical or biological properties of any waters of the state, including underground waters. Injecting CO<sub>2</sub> into an aquifer is pollution as defined by Ch 90.48 RCW.

The *State Waste Discharge Permit Program*, Ch 173-216 WAC is the appropriate, permitting program for permanent geologic sequestration. Washington's *Underground Injection Control Program*, Ch 173-218 WAC, requires waste discharge permits for the operation of all UIC's that do not meet the non-endangerment standard of WAC 173-218-080. Class V UIC wells are among the wells that may be required to obtain a waste discharge permit to operate. Requiring a waste discharge permit will not change a wells classification under Washington's UIC program.

**WAC 173-218-115(1)(b)(iii) AKART**

**Comment W-16**

The department's draft regulations propose to require that operators use "all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants, such as sulfur compounds and other contaminants, from the injected CO<sub>2</sub>." There is no explanation of why such a level of contaminant removal is necessary.

There are legitimate reasons to remove contaminants from injected CO<sub>2</sub>, such as assuring its injectivity, avoiding corrosion of pipelines and injection wells, maintaining integrity of the injection area, and preventing operators from avoiding more stringent regulatory regimes for hazardous materials by injecting them together with CO<sub>2</sub>. However, depending on how the requirement is implemented, mandating the application of AKART may lead to an unnecessarily and wastefully expensive treatment CO<sub>2</sub> purification regime.

We recommend that the standard of CO<sub>2</sub> purity be tied to protecting public health and the environment during injection and long-term storage, and to ensuring that more stringent State requirements are not intentionally skirted by mixing other materials with CO<sub>2</sub>. We suggest that the State request commentary on the specific level of CO<sub>2</sub> purity that would meet these objectives in Washington.

**AND**

**Comment W-18**

Proposed WAC 173-218-115 (b)(ii) and (iii) take an approach of allowing carbon dioxide to be injected at levels above what would otherwise be allowed under the AKART requirement because it can be shown that:

- (A) The permit holder or responsible person demonstrates to the department's satisfaction that an enforcement limit that exceeds a criterion is necessary to provide greater benefit to the environment as a whole and to protect other media such as air, surface water, soil, or sediments;
- (B) The activity has been demonstrated to be in the overriding public interest of human health and the environment;

- (C) The department selects, from a variety of control technologies available for reducing and eliminating contamination from each potentially affected media, the technologies that minimize impacts to all affected media; and
- (D) The action has been approved by the director of the department or his/her designee.

But the proposed rule does not allow a similar approach for other potential constituents of the injectate. Instead, the proposed rule contains a provision that "Class V injection wells used for the geologic sequestration of carbon dioxide may directly discharge into an aquifer only if: ... (iii) The operator uses all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants, such as sulfur compounds and other contaminants, from the injected CO<sub>2</sub>. Geologic sequestration of carbon dioxide shall not be used for the disposal of non-CO<sub>2</sub> contaminants that can be removed with known treatment technologies;"

This would appear to preclude a determination that other constituents captured with the carbon dioxide should be sequestered as well under the same justification as sequestration of the carbon dioxide. This is unnecessarily restrictive if containment is achieved and could affect the Oil and Gas Industry more than others, particularly with recirculation of formation gases at an enhanced oil recovery site, or for gas processing facilities. The cost of this would make this so expensive that sequestration is economically infeasible. This should not be the case.

**AND**

**Comment W-24**

Proposed WAC 173-218-115 (b)(ii) and (iii) take an approach of allowing carbon dioxide to be injected at levels above what would otherwise be allowed under the AKART requirement because it can be shown that

- (A) The permit holder or responsible person demonstrates to the department's satisfaction that an enforcement limit that exceeds a criterion is necessary to provide greater benefit to the environment as a whole and to protect other media such as air, surface water, soil, or sediments;
- (B) The activity has been demonstrated to be in the overriding public interest of human health and the environment;
- (C) The department selects, from a variety of control technologies available for reducing and eliminating contamination from each potentially affected media, the technologies that minimize impacts to all affected media; and
- (D) The action has been approved by the director of the department or his/her designee.

But the proposed rule does not allow a similar approach for other potential constituents of the injectate. Instead, the proposed rule contains a provision that "Class V injection wells used for the geologic sequestration of carbon dioxide may directly discharge into an aquifer only if: . . . (iii) The operator uses all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants, such as sulfur compounds and other contaminants, from the injected CO<sub>2</sub>. Geologic sequestration of carbon dioxide shall not be used for the disposal of non-CO<sub>2</sub> contaminants that can be removed with known treatment technologies;..." This would appear to preclude a determination that other constituents captured with the carbon dioxide should be sequestered as well under the same justification as sequestration of the carbon dioxide. That should not be the case. Instead, permit applicants should be allowed to make a similar demonstration of public benefit for other constituents captured from the same sources to improve the efficiency and effectiveness of overall control systems. The current approach risks having the constituent treatment requirements render the use of geologic sequestration impractical to the ultimate detriment of public health and the environment.

**AND**

**Comment W-25**

\* SUBSECTION (1)(b)(iii) We believe that a prohibition or strict limit to the concentrations of contaminants (e.g. SO<sub>x</sub>, NO<sub>x</sub>, H<sub>2</sub>S), which is allowed in the injected CO<sub>2</sub>, should be set along instead of using AKART (all known, available and reasonable methods of prevention, control and treatment). We believe there should be strict limits for some pollutants and a prohibition on others (hazardous ones). For this section we recommend the following language,

*The operator uses all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants, such as sulfur compounds and other contaminants, from the injected CO<sub>2</sub> to ensure that the injected material does not meaningfully increase the risks of the injection compared to pure CO<sub>2</sub>. Geologic sequestration of carbon dioxide shall not be used for the preferential disposal of non-CO<sub>2</sub> contaminants that can be removed with known treatment technologies; and*

**AND**

**Comment V-10**

We believe that a limit to the concentration or percentage of contaminants which is allowed in the injected CO<sub>2</sub> should be, should have along with it or instead of the all known available and reasonable methods of prevention, control and treatment a percentage requirement.

Ecology Response:

Washington State statute, *Water Pollution Control* in RCW 90.48.010, requires the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state. Ecology has included this legislative requirement in all water quality regulations and refers to it as AKART. AKART is required for all permits that authorize discharges to the waters of the state, including underground waters.

Some comments suggest that this rule should include authorization for the disposal of non-CO<sub>2</sub> contaminants using the demonstration required under WAC 173-200-050(3)(b)(vi), which allows certain ground water quality impacts when necessary to provide greater benefit to the environment as a whole and to protect other media such as air, surface water, soil, or sediments. Although this demonstration is available for any appropriate contaminant, the demonstration and permit approval for this sort of disposal would need to be made on a contaminant specific basis and the permit allowing the discharge would include specific provisions related to the properties and risks associated with the contaminant. This rule is written to address the specific properties and risks associated with the injection of CO<sub>2</sub>.

Some comments suggest that the Geologic Sequestration rules should set a numeric limit for non-CO<sub>2</sub> contaminants along with AKART requirements. Setting numeric limits for contaminants would have to be done for each individual contaminant, based upon its chemical properties, environmental risks and available treatment technologies. It is not possible to identify every possible contaminant or to set specific numeric limits for them all. AKART is the legislatively set standard for water quality protection in Washington. By completing an AKART analysis as part of the permitting process an operator will be required to address each of the contaminants expected for their individual geologic sequestration project. Ecology will include appropriate requirements to address the contaminants in the permit for a project.

AKART is the appropriate, and legislatively set, standard for the treatment and removal of non-CO<sub>2</sub> contaminants at geologic sequestration projects. This section has not been changed.

**WAC 173-218-115(2)(b)(i), Mapped project boundary**

**Comment W-25**

\* SUBSECTION (2)(b)(i) This section provides that the mapped boundary of the project can cover less territory than the CO<sub>2</sub> ultimately occupies. As phrased, the site map is not consistent with the permanence standard. A projection of the plume extent is feasible, and adding this requirement does not make the provision more cumbersome. Accommodating the potential inaccuracies of plume projection in the wording is not appropriate. We recommend that the subsection read,

*The boundaries of the geologic sequestration project which shall be calculated to include the entire area projected to be occupied by CO2 when it reaches its maximum extent in the geologic containment system.*

Ecology Response:

Ecology considered many methods for determining the project boundary. Requiring the mapped boundary to include every molecule of injected carbon dioxide would result in a much larger mapped area and may actually result in reducing the level of environmental protection. The mapped project boundary will be used to focus monitoring and other risk management measures to the areas that have the highest risk. Requiring an overly large mapped boundary may cause monitoring to be spread more thinly to include the outlying areas of low risk. Monitoring and other risk management measures must be focused to the areas of highest risk to be effective. The definition of the mapped project boundary is intended to ensure that monitoring and other risk management measures are located effectively.

**WAC 173-218-115(2)(c)(iii)(A), Geologic containment system**

**Comment W-18**

WAC 173-218-115 (2)(c)(iii)(A): "(A) An evaluation of all existing information on all geologic strata overlying the ~~geologic containment system~~ **injection zone** including the immediate caprock containment characteristics ~~as well as those of other caprocks if layers~~ included in the **geologic** containment system and all designated subsurface monitoring zones;"

Ecology Response:

"Geologic containment system" and "Caprock" are defined in WAC 173-218-030 and used in this rule. The suggested change is not needed.

**WAC 173-218-115(2)(c)(viii), Wells in Geologic sequestration project boundary**

**Comment W-24**

In 173-218-115(2)(c)(viii), the permit calls for a review of all wells "within the geologic sequestration project area" — should be replaced with "within the boundary of the geologic sequestration project"

Ecology Response: This comment correctly indicates that the rule does not define "geologic sequestration project area". The section has been changed to use "geologic sequestration project boundary" which is defined in the rule.

**WAC 173-218-115(2)(c)(iv)(D), geochemical reactions**

**Comment W-25**

\* SUBSECTION (2)(c)(iv)(C) This section should be changed to read, (D) *Absorption or dissolution characteristics, or geochemical reaction/mineralization processes, with regard to the ability to prevent migration of CO2 beyond the proposed geologic containment system;*

Ecology Response:

The suggested change is not needed; dissolution is already included in this section under geochemical reactions.

**WAC 173-218-115(2)(c)(v)(C), Unrecorded Wells**

**Comment W-25**

\* SUBSECTION(2)(c)(v)(D) We recommend this section read,  
(C) *The evaluation shall include a method to identify unrecorded wells and their potential impact on the integrity of the containment system that may be present within the project boundary;*

Ecology Response:

The suggested change is actually for language in WAC 173-218-115(2)(c)(v)(C), and is not needed. This section is intended to locate unrecorded wells. WAC 173-218-115(2)(c)(viii) requires an assessment of risks presented by wells.

**WAC 173-218-115(2)(c)(vi)(C), Faulting**

**Comment W-25**

\* SUBSECTION(2)(c)(vi)(C) We recommend that this section read,  
(C) *Any known regional or local faulting within the boundary of the geologic sequestration project;*

Ecology Response:

This change is not needed. Adding “known” to the sentence adds no environmental protection.

**WAC 173-218-115(2)(c)(vi)(H), in situ water**

**Comment W-25**

\* SUBSECTION(2)(c)(vi)(H) This section should read,  
*An evaluation of the potential displacement of in situ fluids and the potential impact on ground water resources, if any;*

Ecology Response:

The section has been changed as suggested. “In-situ fluids” will include water and the small risk that some other fluids are present.

**WAC 173-218-115(2)(c)(xi), Lifetime of the project**

**Comment W-25**

\* SUBSECTION (2)(c)(xi) and SUBSECTION (3)(a) these subsections include the term "lifetime of the project", yet the term is not defined, and is used to both include and not include the post closure period. To avoid confusion and to ensure the timescale required, we recommend that “lifetime of the project” be removed from this section. This would ensure consistency with the definition of permanent sequestration and would not create confusion as to what lifetime of the project includes



Ecology Response:

Many comments have been submitted indicating that phrases similar to “lifetime of the project” are unclear and confusing.

WAC 173-218-115(2)(c)(xi) has been changed to delete the words, “for the lifetime of the project.”

WAC 173-218-115(2)(d) has been changed to delete the words “throughout the life of the project.”

**AND**

**Comment W-1, W-3, W-4, W-10**

b. the provisions of proposed WAC 173-218-030(2)(b)(xi), requiring evaluation and data sufficient to establish that the containment system is sufficient to permanently sequester CO<sub>2</sub> “for the lifetime of the project” are ambiguous and should be changed to read “for the period defined in 173-407-110 under “permanent sequestration.” This change should also be made in WAC 173-218-030(2)(d) where the phrase “for the lifetime of the project” is used.

Ecology Response:

This comment actually refers to language in WAC 173-218-115(2)(c)(xi) and WAC 173-218-115(2)(d). The rule language in WAC 173-218-115(2)(c)(xi) requires permanent sequestration and does not need changes. WAC 173-218-115(2)(c)(xi) is changed to delete the words, “for the lifetime of the project.” WAC 173-218-115(2)(d) is changed to delete the words “throughout the life of the project.”

**WAC 173-218-115(2)(d) Modeling**

**Comment W-18**

WDOE should modify the requirement in section WAC 173-218-115(2)(d) that the permit application show "The predicted extent of the injected CO<sub>2</sub> plume throughout the life of the project, determined with established modeling tools that use all available geologic and reservoir engineering information, and the projected response and storage capacity of the geologic containment system. The assumptions used in the model and a discussion of the uncertainty associated with the estimate shall be clearly presented;"

Rather than using "established modeling tools," the applicant should be using "modeling tools acceptable to the department." The term "established" introduces too much uncertainty and potential for controversy. In addition, the modeling required should be cross-referenced to section WAC 173-218-115(2)(b)(i), which should be understood to define the "plume" to be modeled.

**AND**

**Comment W-24**

The Department should modify the requirement in section WAC 173-218-115(2)(d) that the permit application show "The predicted extent of the injected CO<sub>2</sub> plume throughout the life of the project, determined with established modeling tools that use all available geologic and reservoir engineering information, and the projected response and storage capacity of the geologic containment system. The assumptions used in the model and a discussion of the uncertainty associated with the estimate shall be clearly presented;. . . ." Rather than using "established modeling tools," the applicant should be using "modeling tools acceptable to the department." The term "established" introduces too much uncertainty and potential for controversy. In addition, the modeling required should be cross-referenced to section WAC 173-218-115(2)(b)(i), which should be understood to define the "plume" to be modeled.

**Ecology Response:**

Comments suggests that the phrase "established modeling tools" used in this section may result in uncertainty and potential for controversy. To clarify modeling the suggested change to modeling has been accepted.

In response to numerous comments, the phrase "throughout the life of the project" has been removed.

Modeling of the extent of the plume may not be limited to the mapped boundary defined by WAC 173-218-115(2)(b)(i).

In response to comments the section has been changed to:

The predicted extent of the injected CO<sub>2</sub> plume determined with modeling tools acceptable to the department that use all available geologic and reservoir engineering information, and the projected response and storage capacity of the geologic containment system. The assumptions used in the model and a discussion of the uncertainty associated with the estimate shall be clearly presented

**WAC 173-218-115(2)(e) AKART analysis**

**Comment W-1**

f. all contaminants in the injected CO<sub>2</sub> should be required to be removed, not just a reasonable attempt made under the AKART standard as proposed in 173-218-115(2)(e). Otherwise, the injected CO<sub>2</sub> could become a dumping ground for other significant pollutants.

**AND**

**Comment W-3**

f. all contaminants in the injected CO<sub>2</sub> should be required to be removed, not just a reasonable attempt made under the AKART standard as proposed in 173-218-115(2)(e). Otherwise, the injected CO<sub>2</sub> could become a dumping ground for other significant pollutants.

**AND**

**Comment W-4**

The new regulations must be very specific to eliminate the ambiguous wording "a reasonable attempt made" under the AKART standard as proposed in 173-218-115(2)(e). Otherwise, sequestration of contaminated CO<sub>2</sub> could also become an underground dump for other significant pollutants creating the potential for an irretrievable toxic waste site and source of groundwater contamination or worse.

**AND**

**Comment W-6**

The AKART regulation in proposed WAC 173-218-115 (2)(e) is inadequate. We believe all contaminants other than CO<sub>2</sub> should be required to be removed, not just a reasonable effort made, otherwise the sequestration could become a dumping ground for pollutants other than CO<sub>2</sub>.

**AND**

**Comment W-10**

f. all contaminants in the injected CO<sub>2</sub> should be required to be removed, not just a reasonable attempt made under the AKART standard as proposed in 173-218-115(2)(e). Otherwise, the injected CO<sub>2</sub> could become a dumping ground for other significant pollutants.

**AND**

**Comment W-14**

We believe that the AKART regulation in proposed WAC-173-115 (2) (e) is insufficient. There are other pollutants than carbon dioxide that contribute to environmental degradation and should be removed.

Will these be removed at the time of production or by polluting our underground with them?

**AND**

**Comment W-15**

We believe that the AKART regulation in proposed WAC-173-115 (2) (e) is insufficient. There are other pollutants than carbon dioxide that contribute to environmental degradation and should be removed.

Will these be removed at the time of production or by polluting our underground with them?

**AND**

**Comment W-18**

There should be no requirement to provide: "An analysis and selection of proposed treatment technology for non-CO<sub>2</sub> contaminant that identifies the technology which meets the requirement that all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants from the injected CO<sub>2</sub>;" when it is demonstrated that an alternative approach that does not include removing "contaminants" from the injected carbon dioxide stream more properly meets the requirements.

**AND**

**Comment W-24**

There should be no requirement to provide: "An analysis and selection of proposed treatment technology for non-CO<sub>2</sub> contaminant that identifies the technology which meets the requirement that all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants from the injected CO<sub>2</sub>;" when it is demonstrated that an alternative approach that does not include removing "contaminants" from the injected carbon dioxide stream more properly meets the overall objectives of protecting public health and the environment.

**AND**

**Comment V-4**

We believe that the AKART regulation and proposed WAC 173-115(2)(e) is insufficient. There are other pollutants than carbon dioxide that contribute to environmental degradation and should be removed. Will these be removed at the time of production or by polluting our underground with them?

**AND**

**Comment V-5**

AKART regulation and proposed WAC 173-218-115(2)(e) is inadequate. We believe all contaminants other than CO<sub>2</sub> should be required to be removed, not just a reasonable effort made. Otherwise, the sequestration could become a dumping ground for pollutants other than CO<sub>2</sub>.

**AND**

**Comment W-25**

\* SUBSECTION (2)(e) We believe that a prohibition or strict limit to the concentrations of contaminants (e.g. SO<sub>x</sub>, NO<sub>x</sub>, H<sub>2</sub>S), which is allowed in the

injected CO<sub>2</sub>, should be set and prevention, control and treatment). AKART represents the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge, but we believe this allows for too much gaming or interpretation. Contaminants beyond set amounts should not be allowed, lest injection wells become a dumping ground for these substances. We believe there should be strict limits for some pollutants and a prohibition on others (hazardous ones).

Ecology Response:

(See full AKART discussion in response above for WAC 173-218-115(1)(b)(iii).) Comments suggest that the Geologic Sequestration rules should allow disposal of contaminants along with sequestered CO<sub>2</sub> and that the standards should prevent this disposal by setting numeric limits for non-CO<sub>2</sub> contaminants along with AKART requirements to ensure that all contaminants are removed. AKART is the legislatively set standard for water quality protection in Washington. By completing an AKART analysis as part of the permitting process an operator will be required to address each of the contaminants expected for their individual geologic sequestration project. Ecology will include appropriate requirements to address contaminant removal in permits for a project.

AKART is the appropriate, and legislatively set, standard for the treatment and removal of non-CO<sub>2</sub> contaminants at geologic sequestration projects. This section has not been changed.

**WAC 173-218-115(2)(i), Leak Detection and Monitoring**

**Comment W-25**

\* SUBSECTION (2)(i) This section should read,

*(i) A leak detection and monitoring plan for all wells and surface facilities. The approved leak detection and monitoring plan shall define thresholds for determining that a leak has occurred and shall address at a minimum:*

*(i) Identification of any breach or failure of the containment system by CO<sub>2</sub> and other fluids;*

Ecology Response:

Adding “at a minimum” as a closing phrase adds nothing to the rule language and is not needed.

A “breach” is one potential form of failure of the containment system; the proposed change is not needed.

The definition of a failure of the containment system should not just be limited to something caused by CO<sub>2</sub> or other fluids. The proposed change would weaken the rule by limiting the definition of failure. No change was made.

**WAC 173-218-115(2)(m), Mitigation and Remediation Plan**

**Comment W-25**

\* SUBSECTION (2)(m) In order to conform this provision to 173-218-115(8) [pg. 22], which also discusses the mitigation and remediation plan, the phrase we recommend this section should be altered to read,

*A mitigation and remediation plan that identifies trigger thresholds and corrective actions to be taken prior to a containment system failure, if ground water quality in the monitoring zone or above is degraded, if carbon dioxide is released to the atmosphere, or if otherwise deemed necessary by the department. The mitigation and remediation plan must be approved by the department before injection begins;*

Ecology response:

The comment suggests that the mitigation and remediation plan required as part of a project application may not be in conformance with the requirements for a mitigation and remediation plan required in WAC 173-218-115(8). This section has been changed to reference WAC 173-218-115(8).

**WAC 173-218-115(2)(q), Financial Assurance in Permit Application**

**Comment W-25**

\* SUBSECTION (2)(q) we recommend this section should read,  
(q) *The application shall designate a financial assurance mechanism sufficient to provide financial assurance to the department to cover the plugging and abandonment of a CO2 injection and/or subsurface observation well and other necessary remedial actions, should the operator not perform as required in accordance with the permit or cease to exist;*

Ecology Response:

Comment suggests the addition of “other necessary remedial actions” to the permit application’s requirement for designation of a financial assurance mechanism. This section requires the applicant to designate a financial assurance mechanism, so the suggested addition would be of no consequence to what activities are included for funding. No changes have been made in response to this comment.

**WAC 173-218-115(3)(a), Lifetime of Project.**

**Comment W-25**

\* SUBSECTION (2)(c)(xi) and SUBSECTION (3)(a) these subsections include the term "lifetime of the project", yet the term is not defined, and is used to both include and not include the post closure period. To avoid confusion and to ensure the timescale required, we recommend that “lifetime of the project” be removed from this section. This would ensure consistency with the definition of permanent sequestration and would not create confusion as to what lifetime of the project includes.

**AND**

**Comment V-10**

We also saw the term lifetime of the project used a few times in this legislation, but it is not well defined. We believe that the lifetime of the project should be defined. We believe that the lifetime of the project should be defined as when the closure certificate is granted.

**Ecology Response:**

Many comments have been submitted indicating that phrases similar to “lifetime of the project” are unclear and confusing. The words “lifetime of” have been deleted.

**WAC 173-218-115(3)(a), Lifetime of the Project**

**Comment W-16**

Casing materials and cement must be designed to contain the fluids “during the lifetime of the geologic sequestration project, including the post-closure period.” There is no defined post-closure period in the proposed regulations, nor is one already established under Washington regulations. In some cases CO<sub>2</sub> stored in CCS wells may be retrieved for future use; however, in most cases it is expected to be stored permanently. Does this mean the State intends that the casing materials and cement must be designed for durability of permanent length?

Rather than apply an unworkable standard, Washington would be served better by requiring casing and cement quality to meet a more appropriate standard and, as the regulations already propose, instituting a monitoring, mitigation and validation program that provides assurance of safe long-term storage. A standard based on clear-eyed protection of human health and the environment, in conjunction with setting a defined financial responsibility period in the range of 10 to 30 years, depending on site-specific factors, would promote the State’s interests. If CCS is to be a real rather than a theoretical practice, policy makers must set financial responsibility periods with real timelines, not theoretical ones.

**Ecology Response:**

Many comments have been submitted indicating that phrases similar to “lifetime of the project” are unclear and confusing. The words “lifetime of” have been deleted.

The length of the post-closure period is determined through a performance standard based upon the reduction of project risks through time and site specific considerations. The length of time for the reduction of project risks will depend upon the site specific characteristics, so a set length post closure period is not appropriate.

**WAC 173-218-115(3)(e), Well Logging**

**Comment W-18**

WDOE should revise the section WAC 173-218-115(e) requirement that "Wells must be logged with appropriate geophysical methods which include at a minimum: Cement bonding and evaluation logs, and casing inspection logs. In

addition a standard suite of "state of the art" wireline logs shall be run on each well to document physical properties of the well, the well integrity and any potential leakage points. At a minimum the wireline logging suite must include: Gamma ray, resistivity, temperature, formation pressure, both p- and v-sonic and neutron-density." There should be less specification of particular logs, more focus on the performance standard to be met, and provision for modification when appropriate. There was no specific intent to preclude that flexibility on the part of WDOE.

A requirement of "state of the art" has immediate interpretative issues. First, the phrase may be interpreted to include technology that is not only commercially unavailable but also untested for widespread use in the field. Instead, the proposed section should be expanded to include the particular factors necessary for adequate well logging, but provide owners the flexibility to use appropriate methods where possible. Language like "state of the art" should not be used because it could be seen to bind the Department of Ecology to require, at any given time, only one method or technology for well logging.

Washington regulations for geological sequestration wells should rely on the flexibility it has used to similarly regulate well logging under the Oil and Gas Conservation Commission, WAC Title 344. WAC Section 344-12-102 requires "All wells shall be logged with an induction electric log, radiation log, or equivalent from total depth to the shoe of the conductor casing. The supervisor may grant an exception to this rule in field wells when well conditions make it impractical or impossible to meet this requirement." The minimum requirements under Section 344-12-102 do not require "state of the art" wireline logs, but rather allow the operator as well as the agency flexibility in measuring well conditions. Although Section 344-12-102 gives supervisors authority for exception to the rule only in impractical or impossible conditions, Washington regulations for geological sequestration wells should additionally give owners and supervisors an exception for use of comparable logging techniques where available.

Retaining discretionary language similar to WAC Chapter 344-12 is also consistent with Proposed WAC Section 173-218-115(3) itself. Proposed Section 173-218-115(3) cross-references WAC Chapter 344-12 for appropriate standards on several well specification areas: drilling fluid standards, well casing standards, and blowout prevention standards. These cross-referenced standards require various factors to be met, but allow well owners the discretion in implementing effective methods and technologies to meet those standards.

**AND**

**Comment W-24**

the Department should revise the section WAC 173-218-115(e) requirement that "Wells must be logged with appropriate geophysical methods which include at a minimum: Cement bonding and evaluation logs, and casing



inspection logs. In addition a standard suite of "state of the art" wireline logs shall be run on each well to document physical properties of the well, the well integrity and any potential leakage points. At a minimum the wireline logging suite must include: Gamma ray, resistivity, temperature, formation pressure, both p- and v-sonic and neutron-density." There should be less specification of particular logs, more focus on the performance standard to be met, and provision for modification when appropriate. There should be no specific preclusion of that flexibility on the part of the Department. Otherwise, new innovations in technology for logging will be excluded.

A requirement of "state of the art" poses immediate interpretative issues. First, the phrase may be interpreted to include technology that is not only commercially unavailable but also untested for widespread use in the field. Instead, the proposed section should be expanded to include the particular factors necessary for adequate well logging, but provide owners the flexibility to use all appropriate methods. Language like "state of the art" should not be used because it could be seen to bind the Department to require, at any given time, only one method or technology for well logging.

Instead, the regulations for geological sequestration wells should rely on the flexibility has used to similarly regulate well logging under the Oil and Gas Conservation Commission, WAC Title 344. IC Section 344-12-102 requires "All wells shall be logged with an induction electric log, radiation log, or equivalent from total depth to the shoe of the conductor casing. The supervisor may grant an exception to this rule in field wells when well conditions make it impractical or impossible to meet this requirement." The minimum requirements under Section 344-12-102 do not require "state of the art" wireline logs, but rather allow the operator as well as the agency flexibility in measuring well conditions. Although Section 344-12-102 gives supervisors authority for exception to the rule only in impractical or impossible conditions, Washington regulations for geological sequestration wells should additionally give owners and supervisors an exception for use of comparable logging techniques where available.

Retaining discretionary language similar to WAC Chapter 344-12 is also consistent with Proposed WAC Section 173-218-115(3) itself. Proposed Section 173-218-115(3) cross-references WAC Chapter 344-12 for appropriate standards on several well specification areas: drilling fluid standards, well casing standards, and blowout prevention standards. These cross-referenced standards require various factors to be met, but allow applicants or the Department discretion in implementing effective methods and technologies to meet those standards.

*Ecology Response:*

The comments suggest that including a minimum list of specific well logging techniques does not provide the flexibility needed to address site specific factors

and changing technology. They suggest that the regulation should allow the discretion of the operator and Ecology in choosing the most appropriate methods of well logging. The intent of the list of required wire line logs was to provide a baseline for permit issuance. There is a great deal of value toward establishing a level playing field by providing a baseline for permit issuance but it is also important to allow flexibility to address site specific circumstances. The section has been amended to allow alternative suites of wireline logs when approved by the department.

The comments indicate that the phrase “state of the art” adds confusion and may not allow standard logging methods. The section has been changed to remove the phrase “state of the art.”

In response to comments this section has been changed to:

“(e) Wells must be logged with appropriate geophysical methods which include: Cement bonding and evaluation logs, and casing inspection logs. In addition a standard suite of wireline logs shall be run on each well to document physical properties of the well, the well integrity and any potential leakage points. The wireline logging suite must include: Gamma ray, resistivity, temperature, formation pressure, both p- and v-sonic and neutron-density. The Department may approve alternate logging suites that provide equivalent information or allow the use of improved methods as new technologies are developed.”

**WAC 173-218-115(4)(a)(i)**

**Comment W-25**

\* SUBSECTION (4)(a)(i) we suggest this section should be altered to read,  
*(i) That the geology, including geochemistry and proposed plan of operation, of the site will*

**Ecology Response:**

In response to comments the rule has been changed to: “ (i) That the geology, including geochemistry, of the site and all proposed plans developed for the permit application will:”

**WAC 173-218-115(4)(a)(i)(A), Permanent Sequestration**

**Comment W-16**

Washington proposes that its permits will require that the site provide for “permanent sequestration” of CO<sub>2</sub>. Permanent sequestration, according to the new definition proposed in WAC 173-407-110, requires “retention of greenhouse gases . . . that creates a high degree of confidence that substantially ninety-nine percent of the greenhouse gases will remain contained for at least one thousand years.” This may be an appropriate standard for certain activities with a known high risk profile. However, this requirement is inappropriate for CO<sub>2</sub> injection wells.

First, CO<sub>2</sub> is not a dangerous gas, except potentially in very high concentrations. Humans are constantly in its presence. We consume it and exhale it. The proposed standard is not related to effects on human health or the environment from a potential leak.

Second, if CO<sub>2</sub> is released from the area where it was intended to be geologically sequestered, even in large quantities, that does not mean that a result harmful to human health or the environment will occur. For example, if the CO<sub>2</sub> plume simply migrates beyond the boundary within the containment formation where it was intended to be stored, there would not necessarily be any consequence to human health or the environment. A secondary containment formation may prevent its further migration. Furthermore, we have learned a great deal from natural geologic trapping of oil and gas for millions of years, and from injection of supercritical CO<sub>2</sub> and other fluids into underground formations. Such experience has shown that while quantities of supercritical CO<sub>2</sub> are likely to remain mobile over long periods, trapping mechanisms beyond structural and stratigraphic trapping apply increasingly over time. Residual phase trapping can maintain CO<sub>2</sub> within the pore spaces of the sedimentary formation within which it is injected. Over time, an increasing portion of the CO<sub>2</sub> will dissolve into the brine in the formation. Finally, the CO<sub>2</sub> becomes mineralized. Rates of these occurrences will differ by formation. If CO<sub>2</sub> injectate does not show a likelihood in the near term of escaping a formation in a manner than may cause adverse effects to human health and the environment, it is increasingly unlikely to do so over time.

Third, a 1,000 year standard, even with such softening phrases as “a high degree of confidence” and “substantially” 99 percent, is not suitable for engineering prognoses. It is the sort of standard one might see for radiological materials, which, in contrast to CO<sub>2</sub>, are clearly harmful to humans, have decay ratios that are easier to model than the entrainment of supercritical CO<sub>2</sub> in deep subsurface formations, and are easier to track. In addition, ensuring containment generally depends on proper site selection and characterization. We strongly recommend devising a standard that encourages detailed engineering inquiry rather than a political standard that instead may encourage creative application writing.

Finally, the 1,000 year standard will discourage investors and risk managers from supporting CCS projects, as it may lead to or at least imply a longer than necessary period of financial responsibility, especially since Washington does not specify a set post-closure financial responsibility period. If this standard implies a period of financial responsibility, it is not a relevant one from a financial responsibility context since the risk of failure declines over time, as discussed above. Stated flatly, insurers would not provide coverage for projects obligated under such terms. Without insurance, projects will not go forward.

**AND**

**Comment W-19**

Permanent is an ambiguous word open to interpretation, constantly. Please change the language in WAC 173-218-115 where the phrase “for the lifetime of the project” is used to read, “a thousand years for the containment and sequestration of GHG”. The methods employed must meet approved standards to contain at least 99% of GHG for at least one thousand years.

The term “lifetime of the project” is not defined in the above and should be defined as when a closure certificate is granted.

**Ecology Response:**

The Washington Legislature instructed Ecology to develop rules for permanent geologic sequestration. Regulations developed by Ecology in response to legislative action must remain in conformance with that legislation. In this case Ecology is developing rules for the permanent geologic sequestration of carbon dioxide. The suggested changes would conflict with legislation.

The comments also indicate that the injection of CO<sub>2</sub> has little or no risk to human health and the environment. The injection of CO<sub>2</sub> into subsurface aquifers is expected to change the quality of the water in the receiving aquifer by lowering the pH, making it more acidic. Acidic ground water will increase the concentrations of minerals leached from the rock formations, degrading the quality of the water in the receiving aquifer. It is quite conceivable that leaking CO<sub>2</sub> from a failed geologic containment system would degrade potable aquifers in the region to the point that they would be unusable. Migrating saline fluids from the geologic containment system may also degrade the ground water quality. *Water Pollution Control*, Ch 90.48.020 RCW defines pollution to include any contamination or other alteration of the physical, chemical or biological properties of any waters of the state, including underground waters. There are environmental risks associated with geologic sequestration that must be managed properly to prevent environmental degradation and possible long term impacts.

Many comments have been submitted on the phrase “lifetime of the project” indicating that it is confusing and not defined. This phrase has been removed.

**WAC 173-218-115(4)(a)(i)(B), Permitting demonstration/Caprock**

**Comment W-12**

Another concern is that the WDOE amendments would appear to require the presence of a "caprock." Instead, the multi-stakeholder recommendations call for a geologic system comprised of:

- An injection zone of sufficient depth, areal extent, thickness, porosity, and permeability;
- A confining zone that is free of transecting transmissive faults and fracture zones;
- A confining zone of sufficient areal extent and integrity to confine injected fluid and allow injection at proposed rates and volumes without reactivating

transecting, transmissive faults or initiating or propagating transecting, transmissive fractures in any confining zone.

This approach is more consistent with the current EPA UIC program, while being equally protective of underground sources of drinking water.

**AND**

**Comment W-18**

WAC 173-218-115 (4)(a)(i)(B): "(B) The caprock and other features of the geologic containment system have the appropriate characteristics to ~~prevent migration of~~ **contain the** carbon dioxide, other contaminants and nonpotable water."

**Ecology Response:**

"Caprock" as defined in the rule is intended to describe a layer that will protect the existing ground water quality of aquifers outside of the geologic containment system from degradation caused by the escape of carbon dioxide or other formation fluids. In most cases a caprock will be required to meet the permit performance standard of preventing migration. In rare circumstances permits may be issued under WAC 173-218-115(4)(a)(i)(B) where other features of the geologic containment system have the appropriate characteristics to prevent migration.

The comments include multi-stakeholder recommendations which are consistent with the concept intended in this rule for an acceptable geologic setting for a geologic sequestration project.

**WAC 173-218-115(4)(a)(ii), Atmospheric Monitoring**

**Comment W-12**

Additionally, the proposed amendments would require "identification of release to the atmosphere." The effectiveness of atmospheric monitoring was extensively examined at the most recent EPA public workshop in February 2008. The consensus of the experts was that atmospheric monitoring is not a practical approach given the imprecision of such monitoring techniques and that it would be much more effective to monitor for CO<sub>2</sub> migration at depth, when the range of mitigation techniques is greater. EPA, in its meeting summary comments, appeared to agree with that assessment.

**AND**

**Comment W-16**

Monitoring is required for leaks into groundwater, surface water, and the atmosphere, notwithstanding that the UIC program is for protection of groundwater. The EPA stated publicly that it is likely to decline to require monitoring for atmospheric leaks since the mission of the UIC program is groundwater protection. Surface monitoring would be wasteful unless there is some indication that the injected CO<sub>2</sub> has moved out of the containment formation, and should not be required absent such a circumstance.

**AND**

**Comment W-25**

\* SUBSECTION (4)(a)(ii) we recommend this section should be amended to read,

*(ii) A monitoring program has been developed to identify leakage outside the geologic containment system, to the atmosphere, surface water and ground water. The monitoring program must be able to identify ground water quality degradation in aquifers prior to degradation of any potable aquifer. The monitoring program shall include observations in the monitoring zone(s) that can identify migration to aquifers as close stratigraphically to the geologic containment system as practicable.*

**Ecology Response:**

To be permitted, WAC 173-218-115(4)(a)(ii) requires a monitoring program that will identify leakage to the atmosphere, surface water and ground water. The only specific requirement for monitoring is observations in a monitoring zone that can identify migration to aquifers as close stratigraphically to the geologic containment system as possible. Monitoring zone(s) as defined in WAC 173-218-030 must be beneath the ground surface and outside the geologic containment system.

The rule requires ground water monitoring. It may require surface water or atmospheric monitoring depending upon site specific considerations. Depending on the site characteristics, an operator may be able to demonstrate that the ground water monitoring program is sufficient to detect leakage before any impacts to the atmosphere or surface water occur. If the site specific conditions do not support a demonstration that ground water monitoring is sufficient, surface water and atmospheric monitoring is appropriate and required. No changes are needed for this section.

**WAC 173-218-115(4)b, Pilot Study**

**Comment W-25**

\* SUBSECTION (4)(b)(i) should be amended to read,  
*(i) The pilot study is for a defined limited time duration;*

**Ecology Response:**

The duration of pilot studies is defined in WAC 173-218-115(4)(b)(iv) “not to exceed five years. No changes are needed.

**WAC 173-218-115(4)(c)**

**Comment W-25**

\* SUBSECTION (4)(c) Generally, operators use injection pressure limits, not maximum working pressure in the containment system, to steer clear of initiating fractures. Setting a maximum pressure for the containment system is useful in

order to prevent fault reactivation and exceeding the capillary entry pressure of seals. Better wording would be:

*The permit shall include an injection pressure limitation and a maximum working pressure in the geologic containment system, calculated from information provided in the application. In no case shall the injection pressure or the working pressure in the geologic containment system initiate fractures in the caprock, cause non-transmissive faults that transect the caprock to become transmissive, or cause the movement of injected fluids or formation fluids into shallower aquifers. Controlled artificial fracturing of the injection zone of the geologic containment system may be allowed with a plan that has been approved by the department.*

Ecology Response:

The suggested changes may provide additional clarification by adding “injection pressure limitation”. The remainder of the suggested changes are not needed.

In response to comments this section has been changed to:

“The permit shall include an injection pressure limitation and a maximum working pressure in the geologic containment system, calculated from information provided in the application, that assures that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone or caprock. In no case shall the injection pressure initiate fractures in the caprock or cause the movement of injected fluids or formation fluids into shallower aquifers. Controlled artificial fracturing of the injection zone of the geologic containment system may be allowed with a plan that has been approved by the department.”

**WAC 173-218-115(4)(d), Geologic Containment System Failure**

**Comment W-16**

If a site is not in compliance, proposed WAC 173-218-115 would require the operator to “stop injecting immediately, until the project obtains approval for redefining the geologic containment system and its relevant dimensions by the department.” In conjunction with the requirement for permanent sequestration described above, this language means that if CO<sub>2</sub> migrates out of the expected containment area but poses no threat to human health or the environment, injection would be required to cease immediately.

If injection ceases immediately, a new baseload generation unit that without the operation of CCS equipment would emit in excess of 1,100 pounds of greenhouse gases per megawatt hour may be required to stop operating. Baseload generating units are units that essentially operate all the time to provide electricity. Interrupted operation, especially for a prolonged period but even potentially for a short time, at a minimum would degrade electric reliability, and could potentially result in blackouts.

If injection is interrupted for more than 180 days, perhaps as a result of regulatory proceedings to address non-compliance matters that may be of little environmental or health consequence, closure proceedings for the injection site must begin. This provision subjects owners of new baseload generation facilities relying on CCS to substantially increased risks. If the injection site is closed, generation owners relying on CCS in order to operate in compliance with State law would be required to inject elsewhere, if available. It may take a substantial period of time to characterize and permit a new injection facility and put in place the pipeline and other equipment that may be necessary to its operation.

Again, investors, insurers, and others may be deterred from involvement in facilities subject to such conditions – not only CCS facilities, but coal-fired generation plants as well.

There are less draconian means of reducing CO<sub>2</sub> emissions. For example, during a period of interrupted injection, generating facilities relying on the injection site could purchase carbon offsets, rather than shut down.

*Ecology Response:*

The thresholds for determining a geologic containment system failure are proposed by the operator in the mitigation and remediation plan and approved by Ecology. This scenario is designed to allow the operator to include specific considerations of their project, including the containment system and monitoring zone(s) characteristics in setting an action threshold that both protects the environment and avoids false alarms. If containment system failure is identified, the requirement to stop injecting immediately is absolutely appropriate. Once a problem has been discovered the first thing that must be done is to stop making it bigger.

A containment system failure will have impacts, possibly severe, on facilities that depend upon that system, but the alternative scenario of allowing a facility to continue injecting into a failed containment system would not be proper environmental protection. Depending upon the circumstances of the containment system failure, a facility may be able to resume operation once the problem has been corrected. If the problem can not be corrected, the geologic sequestration project may be required to move immediately to closure and remedial action. When a facility fails and causes environmental damage, it is no longer business as usual, immediate actions are required. In this case the requirement to stop injecting may only be the first financial impact that the facility encounters.

The compliance issues for facilities that no longer have a viable geologic sequestration site due to containment system failure have been established by the Washington State Legislature.

**WAC 173-218-115(4)(e)(v), Monitoring**

**Comment W-25**

\* *SUBSECTION (4)(e)(v)* we recommend this section should read as follows,



*Sufficient monitoring to establish the spatial distribution, and the physical and chemical trapping state of the CO<sub>2</sub> in the subsurface.*

Ecology Response:

The suggested change is not needed. Monitoring is intended to determine the location of the injected CO<sub>2</sub> and whether unacceptable leakage is occurring.

**WAC 173-218-115(4)(g), Annual Report**

**Comment W-25**

\* SUBSECTION (4)(g)(iv) this section should read,  
*Observed deviations from predicted behavior shall be identified and explained;*

Ecology Response:

According to *Webster's II* dictionary an anomaly is a deviation. The suggested change is not needed.

**Comment W-25**

\* SUBSECTION (4)(g)(v) requires annual reports to include discussion of suggested changes in project management or suggested amendment of permit conditions; We recommend that this can be combined with the two prior requirements, in (iii) and (iv), by inserting the following at the end of (v) after "permit conditions":  
*"in light of observed anomalies, assessment of model accuracy, and any other relevant considerations."*

Ecology Response:

This suggestion is not needed and unnecessarily limits the suggested project management and permit condition changes that may be proposed in the annual report.

**WAC 173-218-115(6), Post-closure**

**Comment W-16**

As noted above, Washington does not have a defined post-closure period for Class V wells, and none is provided in the draft regulations. In proposed Section 173-218-115(6), the Department proposes:

The post-closure period shall continue until the department determines that modeling and monitoring demonstrate that conditions in the geologic containment system indicate that there is little or no risk of future environmental impacts and there is high confidence in the effectiveness of the containment system and related trapping mechanisms.

While flexibility is welcome and helpful in a variety of regulatory areas, the proposed regulations may deter investment in CCS projects by leaving too open-ended the period of post-closure responsibility and the duration of which a site owner or operator must maintain financial assurance. Contrast the department's

amorphous standard with the time-limited financial responsibility period proposed by the IOGCC. Somewhere between lies a financial responsibility period that gives sufficient certainty to project developers, owners, operators, financiers in order for CCS projects to go forward, and the flexibility to take into account site specific factors. Risk profiles - both for types of sites with which there is little experience at present, such as deep saline formations, as well as specific injection sites - will become clearer as more experience is gained. We suggest including a sufficiently protective specified time limit for financial responsibility in the regulations, which would be shortened as information is developed to promote a clearer risk picture and higher degree of confidence.

The State should develop and employ risk indicators to track and characterize the (likely diminishing) risk levels as operation progresses and eventually ceases, and post-closure monitoring begins. This will encourage appropriate allocation of resources.

The IOGCC's CCS Task Force proposed a two-stage period, following the cessation of operations, for which it used the nomenclature "closure" and "post-closure." An "industry-funded and state-administered trust fund" would assure the financial ability to respond to releases during the post-closure period.

We support this concept and strongly encourage the State to consider such a mechanism. State-chartered carbon mutual trusts could act as a "first loss reserve" for CO<sub>2</sub> leakage or damages, beyond the damages to be covered by the operator through private insurance programs. Such a risk sharing measure encourages better site review, selection, management and monitoring by both the State and the project developer, while avoiding the potential moral hazard for government agencies. Private commercial insurance could be negotiated for the CO<sub>2</sub> transportation and injection period and capped at a reasonable level. The "first loss" reserve protection of a state-chartered carbon mutual trust would cover losses in excess of those covered by negotiated private insurance instruments. This protection could be coupled with a Federal backstop for long term, indefinite losses and the long-term post-closure period.

Capitalization for a carbon mutual trust could come from a number of sources--a royalty fee on coal; an injection fee or adder applied to the rates approved by the State Public Service Commission (PUC) and charged by the storage facility and/or coal-burning power plant; a wires charge or carbon levy applied to regulated transmission entities; and/or from a percentage of the State taxes generated from one or more CCS projects in the state. Each state could have one or more carbon mutual trusts, which could be capitalized by multiple projects, as the sector evolves. Or states could collaborate regionally as on other issues to charter the same trust operating in multiple territories. The trusts could be privately administered in compliance with state insurance regulations; in this manner the state has final governance authority by charter status, while private industry can bring fiduciary and engineering analysis resources to bear which would be expensive for states to match.

**AND**

**Comment W-25**

\* SUBSECTION (6) Because there is no way to ensure that taxpayers will not be called to cover a potential cost, the following suggestion is very important to include in this rule. The following language should be added to the end of section 6

*The department retains the right to require operators to undertake subsequent monitoring or other necessary remedial actions after the completion of the post-closure period if a breach or potential breach in the containment system is identified, or if additional post-closure activities by the operator may become necessary to ensure the permanence of the sequestration or the protection of public health or the environment.*

**Ecology Response:**

The length of the post-closure period is determined through a performance standard based upon the reduction of project risks through time and site specific considerations. The length of the post closure period will depend upon unique geologic characteristics of the site and the geochemical processes that are expected. The use of a performance standard, as opposed to a set time post-closure period, will encourage operators to select sites where the risks are expected to decline quickly resulting in a shortened post-closure period.

Comments suggest several scenarios that include changing the state's liability laws and/or developing risk sharing financial mechanisms. Changes to liability laws and developing new financial mechanisms are beyond the scope of Ecology's current legal authority. The Washington State Legislature is the body with the authority to take any of these liability related actions, if they choose to do so.

Comments suggest adding language to the end of the post-closure period extending liability after Ecology has provided written approval to complete the post-closure period. If additional measures are required Ecology should not approve the end of the post-closure period. If unexpected problems are encountered after the end of the post closure period, Ecology can use toxic cleanup program rules to require additional actions. It will be important for project operators to have some end point provided with an approval to end the post closure period. No changes to the post-closure rules have been made.

**WAC 173-218-115(7), Financial Assurance**

**Comment W-24**

In 173-218-115(7)(a) - This provision should also allow "(vii) Other financial instruments or performance security acceptable to the department." This would allow for new instruments or pooling arrangements.

**AND**

**Comment W-25**

\* SUBSECTION (7)(a) Financial Assurance

It is not clear whether a closure and post closure account is separate or one account. These accounts should not be commingled for the purpose of both activities, without establishing clear financial sub limits for closure and post-closure. If the owner/operator mis-estimates the costs of closure or post-closure at one or more wells, and the account is managed as one large account as currently proposed, funds could be drawn down in excess to cover one well, leaving other wells potentially uncovered. If the concern is that financial assurance funds may be left over for closure and could be used to finance post-closure care, then additional language can be added to that effect - residual funds from closure may be used for the purposes of post-closure care once closure is complete. Likewise, if the intent were that these accounts also would secure possible remediation / mitigation activities (which tend to be probabilistic, not certain in nature like closure / post-closure), one event could deplete the entire account.

This can be achieved with the following minor changes,

*(7) (a) The owner or operator shall establish a closure and a post-closure account to cover all closure and post-closure expenses respectively.*

*The performance security held in the accounts may be:*

Also, we recommend the addition of the following options for accounts because the proposed list of instruments is too restrictive and solely cash-based. Other mechanisms should be allowed too as below, along with a provision to safeguard against inappropriate withdrawal,

*(vii) Third party insurance;*

*(viii) Self insurance in the form of a corporate financial test or corporate guarantee; or*

*(ix) Any other instrument deemed acceptable by the department.*

*(add before b) The owner/operator shall be responsible for paying all assessed trustee or administrative fees assessed by a financial institution financing any cash instruments. A financial institution may not withdraw funds to cover administrative fees.*

\* SUBSECTION (7)(c) Because it is not clear whether the cost estimate is the net present value of the future stream of closure/post-closure activities (i.e. a discounted cost in current dollars) or a current engineering cost estimate (i.e. not discounted). If it is the latter, and depending on the magnitude of costs associated with closure/post-closure, the investment "hit" on a company of posting 100% cash up-front could be significant. Therefore this section should read,

*The cost of the closure and post-closure activities shall be calculated as net present value figures using current cost of hiring a third party to close all existing facilities and to provide post-closure care, including monitoring identified in the closure and post-closure plan.*

Ecology Response:

The closure and post closure accounts may be one or two accounts but must have separate calculations of closure costs and post-closure costs. The account cost estimate must be updated annually. If unforeseen closure costs are encountered the operator would be required to add to the account to cover the remaining post-closure cost estimate. The account balance will become important if the operator defaults upon their closure and post-closure financial obligations, so having one or two separate accounts would not change the costs to the state for covering unforeseen expenses if the operator is no longer financially viable.

A comment suggested adding word “net present value” to the requirement to use current cost estimate. The intent of the rule on cost estimate for financial assurance is that the operator estimate the cost of the activities today (i.e. current cost) for closure and post-closure activities. The current cost will be updated annually to include changes. Net present value would require a prediction of future cost and is not what this rule intends to require for financial assurance.

Comments suggest adding an option for "Other financial instruments or performance security acceptable to the department." The rule has been changed to add this suggestion which will allow the department to review and possibly approve financial assurance mechanisms that may not be available today.

**Chapter 173-407 WAC – Carbon Dioxide Mitigation Program,  
Greenhouse Gases Emissions Performance Standard and  
Sequestration Plans and Programs for Thermal Electric  
Generating Facilities**

**GENERAL COMMENTS:**

**Comments W-1, W-3 and W-10**

Our communities will be directly affected by the quality of these regulations, and by the climate change, pollution, and other consequences of further use of coal plants for electrical generation.

We urge you to adopt the most stringent standards available to you to protect current residents, as well as our children and grandchildren, and also their grandchildren from unwise and unsustainable actions that would support our lifestyle at the expense of the health and wellbeing of future generations.

**AND**

**Comment W-2**

Climate change is the biggest challenge we all face for this and the next couple generations. Washington's "Emissions Performance Standards for Power Plants that Emit Greenhouse Gases" are a step in the right direction. Thank-you for walking over these thorns for us and our kids.

**AND**

**Comment W-4**

Stringent air quality regulations are needed now. Eastern Washington needs a law that clearly defines the maximum air quality limits for the industry but especially for the protection of our communities. I urge you to adopt the most restrictive standards available to you and to make all regulations crystal clear so the energy industry understands that it's moral obligation is to the health and well-being of current and future residents including Mother Earth and not solely to the company's profit margin. If they won't commit to being good stewards of the environment by adhering to your (hopefully) very strict standards, then they shouldn't be allowed in Washington State.

**AND**

**Comment W-6**

The Coal Plant Working Group steadfastly opposes the building of more coal-fueled plants. That said, we do feel that EFSEC and the Department of Ecology need to write regulations which work to protect the health and safety of the public and the environment. We do feel more can be done and urge you to redouble your efforts in these last several months of your rule revision process to ensure that, to the best of your ability, you are protecting the environment and the health and well being of citizens now and for generations to come.

**AND**

**Comment W-28**

My dominant comment is that the most significant issue is NOT addressed so I consider this DOE exercise a sham. Yes, a sham. The dominant issue: Because global climate change is such a significant problem, there should not be any action by the WA Department of Ecology (DOE) to minimize or in any way undermine SB 6001 and HB 2815: your draft rule purports to do just that!!!!

**AND**

**Comment V-3**

By supporting new coal infrastructure in Washington, we are effectively supporting a new coal infrastructure nationally and weakening our leadership in

progressive climate change legislation. We cannot forget the price of coal impacted communities wherever they are and watch whether they are Washington residents or not. Coal has become an increasingly difficult sale in Washington due to our emissions standards and I applaud that but I also urge you to avoid falling for clean coal as a global warming solution. To anyone who says that coal must be part of our clean energy future, I say they are severely underestimating the potential of the human race for innovation in the face of challenge and know we can and must do better.

**AND**

**Comment V-8**

I agree with most of the people that have already spoken, but I would like to point out that when we are talking about the kinds of programs that we are talking about today, we are talking about clean coal. The idea that there can be such a thing as clean coal. As a matter of fact, there is adequate evidence that that is not possible in a practical way. So, coal is not just harmful because of the emissions that it comes from, but it is harmful because of the kinds of things that it creates in the mining of it. It seems to me that the best that we can expect here is a level that would be from these plants if they are ever produced to be the same as the levels that are recommended for the natural gas generation plants.

**AND**

**Comment V-11**

Finally, I think a point that is critical for those of us who live on the East side of the Cascade crest is that we not ended up developing laws and implement regulations that create or worsen the problems of Eastern Washington as an environmental sacrifice for the state. We are already dealing with the legacy of Hanford, mining wastes that contaminant Lake Roosevelt and the Spokane River and Lake Coeur d'Alene Basin. We are at risk of becoming a center for energy production, pollution of agricultural lands and the pollution of our ground waters as well as worsening of global warming.

**Ecology response:**

ESSB 6001 directed Ecology to adopt rules to implement and enforce the GHG EPS. Ecology believes that the proposed rule establishes stringent standards to meet the legislative intent in ESSB 6001 to “authorize immediate actions in the electric power generation sector for the reduction of greenhouse gases emissions”. The rule is applicable statewide and will protect communities in both eastern and western Washington. While the rule does not prohibit new coal-fueled plants, any coal plant proposed to be built in Washington will have to comply with the EPS under this rule. Washington is one of the first states to adopt a GHG EPS standard for power plants. As other states follow Washington’s lead in reducing GHG emissions, the benefits will begin to accrue on the national level. Development of new laws is up to the legislature and

citizens need to work with their elected representatives to assure the laws they pass do not result in worsening existing environmental problems in Washington.

It is estimated that the amount of electricity produced by a power plant is reduced to support the carbon capture and sequestration. The reduction in electricity available for sale is reduced between 10 and 30 percent, depending on the specific power plant design. That reduction in electricity in turn reduces the cost effectiveness of new coal power plants. It allows new coal plants, but requires that they do their part to reduce GHG emissions to a rate similar to that of older natural gas fired combustion turbine based power plants. This puts the coal plants at an economic disadvantage compared to new natural gas fired combustion turbine power plants. The economic impact statement that accompanies this rule indicates that the cost of carbon capture and sequestration is cost prohibitive.

**Comment W-4**

I would like to see the rules expanded to provide:

c. that existing power plants in Washington State must be retrofitted to meet new standards or phased out on a DOE stated timeline with no exceptions.

This would be similar to but much more important than updating or phasing out aging infrastructure systems because outdated power plants create the most air pollution of any industry.

**AND**

**Comment W-19**

Existing plants must be retrofitted to meet new standards or phased out on a DOE stated timeline with no exceptions. To state that these plants cannot be upgraded is to set the table for the same conversation ten years down the road on new plants going in under 6001. This is not acceptable and regulations should be expanded to deal with the old plants.

**AND**

**Comment V-7**

Washington State must be retrofitted to meet new standards or phased out on a DOE stated timeline with no exceptions. To state that these plants cannot be upgraded is to set the table for the same conversation ten years down the road on new plants going in under 6001. This is not acceptable and regulations should be expanded to deal with old plants.

**Ecology response:**

Your proposal is beyond the scope of the authorizing legislation. ESSB 6001 specifically applies to new long term financial commitments and new plants built after July 1, 2008.



**Comment W-4**

e. that very specific regulations be crafted to deal with the disposal of toxic chemicals removed from the emissions by high tech scrubbers. Each toxic chemical needs to have it's own disposal regulation and detailed regimen in the manner of the regulations required for asbestos disposal.

**Ecology response:**

Your proposal is beyond the scope of the authorizing legislation. However, proper disposal of solid and hazardous wastes are dealt with in other regulations issued and enforced by the Department of Ecology. Ch. 173-303 WAC is Ecology's rule for dangerous waste.

**Comment W-4**

f. that regulations be written to require the detailed monitoring of air quality for Eastern Washington communities and establishing baseline limits which include all pollution sources. No new industries with toxic emissions should be allowed within a community airshed (100 mile radius) if the emissions will further degrade the air quality from the baseline limit. For example, Walla Walla has terrible air quality. We are surrounded by mountains on 3 sides, have many inversions with "dead air" days, are downwind of Boardman Coal plant/Hermiston power plant/Boise plant, and have many days of windborne dirt/dust/smoke from farming plus local cars, trucks, heavy equipment etc. but there are no air quality regulations that would prevent the additional pollution from a coal-fueled power plant in Wallula and/or an ethanol refinery in Boardman, Oregon even though both plants are within the Walla Walla airshed.

**Ecology response:**

Your proposal is beyond the scope of the authorizing legislation. However, the monitoring that you suggest is carried on in many areas of the state and nation for criteria pollutants. Criteria pollutants are: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Routine monitoring of particulate emissions is carried out in locations considered to be either representative of a larger area or areas where specific air quality problems due to particulate emissions are known or suspected. Other criteria pollutants are monitored as required by federal guidance or in areas suspected of having ambient air quality issues with that pollutant.

However the monitoring of other toxic pollutants is not routinely carried out due to the high cost of monitoring and technical difficulties with the monitoring equipment. As a result, routine monitoring of toxic air pollutants is not done except in a few well defined locations in the country. Emissions of toxic air pollutants are accounted for by using dispersion modeling and emissions inventories of permitted sources. In both cases when permitting of a new source of air pollution requires assessing the impact on the impacted communities using

the best data we have on what the current ambient air contains and the emissions from the proposed facility.

**Comment W-13**

2) When this rule become effective, will SRCAA be required to place these requirements into Waste-to-Energy's Air Operating Permit as applicable requirements? Since the statutory authority for Chapter 173-407 WAC is not from the Washington Clean Air Act, it appears that the GHG emission performance standard would not be an applicable requirement under the AOP program. Please confirm if this is a correct interpretation.

**Ecology response:**

The requirements of WAC 173-407, Part I and Part II, are based on RCW 80.70 and 80.80. These laws are not part of the Clean Air Act, and as such are not directly applicable requirements for an Air Operating Permit. The provisions are applicable when triggered.

The Part I requirements of this rule are incorporated in air quality permits issued under the authority of Chapter 70.94 RCW as noted in WAC 173-407-020 "Order of Approval" and "Total Carbon Dioxide Emissions", and WAC 173-040-060(1). Thus, when the requirement to mitigate the increase in CO2 emissions is triggered, the approval of the mitigation plan must be incorporated in an Order of Approval. Once incorporated in the Order of Approval, the mitigation requirement becomes an applicable requirement.

The Part II requirements are to be enforced using enforcement authorities in the state's Clean Air Act (WAC 173-407-240). For ease of enforcement of the requirements, it is best if they are included in an Order of Approval (thence in the AOP as a state only requirement). However, this rule does not contain a requirement to include the EPS or the associated recordkeeping, monitoring, and reporting requirements of the rule within the air operating permit or an NOC. We would encourage a permit writer and source to include the EPS, and the monitoring, recordkeeping, and reporting provisions of WAC 173-407 Part II be included or referenced in an Order of Approval or in the Air Operating Permit as a state only requirement.

**Comment W-17**

Compliance should be a one-time determination, not an annual review. CCW strongly disagrees with the approach in Sections 140 and 230 that requires annual compliance and on-going monitoring. Compliance should be a one-time activity and not subject to regular review and on-going monitoring. Section 8 of SB 6001 provides the Washington Utilities and Transportation Commission will determine compliance once, either in a general rate case or upon application by a utility.

The commenter continues with additional text that since the power plants are subject to power contracts that are subject to a one time review by the WUTC and that an independent generator providing electricity to a WUTC regulated entity under a long term-contract must have assurance that it will be allowed to fulfill its contract terms.

Ecology response:

The comment is limited in scope to independent generators subject to long term contracts with electric utilities regulated by the WUTC and does not recognize that the WUTC role in RCW 80.80 is to assure the contracts comply with the provisions of the law and the regulatory scheme developed by Ecology.

RCW 80.80.040 contains terms specifically related to power plants located within Washington, and not necessarily tied to power sales contracts with Washington state electric power retailers (public or private). The Department of Ecology is clearly given the authority to develop methods to determine compliance with the EPS and to provide for enforcement with noncompliance with the standard.

Ecology will not impinge on the authority or prerogatives of the WUTC or the public utility governing boards in their oversight of compliance of long-term contracts with the greenhouse gas performance standard. We will assist EFSEC and the local air pollution authorities in their compliance oversight and enforcement of the standard in air quality permits issued to electric generation plants subject to this law.

It is a common practice under air quality law to require regulated sources to determine compliance with emission standards on a continuing or intermittent basis. Thus the rules we have proposed are based on determining that the electric generation plant owner/operator assures compliance with the performance standard on an annual basis.

**Comment W-17**

Refinery gas should not be included in calculating the emissions rate.

Ecology response:

Ecology respectfully disagrees. Refinery gas has, in the intervening years since FERC determined refinery gas need not be included in its efficiency calculation, become a valuable commodity at Washington State's refineries. Refinery gas is increasingly being used internally to the refineries to fuel process heaters and boilers in order to reduce emissions of SO<sub>2</sub> and NO<sub>x</sub>. Refinery gas has become such a valuable internal fuel that refineries have installed wet gas compressors to compress the gas prior to going to the plant flare system simply in order to recover the fuel value of the refinery gas within the plant. Such recovery includes sending the compressed gas to the refinery gas treatment system to remove reduced sulfur compounds.

Refinery gas is derived from the oil refining process and as such is clearly a fossil fuel. Ecology will continue to treat it as a fossil fuel for all emissions control purposes, including greenhouse gas emissions calculations.

**Comment W-20**

1. It is sometimes difficult to understand how these rules relate to one another. At times it seems like the Ecology rule is broader, in that it covers its own jurisdiction, other local jurisdictions, and EFSEC jurisdiction. At other times and places it appears to cover just its own and local jurisdictions, but not EFSEC's. These rules (Ecology's and EFSEC's) were very difficult to read together, because of the occasional and sometimes subtle differences.
  - a. We would recommend one last careful reading of the rule to ensure that your intended approaches are consistent.
  - b. Where the text can be identical we urge you to make it so. We understand that numbering will be different on occasion, because one or the other agency may have requirements that differ, but subsection titles and text, unless substantively different should be identical. This only makes sense and would make the rules more reader friendly, a key goal of any rulemaking.
  - c. It would also be useful at some place, perhaps in multiple places, to state explicitly how the two agencies rules are related. For example, Ecology might state "These rules implement Chapter 80.70 RCW and cover all requirements under the jurisdiction of Ecology and local governments, and EFSEC where requirements are the same as for Ecology and local governments. Rules implementing Chapter 80.70 RCW that are specific to EFSEC only are codified in Chapter 463-80 WAC." Language of this sort would make it more clear what each WAC deals with and how they relate to each other.

**Ecology response:**

Differences between the EFSEC rules and the Ecology rules, beyond the numbering of sections, are as you stated mostly the same. Where the rule text is different, there are reasons for that difference that deal with the underlying statutes that authorize the creation of each agency. The suggestion that we are more explicit is not taken at this time. The rule text says that the Ecology rule is for power plants below 350 megawatts. This should be enough to direct an interested source to the correct rule. We can deal with public inquiries via phone or e-mail. In that way we can answer additional questions that will surely pop up.

**Comment V-8**

I am very discouraged the way that this hearing has been conducted. The publicity was inaccurate and the timeline situation was confusing. The equipment was not pre-tested so that it was going to be working properly so the hearing was held up because of that. And it just seems to me that this is so

frequently with these public hearings that they are set up rather haphazardly, so that people are discouraged from attending and participating in public hearings.

Ecology response:

Ecology is always interested in improving on our public process. We recognize that your time is valuable, and apologize for the delay caused by the equipment malfunction. We thank you for your feedback on the hearing procedures and will make adjustments in the future, as needed, to avoid the potential for confusion or delays.

**Comment V-11**

I would be concerned that we need to develop regulations that adequately protect the public and the public purse, and assure that liability lies with the polluting industry.

Ecology response:

Ecology agrees with your concerns. It is our aim to do exactly what you have asked us to do. In order to assure that liability remains with industry, both WAC 173-218-115 and WAC 173-407-220 have requirements for providing financial assurances (a letter of credit) that money is available “as a condition of plant operation sufficient to ensure successful implementation, closure, and postclosure activities identified in the sequestration plan, including construction and operation of necessary equipment, and any other significant costs.”

**Comment V-11**

Also, we need to look at how the state would intervene should standards not be met. I think it has been raised already if companies make a major investment the science is inadequate, standards are exceeded, is the state prepared to intercede.

Ecology response:

If the power plant does not meet the EPS the state is prepared to act with enforcement tools found in WAC 173-407-240.

**SECTION 005 Work in unison:**

**Comments W-1, W-3, W-4, W-10, W-25**

This group of commenters all support retention of the proposed rule language regarding “work in unison”. They view the requirements of RCW 80.70 and RCW 80.80 (aka 6001) as separate requirements. Commenter W-25 specifically notes that if the legislature intended to repeal portions of RCW 80.70, that it would have specifically done so. This commenter also notes (as does commenter W-11) that the two laws address greenhouse gases in very different ways.

Ecology response:

Thank you for your comments.

**Comment W-20**

On page 12, at the beginning of PART II, at WAC 173-407-110 Policy and Purpose of Part II, there is no restatement of the rules working in unison. EFSEC includes the “working in unison” language in both its rules. Perhaps because it is in the same rule Ecology does not restate it. For consistency with the EFSEC rules, and for clarity when looking at either section in the Ecology rule, we think that Ecology should consider restating in Part II what was stated in Part I.

Ecology response:

WAC 173-407-005 Work in unison applies to Parts I through III of Chapter 173-407 WAC. It is located prior to Part I and references the sections located in Part I that apply to Chapter 80.70 RCW and the sections in Part II and Part III that apply to Chapter 80.80 RCW.

**Comment W-11**

Our understanding of the commenter’s position is that Ecology has reversed the proper order of application of the requirements of RCW 80.70 and RCW 80.80 regarding mitigation of CO<sub>2</sub> emissions (per RCW 80.70) and meeting of the greenhouse gas emission performance standard (per RCW 80.80). The commenter indicates the economic hardship of the Ecology proposed approach on its client, who is anticipating application to construct a new power plant in the near future.

The commenter proposed that the rule text be:

- o modified to be clear that if sequestration to meet the greenhouse gas emission performance standard is also full compliance with the mitigation requirements of RCW 80.70, or
- o that section 005 should be deleted in its entirety since greenhouse gas regulatory requirements are changing rapidly and these 2 laws and their implementing rules are likely to be superseded in the next few year .

Ecology response:

The commenter correctly points out one of the difficulties in following the Legislature’s directive that the two laws are to work in unison. To quote the commenter

”Applying 80.80 and 80.70 in unison is difficult because they regulate different things through different means. First, 80.80 and 80.70 regulate different universes of pollutants. Specifically, 80.70 regulates exclusively CO<sub>2</sub>, while 80.80 regulates all six Kyoto greenhouse gas categories. Second, 80.80 and 80.70 require differing temporal outcomes. 80.70 requires a source to mitigate a portion of its CO<sub>2</sub> emissions. This can be achieved either through payment of \$1.62 [ed. \$1.60] per tonne to a third

party or through self-directed mitigation projects. ... 80.80, on the other hand, requires that a source either never emit above a particular level of greenhouse gases or that the source extract and sequester GHGs emitted by the project adequate to ensure compliance with the EPS over the life of the project.”

The commenter goes on further in his comments to discuss why in their case the term 'work in unison' should be applied in a manner in which if applied outside of the context of their specific project proposal's outlines would fail to give full effect to the two laws separate requirements.

The pertinent section in RCW 80.80.005(e) reads as follows:

“A greenhouse gases emissions performance standard will work in unison with the states carbon dioxide mitigation policy, chapter 80.70 RCW and its related rules, for fossil-fuel thermal electric generation facilities located in the state;”

In the text of the law, the legislature states as a fact that the two laws will work in unison and no strained or forced regulatory approaches will be required to apply them to fossil fueled thermal electric generating plants. Ecology has followed the principle that since the Legislature did not provide any further direction on how the two laws work in unison, that the requirements of each law are to be met individually.

The current proposed rule language says:

“WAC 173-407-005 Work in unison. The requirements of this chapter, WAC 173-407-010 through 173-407-070 are based upon chapter 80.70 RCW and are separate and distinct from the requirements found in this chapter, WAC 173-407-100 through 173-407-320 that are based upon chapter 80.80 RCW. These two requirements are required to work in unison with each other in a serial manner. The first requirement is the emissions performance standard. Once that standard is met, the requirements of chapter 80.70 RCW (WAC 173-407-010 through 173-407-070) are applied.”

Assuming that Ecology is the local jurisdiction issuing the Notice of Construction Order of Approval to the commenter's project, Ecology's interpretation of how this text would apply in the context of the commenter's proposal is as follows:

1. Emissions of total greenhouse gases would be limited by a condition of the Order of Approval.<sup>1</sup>

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<sup>1</sup> Inclusion of the greenhouse gas emission performance standard or a lower emission limitation in the Order of Approval is the method that would be used to assure the ability of ecology to enforce non-compliance with the standard. Inclusion of the limitation in an Order of Approval makes it an enforceable limitation that is looked at when determining the quantity of emissions subject to mitigation under RCW 80.70.

2. Costs over the lifetime of the project to sequester greenhouse gasses in excess of the performance standard are calculated.
3. The dollar value (per requirements of RCW 80.70 and WAC 173-407, Part I) of the CO<sub>2</sub> that is proposed to be actually emitted to the atmosphere is determined.
4. The sequestration is considered under WAC 173-407, Part I, as a self directed mitigation program.
5. As self directed mitigation program, if the dollar value of the costs to sequester greenhouse gas emissions is greater than the value of the mitigation requirement of RCW 80.70, then both laws have been complied with.
6. If the value of the self directed mitigation program is greater than the costs to sequester then additional mitigation is required as either a self directed mitigation program, payment to an independent qualified organization, or through purchase of greenhouse gas credits.

In the commenter's case, they state that they would operate their coal based IGCC project to meet a GHG emission rate of about 650 – 700 lb/MWh (about 65 percent reduction in GHG emissions). The mitigation requirement would be based on the emissions actually anticipated/permitted in an air quality permit to occur. If we assume the emissions will be 650 lb/MWh and the facility produces 750 net MWh, the quantity of CO<sub>2</sub> to be mitigated under RCW 80.70 and WAC 173-407, Part I would be \$12,150,200.<sup>2</sup>

If the costs, over the lifetime of the project, to sequester CO<sub>2</sub> in excess of the performance standard would exceed this \$12 million dollar value, then the mitigation requirement of RCW 80.70 will be met.

Removal of section 005 would leave the intent of the agency on how the two laws are to work in unison ambiguous to affected electric generation facilities. The determination of how they work together would be subject to policy determination by the agency and not open to public scrutiny or comment.

Ecology appreciates the commenter's concerns, but respectfully disagrees with both the commenter's reading of the provision, and the commenter's recommended solution. We do not read the provision as currently drafted as barring additional sequestration beyond the GHG EPS being used for the purposes of mitigation under RCW 80.70. For example, if a facility was obligated to meet a performance standard of 1,100 lbs/MW-hr under RCW 80.80, but chose to sequester through 700 lbs/MW-hr, the mitigation requirement of RCW 80.70 would be met.

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<sup>2</sup> This contrasts to the commenter's proposal that the RCW 80.70 emissions would be the emission performance standard. This is could occur if the permitting agency only limits the greenhouse gas emissions to the performance standard, rather than the lower proposed emissions.



Ecology was specifically directed by the language of RCW 80.80 to ensure that RCW 80.80 “works in unison” with RCW 80.70. Given this directive, Ecology is unable to remain silent on the issue in the rule language as the commenter suggests.

## **PART I**

### **SECTION 010 Policy and purpose of Part I:**

No Comments

### **SECTION 020 Definitions to Part I:**

No Comments

### **SECTION 030 Carbon dioxide mitigation program applicability for Part I:**

No Comments

### **SECTION 040 Carbon dioxide mitigation program fees under Part I:**

No Comments

### **SECTION 050 Calculating total carbon dioxide emissions to be mitigated under Part I:**

No Comments

### **SECTION 060 Carbon dioxide mitigation plan requirements and options under Part I:**

#### ***Comment V-6***

I am also concerned about mitigation through payment. It makes me very nervous. And, I wonder how we can pay a Portland based company to mitigate when air quality in another region is being directly impacted. This is not an acceptable mitigation tool in my mind.

#### ***Ecology response:***

The provisions of Chapter 80.70 RCW (passed in 2004) require new qualifying power plants to mitigate some of their carbon dioxide emissions. One of the

mitigation options that the law allows is for payment to a third party. The intent was that if a power plant could not conduct their own mitigation project, or if it made better economic sense to have another entity do the mitigation, the power plant would have the ability to contract with an independent third party to do the mitigation for the power plant. The company in Portland, which you refer to, is the only contractor who has stepped up to the task so far. Others may in the future. You raised the notion that mitigation should occur where the emissions are released. Because the global climate change problem is indeed global and there are no local direct health consequences, it is not required or necessary that the emissions point and the mitigation take place in the same locale. We agree that if the impacts would be in the vicinity of the plant that this would be where the mitigation should take place.

### **SECTION 070 Carbon dioxide mitigation option statement and mitigation plan approval under Part I:**

No Comments

### **SECTION 080 Enforcement under Part I:**

No Comments

## **PART II**

### **SECTION 100 Policy and purpose of Part II:**

No Comments

### **SECTION 110 Definitions to Part II:**

#### **Comments W-5 and W-27**

We recommend the following change:

WAC 173-407-110 Definitions to Part II. The following definitions are applicable for the purposes of Part II and Part III of this chapter.

Reason for proposed change:

Part III of WAC 173-407 uses terms defined in WAC 173-407-110. Without the proposed change, these terms do not benefit from definition in WAC 173-407-110. Without definition the terms could engender controversy.

#### **Ecology response:**

Ecology staff agrees with this recommendation and will incorporate this change into the final rule.

## **Definition of “baseload electric generation”**

### **Comment W-9**

The proposed characterization of a ‘cogeneration facility’ in this definition is ambiguous and is perhaps not consistent with statutory intent. The result may cause cogeneration facilities to improperly be considered as “baseload electric generation facilities” Ecology should simply utilize the definition of baseload electric generation provided in the statute, and not seek to fill assumed regulatory gaps with the creation of new terms and definitions.

The commenter goes on to note that there is a separate definition in the law for cogeneration facility and that cogeneration facility is used t in other locations in the law to distinguish these operations form baseload electric generation facilities. The commenter also questions the authority of Ecology to develop the text included in the proposed rule.

The commenter also believes that the usage of the concept of ‘capacity factor’ is alien to the cogeneration world and should not be applied to these facilities and units.

### **Ecology response:**

As with much of this law, statutory intent can be ambiguous and often in contradiction to the plain language of the law. The definition of cogeneration facility clearly includes the commenter’s facility, a facility where steam is produced in a number of boilers using fossil and biomass fuels. The steam is used to power steam turbine/generators and is used to provide mechanical power and process needs in other portions of the industrial facility.

Since this facility and many other similar cogeneration facilities provide electricity for sale on a continuing basis, they function as baseload generation. There are other facilities that are by design intent baseload generation that find users for waste heat energy in order to qualify for the special treatment that cogeneration facilities receive under FERC regulations.

We note that RCW 80.80.040 only grandfathers cogeneration facilities using natural gas or waste gas, a very limited universe of units in Washington. This would imply that a cogeneration facility utilizing fossil fuels and biomass would not be grandfathered and have to meet the greenhouse performance standard as of July 1, 2008. This need to comply with the performance standard would apply regardless of how much electricity is sold or the capacity factor of the electricity sold to the capacity to produce electricity. We feel this is a situation similar to the lack of recognition that biomass combustion involves some usage of fossil fuel (such as for cold start-up or to stabilize combustion).

The language of RCW 80.80.040(6) clearly anticipates the inclusion of emissions from cogeneration facilities in this program. However, a facility such as the

commenter's would also be required to comply with the performance standard since it is not a specifically grandfathered cogeneration facility (per RCW 80.80.040(4)) a grandfathered baseload cogeneration facility (per RCW 80.80.040(2)) or a facility powered exclusively by a renewable energy source (per RCW 80.80.040(3)).

The intent of the proposed modification to the definition of baseload electric generation facilities was specifically to clarify the application of this law and rule to cogeneration facilities that are not fueled exclusively with natural gas or waste gas. The inclusion of cogeneration facilities with an electrical output capacity factor of at least 60% was to accomplish two things. First it was to set a de minimis generation rate that would require such a facility to be included in the program, so that facilities that consume all the electricity they produce and only offer trivial or intermittent amounts for sale would not be included. Second it was in recognition that cogeneration plants are often or routinely designed to provide baseload electricity with some usage of excess energy for other useful purposes. This recognition of special status is included in the requirement that a cogeneration facility must meet the criteria to be classed as a "Qualified Facility" per FERC regulations, and as a result of that status is allowed to utilize an alternative formula to determine compliance with the GHG EPS in a way that accounts for the beneficial use of energy in the industrial plant. We note that this issue was not an item of contention or comment during the rule development stakeholder process.

Ecology will not make any changes to the definition of baseload electric generation in response to these comments.

**Comment W-23**

Ecology uses the term "designed and intended" in its definition of "baseload electric generation". "Designed and intended" is not defined in Ecology's Draft rules. Clarifying the meaning of "designed and intended" is important to understanding and implementing the definition of "baseload electric generation". Some power plants may not be considered baseload electric generation based on an interpretation of the phrase "designed and intended". PSE recommends that Ecology adopt the following language defining 'designed and intended': "Designed and intended" means 1) designed is the level of operation originally specified by the engineers for the power plant, and 2) intended is the level of operation allowed for by the current permits for the power plant."

**Ecology response:**

Note that the definition of 'baseload electric generation' in RCW 80.80.020(4) includes the term "designed and intended", so the use of the phrase in that definition is not our invention.

However, the suggested definitional clarification proposed is our understanding of the meaning of the phrase. We agree that such a clarification is in line with

our understanding of the language as used in the law and as we have used it within the proposed rule. Therefore, we will make the following change:

"Baseload electric generation" means electric generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least sixty percent. For a cogeneration facility, the sixty percent annual capacity factor applies to only the electrical production intended to be supplied for sale. For purposes of this rule, designed means originally specified by the design engineers for the power plant or generating units (such as simple cycle combustion turbines) installed at a power plant; and intended means allowed for by the current permits for the power plant, recognizing the capability of the installed equipment or intent of the owner or operator of the power plant.

### **Definition of "Electricity from unspecified sources"**

#### **Comment W-23**

Comment excerpt:

Electrical companies have significant amounts of electricity from unspecified sources in their supply portfolio. In PSE's current Request for Proposals for electric supply, PSE has received over 1,600 MW of bids in the form of Power Purchase Agreements with the electricity from unspecified sources. This 1,600 MW represents over 30% of the total MW bid into PSE's current RFP. Given that this represents a substantial amount of potential power in PSE's and the regions portfolio, it is imperative that "electricity from unspecified sources" apply to an "electrical company". PSE recommends that Ecology clarify that "electricity from unspecified sources" can apply to both consumer-owned utility and electrical company:

Suggested Rule Language: "Electricity from unspecified sources" means electricity to be delivered pursuant to a long-term financial commitment whose sources or origins of generation and expected average annual deliveries of electricity cannot be ascertained with reasonable certainty. This provision can be utilized by both a consumer-owned utility and an electrical company.

#### **Ecology response:**

Thank you for your suggestion. While Ecology believes that the existing definition does not exclude investor owned utilities, we want to avoid any uncertainty or confusion that may exist. The term "electric utility" is defined in the rule as an electrical company or a consumer owned utility.

Ecology will revise the definition of "electricity from unspecified sources" to reference electric utilities:

"Electricity from unspecified sources" means electricity to be delivered pursuant to a long-term financial commitment entered into by an electric utility whose sources or origins of generation and expected average annual deliveries of electricity cannot be ascertained with reasonable certainty.

**Proposed Definition of “local jurisdiction”** (Note: Cr-102 draft did not include a definition for this term and it is not included in the final rule filed with the CR-103)

**Comments W-1, W-3, W-4, W-10 and W-15**

Not defining power plant sources for Washington utilities to include those licensed by “local jurisdictions” in other states will also dilute and defeat the purpose of 6001 to protect our common climate and environment.

**AND**

**Comment V-7 and W-19**

Comment excerpt:

the term “local jurisdiction” needs to include not only in-state producers of fossil fuel supplies, but local jurisdictions in other states. If this is not done, in-state suppliers as well as the Washington state consumers will be penalized and costs will increase for power production.

**AND**

**Comment W-25**

Comment excerpts:

For clarity, we strongly recommend defining local jurisdiction in these rules as

“Any entity in Washington state in addition to the energy facility site evaluation council that has authority for permitting electric generation facilities, and any entity located in another state, region, or province with authority for permitting electric generation facilities.”

Some parties may argue that local jurisdiction refers solely to entities within Washington state that have authority for permitting electric generation facilities. The effect of that interpretation would be to limit application of the emissions performance standard to utility long-term contracts with in-state electricity providers, thus violating the meaning and intent of this statute.

Because the term “local jurisdiction” on its own is ambiguous, we must look to the intent of the Legislature and the substance of the law in interpreting its meaning. See Kokoszka v. Belford, 417 U.S. 642, 650 (1974) (“[when ‘interpreting a statute, the court will not look merely to a particular clause in which general words may be used, but will take in connection with it the whole statute (or statutes on the same subject) and the objects and policy of the law, as indicated by its various provisions, and give to it such a construction as will carry into execution the will of the Legislature.” ). RCW 80.80.005 clearly lays out the interest of the Legislature in reducing greenhouse gas emissions and addressing the global problem of climate change. The Legislature finds “there is a need ... to take sufficient actions so that Washington meets its responsibility to contribute to the global actions needed to reduce the impacts and the pace of global

warming.” (RCW 80.80.005(1)(f)). It would be nonsensical to assume that the Legislature intended simply to push polluting power outside the state while allowing in-state utilities to continue to rely upon it. The goal of the law is to reduce greenhouse gas emissions, not outsource them.

Another important purpose of the statute is to advance Washington’s role as a leader in developing technology to combat climate change. See RCW 80.80.005(1)(g) (legislature finding that “[a]ctions to reduce greenhouse gases emissions will spur technology development and increase efficiency, thus resulting in benefits to Washington’s economy and businesses”).

The substantive provisions in RCW 80.80 also underscore the clear application of the emissions performance standard to all new long-term financial commitments of Washington utilities, regardless of whether those are within-state or out-of-state generators. RCW 80.80.040 (2) says "*All baseload electric generation facilities in operation as of June 30, 2008, are deemed to be in compliance with the greenhouse gases emissions performance standard established under this section until the facilities are the subject of long-term financial commitments. All baseload electric generation that commences operation after June 30, 2008, and is located in Washington, must comply with the greenhouse gases emissions performance standard established in subsection (1) of this section.*" (emph added). The first part of this provision refers to all baseload electric generation facilities, while the second part refers to those baseload electric generation facilities that are located in Washington. If the term baseload electric generation was intended to apply only to in-state facilities, there would have been no need for the qualifier in part 2 of this provision that specifies facilities located in Washington.

The absence of any parallel specific limitation in the sections of the statute governing power contracting is significant. See, e.g., RCW 80.80.060 and 80.80.070.

Similarly, RCW 80.80.040 (3) deems compliant all renewable resources, regardless of where they are located, while RCW 80.80.040 (4) deems compliant only those cogeneration facilities located in Washington. Again, specific reference to Washington state facilities is purposefully used. The emissions performance standard also applies to contracts with the Bonneville Power Administration, as no provision was included to deem "Bonneville Power Administration resources" compliant with the law.

We can also look to formal comments made by legislators during deliberations prior to bill passage. Generally courts will provide the most weight to legislator statements made on the floor of the Senate or House during debate, particularly those made by the chair of the committee that brought the bill to the floor. On April 17, 2007, during the Senate Floor Debate regarding concurrence on ESSB 6001, Erik Poulsen, Chair, Water, Environment and Telecommunications

committee stated:

“I would just like to add my support for this legislation... This is a big step forward at closing the door on pulverized coal, not just here in Washington state but throughout the west. Under this bill, this bill will help ensure that no new pulverized coal plants are built in Washington and also that our utilities stop buying pulverized coal from out of state.” (emph. added)

Finally, it is informative to examine reports in the media regarding the effect of the proposed legislation.

Ecology response:

Thank you for your comments. RCW 80.80 defines power plant to mean “a facility for the generation of electricity that is permitted as a single plant by the energy facility site evaluation council or a local jurisdiction”. Since the GHG EPS is an air emissions requirement, and both EFSEC and Ecology and the local air pollution control authorities within Washington state all have air pollution permitting authority, we believe it is appropriate to focus on that permitting aspect to define local jurisdiction. Washington state law is not enforceable on or by jurisdictions outside of the boundaries of the state. Therefore, Ecology does not agree that the definition of local jurisdiction should include out-of-state facilities.

Ecology does not interpret this to mean that the EPS is only applicable to long-term contracts with in-state electricity providers, resulting in the dilution of ESSB 6001 or the outsourcing of emissions of GHG to other states. Ecology agrees that RCW 80.80.040 addresses the reduction of GHG emissions from power use in Washington by 1) requiring new power plants located in Washington to meet the emissions performance standard and 2) requiring all long-term financial commitments for baseload electric generation to comply with the EPS.

Recognizing that Washington state does not have authority to regulate the construction of new power plants located outside the state, RCW 80.80.040(2) limited the application of the EPS to all new baseload electric generation located within Washington. New power plants constructed in other states are not directly subject to the EPS under this rule. However, Ecology does not interpret this to mean that out-of-state power that does not meet the EPS can be included in a new or renewed long-term contract (term of 5 or more years) for baseload electric generation that provides power to customers in Washington state. To the contrary, Ecology interprets the law to apply to all sources of power within a new or renewed long-term contract for power, regardless of whether the source is located within or outside the state of Washington.

As Commenter W-25 noted, RCW 80.80, subsections 060 and 070 address long-term financial commitments for electrical companies (i.e. investor owned) and consumer-owned utilities, respectively. Each of these subsections states that the electrical company or consumer owned utility may not enter into a long-term financial commitment unless the baseload electric generation supplied under the



commitment complies with the GHG EPS. Neither of these subsections limits the application of the EPS to purchases of in-state power supplied under the long-term financial commitment for either electrical companies or consumer-owned utilities. Procedures for determining the EPS for long-term financial commitments are addressed in WAC 173-407-300 of the rule. Subsection 300 does not limit the applicability of the EPS to only in-state power supplied under long-term financial commitments. To the contrary, Subsection 300 specifically states that it applies to any long-term financial commitment that includes electricity from unspecified or specified sources of power. The intent of this language is to include all power sources contained in a long-term financial commitment to provide retail or wholesale power to end-use customers in Washington. Ecology believes that the existing language accomplishes the intent and respectfully disagrees that a definition is needed for local jurisdiction.

### **Definition of “new ownership interest”**

#### **Comment W-23**

PSE is concerned that the definition of “new ownership interest” proposed in the draft rules is inconsistent with the language and intent of Chapter 80.80 RCW. The operative provisions of Chapter 80.80 RCW relating to “long-term financial commitments apply only to long-term financial commitments entered into by an electric utility (meaning either an electrical company or a consumer-owned utility). RCW 80.80.040(1); RCW 80.80.060-.070. A “long term financial commitment” has no relevance except in the context of a commitment is made by an electric utility. Accordingly, PSE recommends that Ecology define “new ownership interest” in a manner that complies with the scope and intent of the statute, as follows: “New ownership interest” means the acquisition by an electric utility of more that 50 percent of the assets, or more than 50 percent of the equity interests in the owner of the assets, of a baseload power plant or a cogeneration facility or the electrical generation portion of a cogeneration facility. In no event shall a direct or indirect change in ownership of an electric utility constitute anew ownership interest.”

#### **Ecology response:**

The proposed language was briefly discussed during the stakeholder process and all stakeholders (including PSE) had an opportunity to comment on the proposal before we finalized the language to go to public notice. The language proposed is not incompatible with the plant-centric language Ecology has proposed with the draft rule except for the ownership change percentage.

Ecology would like to understand the basis for the proposed 50% ownership interest change proposal, but PSE does not offer any information explaining why 50% change is better than the 5% change in our proposal.

While the language of RCW 80.80.040(1) clearly looks at the financial commitment trigger involving a contract with a utility (not limited by where the utility is located), the usage of long-term financial commitment within RCW

80.80.040(2) and a subset of long-term financial commitment - new ownership interest - within RCW 80.80.040(4) do not seem to be similarly constrained.

Since power plant ownership can change independent of long-term contracts and our belief that such an ownership change would be a trigger to require compliance with the performance standard, we are not changing our plant-centric view of what a new ownership interest is.

**Definition of “Permanent sequestration”**

**Comments W-1, W-3, W-4, W-6, W-10, W-15, V-5 and V-6**

The definition of “permanent sequestration” in proposed WAC 173-407-110 is ambiguous with respect to the phrases “high degree of confidence” and “substantially ninety-nine percent.” We believe this language should be changed to read,

“Permanent sequestration” means the retention of greenhouse gases in a containment system using a method and in accordance with standards approved by the department that can be proven to contain at least ninety-nine percent of the greenhouse gases for at least one thousand years.

**AND**

**Comment W-9**

WAC 173-407-110 definition of Permanent Sequestration – It is premature to define this term. Discussion – Defining Permanent Sequestration as ninety-nine percent greenhouse gas containment for one thousand years is very robust. The World Resource Institute and World Business Council for Sustainable Development are considering a sequestration methodology that uses a 100 year decay curve and half lives of around 40-50%. Is there any information to suggest the 99%/1000 year performance is achievable?

**AND**

**Comment V-4**

We want to note for certain that if storage does occur it will be at least 99 percent or more for at least a thousand years, in essence, permanently.

**AND**

**Comment V-7**

Permanent is an ambiguous word open to interpretation constantly.

**AND**

**Comment V-11**

In regards to the permanent sequestration, we have a lot of experience with another pollutant and those are the mining wastes in the region. We have had mining companies that have severely polluted the Spokane River system and they have since left, transferring capital and avoiding liability. Most recently Asarco.

**Ecology response:**

The proposed definition of permanent sequestration acknowledges the direction from the Legislature to “permanently” sequester greenhouse gases while recognizing the current state of technology and the ability of computer modeling systems and monitoring programs to demonstrate compliance. Merriam-Webster defines permanent as “continuing or enduring without fundamental or marked change; lasting forever”. Applying this strict definition to sequestration could potentially prohibit the development and implementation of sequestration projects in Washington.

Ecology relied upon the scientific findings in the *Intergovernmental Panel on Climate Change (IPCC) Special Report on Carbon Dioxide Capture and Storage* published in 2005 to develop the definition of permanent sequestration in the draft rule. The IPCC reports that “Observations from engineered and natural analogues as well as models suggest that the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1,000 years”. The report further states that “the outcomes suggest that a fraction retained on the order of 90–99% for 100 years or 60–95% for 500 years could still make such impermanent storage valuable for the mitigation of climate change. All studies imply that, if CCS is to be acceptable as a mitigation measure, there must be an upper limit to the amount of leakage that can take place”.

During stakeholder committee meetings, discussions about how to define permanent sequestration produced suggestions varying from the most stringent definition that allowed no flexibility to a broader definition to require “substantially complete retention” without a defined percentage or time frame. Ecology’s proposed definition of permanent sequestration is based on the upper end of the scientifically supported IPCC report’s retention range for sequestered carbon. This range is considered achievable using existing technology and provides a degree of accountability that should instill public confidence while avoiding a limitation so burdensome as to prohibit the development of sequestration projects. Therefore, Ecology will retain the existing definition of permanent sequestration.

**Comments W-25 and V-2**

Merriam-Webster defines “permanent” as “*continuing or enduring without fundamental or marked change.*” Yet we appreciate that, in the context of sequestration under this rule, the definition needs to be workable and be able to

be enforced. The current definition is appropriate and perfectly feasible. It is consistent with the performance that can be achieved today in geologic sequestration projects. The IPCC has stated that "Observations from engineered and natural analogues as well as models suggest that the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1,000 years". We strongly urge the current definition to be retained and not diluted. It would not impose undue burdens on sequestration projects, but ensure that they are undertaken according to known and established methods.

We're pleased that the definition of permanent as provided by the rules is in line with scientific standards. For geologic sequestration, we recommend that we did advocate that permanent should mean the dictionary definition of permanent, forever and ever and ever, we accept this compromise because scientists have told us that it's entirely feasible and appropriate so we appreciate that.

**AND**

**Comment V-10**

We are pleased that the definition of permanent as provided by the rules is in line with scientific standards for carbon sequestration. It is a fairly feasible and appropriate definition, but we would also support the strengthening of this definition as proposed by the previous testimony.

**AND**

**Comment W-26**

Escape of injected CO<sub>2</sub> to the atmosphere from a sequestration site might increase CO<sub>2</sub> concentrations at a later date. Therefore, the higher the "re-emission" of CO<sub>2</sub> the less we can potentially use CCS as a transitional climate mitigation tool. Higher emissions also increase the potential for environmental impacts associated with leakage of CO<sub>2</sub> brine.

This raises the question of what is an acceptable leakage rate, and what is technically achievable today. We believe that experience to date with CO<sub>2</sub> injection; other related industrial activities such as natural gas storage, as well as seepage of CO<sub>2</sub> from natural underground sources are consistent with the proposed definition of permanence. The definition is also consistent with the findings of the IPCC report.

It is our view that there is sufficient experience and expertise to design and operate projects for the proposed permanence standard. We also believe that in general early projects should aim for these operating conditions first for establishing public confidence and acceptance of sequestration and, second, in order to increase the potential for sequestration to reduce emissions globally - as we mention above, higher leakage rates reduce the total volume that could be

sequestered worldwide over the next few decades and centuries.

At the same time it is important to recognize that early projects will help us to validate what are the most appropriate operating standards and therefore early approval processes should not be so onerous that geological sequestration is unduly inhibited and key learning lost as a consequence. We must also recognize that at some time in the future it may be shown that a very cost effective site exists that would have an anticipated storage performance of 95-98% for 1000 years. Society may wish to make that judgment. Therefore there must be scope for some flexibility in the application of the 1000/99 standard in the future, based on our experience over the coming decades, without undercutting the principle of "permanence".

Ecology response:

Thank you for your comments. Ecology believes that the proposed definition of permanent sequestration meets the intent of ESSB 6001 of reducing emissions of greenhouse gases while avoiding a standard so onerous that geologic sequestration would be prohibited. Ecology relied upon the scientific findings in the *Intergovernmental Panel on Climate Change (IPCC) Special Report on Carbon Dioxide Capture and Storage* published in 2005 to develop the definition of permanent sequestration in the draft rule.

**Proposed Definition of “permitted”** (Note: CR-102 draft did not include a definition for this term and it is not included in the final rule filed with the CR-103)

**Comment W-23**

Clarifying the meaning of “permitted” is important to understanding and implementing the definition of “power plant” and “baseload electric generation”. Some power plants may not be considered baseload electric generation based on interpretation of the phrase “permitted”. PSE recommends Ecology adopt the following language defining “permitted”: “Permitted” means the energy facility site evaluation council certification process that is the licensing process for the siting, construction and operation of power plant.”

Ecology response:

Thank you for your suggestion. As this legislation is to limit the emissions of GHG from new power plants, your suggestion would exempt all power plants that are not subject to EFSEC’s permitting process. There is a long history in Washington of baseload power plants being designed to be just below the size that is subject to the EFSEC permitting process. This size is currently 350 MW and larger power plants. Power plants under 350 MW are under the air pollution permitting authority of Ecology and the local air pollution control authorities. 300 MW is an entirely reasonable size for a new pulverized coal fired power plant to make economic sense. Such a plant would then be entirely outside of regulation by the permitting process you propose. If we were to adopt the definition of local jurisdiction you have proposed, then the hole might be closed, but leave open the question of how to enforce non-compliance with the performance standard which

our proposed rule proposed to do through the compliance and enforcement provisions in the state Clean Air Act. Without Ecology and the local air pollution control authorities involved in the permitting process and including the GHG EPS as an enforceable provision of the Notices of construction issued, enforcement via the tools in the state Clean Air act becomes very difficult.

Ecology is of the view that “permitted” implies any of a number of permits including a notice of construction order of approval issued under the state Clean Air Act. As such, we do not believe the term needs further explanation or definition.

### **Definition of “power plant”**

#### **Comment W-9**

Comment 1 -- The chapter 80.80 RCW definition of “power plant” is specific to facilities permitted by the “energy facility site evaluation council or a local jurisdiction.” This feature of the definition has been faithfully carried into the power plant definition in proposed WAC 173-407-110. Notably excluded are those power plants permitted by the Department of Ecology. This gap in coverage ostensibly represents the intent of the legislature and Governor.

#### **Ecology response:**

Local jurisdiction is often used as a vernacular term applying to local air pollution agency or authority in addition to other local governmental agencies.

As can be noted in looking at other comments (commenters W-15 and W-25 for example), there is a position that ‘local jurisdiction’ be considered to have an even broader context than anticipated by this commenter. These other comments advocate for an interpretation beyond simply jurisdictions in Washington that have authority for permitting electric generation facilities to any local jurisdiction in any state that could permit an electric generation facility that could supply electricity to Washington users.

If we were to follow this commenter’s suggestion that ‘local jurisdiction’ did not include the Department of Ecology where it functions as a local air pollution control authority, we would have to extend the logic to exclude all local air pollution control authorities from coverage and assume that ‘other jurisdictions’ are only counties, cities, and similar municipal governmental units. However since a local jurisdiction is equivalent to EFSEC, it is not clear how the Ecology or a local air pollution control authority differs from EFSEC in its responsibility to permit new power plants, develop, and enforce air emission control requirements and regulations, and enforce non-compliance with the GHG EPS.

Another alternate outcome of limiting the world of permitting agencies to EFSEC or a local jurisdiction, assuming that local jurisdiction means only a local air pollution control authority, means that power plants not subject to EFSEC jurisdiction could be located in the counties of eastern Washington where there is

no local air pollution control authority and never have to consider applicability of the GHG EPS. This is an outcome that is clearly not contemplated in the rest of the legislation (see specifically RCW 80.80.030, establishing emission reduction goals) as it would do nothing to control or reduce emissions of GHG from electric power generation.

It is Ecology's position that in the definition of 'power plant' in RCW 80.80.020 and in this regulation, that the air quality permitting offices of the Department of Ecology and the local air pollution control authorities are 'local jurisdictions' equivalent to EFSEC in its air quality permitting role.

**Comment W-23**

Clarify the meaning of power plant. Some power plants may not be considered baseload electric generation based on interpretation of the phrase 'energy facility site evaluation council' and "local jurisdiction." Ecology should clarify that the "energy facility site evaluation council" is a state level agency of the state of Washington. Similarly, Ecology should clarify that a "local jurisdiction" is a non-state agency in the state of Washington (such as a municipal corporation). Suggested rule language "Power plant means a facility for the generation of electricity that is permitted as a single plant by the energy facility site evaluation council or a local jurisdiction. "Energy facility site evaluation council" is a Washington state agency. "Local jurisdiction" shall have the meaning as defined in RCW 36.37C.020(2)."

**Ecology response:**

Thank you for your suggestion. We note that since development of this rule was left to Ecology, and we are to coordinate our rulemaking with EFSEC, we would question the usage of a definition of local jurisdiction that did not include Ecology and the other local air pollution control authorities as permitting entities. The suggestion is a reasonable one that local jurisdictions means a city, town or county government, but we wonder why the legislation was not more explicit by referencing the definition you have found. Since this is an air emissions requirement, and both EFSEC and Ecology and the local air pollution control authorities all have air pollution permitting authority, we believe it is appropriate to focus on that permitting aspect to define local jurisdiction. This is a position that is also compatible with our decision to utilize the state clean air act to provide a framework for enforcement of noncompliance by an individual power plant with the greenhouse GHG EPS.

**Definition of "regulated greenhouse gases"**

**Comment W-25**

The current definition for regulated greenhouse gas emissions reads, {definition text omitted}. From the beginning of this process, we have recommended that this should read that "regulated greenhouse gas emissions" is measured in terms of carbon dioxide equivalent. As it currently reads it appears that these rules do not recognize the vastly different global warming potentials of different

greenhouse gases. Methane has a global warming potential 23 times that of CO<sub>2</sub> - treating this gas as if it has the exact same impact on climate change as CO<sub>2</sub> is not scientifically accurate and will not help to meet the intend of the law.

**AND**

**Comment W-6**

We believe that “greenhouse gases” should be further defined, and some greenhouse gases should be weighted when figuring the required amount of emissions to be sequestered. For example, methane is 23 times as harmful as CO<sub>2</sub> as a greenhouse gas when released into the atmosphere. This should be taken into account if methane is found to be part of the mix of emissions produced by a power generation facility.

**Ecology response:**

Thank you for your comments. Such a position would have been easier to support had the term equivalent been applied to the performance standard. Notwithstanding the commenter’s view, nothing in the law indicates that the emission standards are on a carbon dioxide, global warming equivalent basis. We note that the most recent legislation on climate change and GHG emissions has rectified the oversight in this law by clearly regulating carbon dioxide equivalent of greenhouse gases.

We are retaining the process in the proposed rule to sum the simple masses of each greenhouse gas that is regulated under this rule.

**Definition of “renewable fuel”**

**Comment W-7**

Supports the Ecology change to the definition of renewable fuel to include byproducts of pulping or wood product manufacturing.

**Ecology response:**

No change was made to the definition of renewable resource as defined in RCW 18.280.020(13). In this proposed rule, we separated fuels from non-fuels included in that definition, and listed the renewable resources and fuels in a list format. We note that the definition as written in RCW 18.280.020(13) is difficult to understand as printed in the law. Once we separated it into a list format, the inclusion of byproducts of pulping and wood product manufacturing as a renewable fuel became clear.

**Comment W-9**

Comment 3 – WAC 173-407-110 definition of “renewable fuel” - Subsection (c) could be expanded to include: “By-products of pulping or wood manufacturing processes, including but not limited to bark, wood chips, sawdust, shavings, ~~and~~ lignin in spent pulping liquors, noncondensable gases, crude sulfate turpentine, and methanol; or”



Ecology response:

Thank you for the suggestion. The inclusion does not change the intent of the definition, though it is more extensive than the original list which was copied from RCW 18.280.020(18) as directed in RCW 80.80. We will not include the proposed changes in the final rule.

**Comment W-13**

Please confirm that municipal solid waste is not considered a "renewable fuel". I find it somewhat odd that landfill gas, which is a byproduct of municipal solid waste disposal is considered a renewable fuel, but municipal solid waste is not.

Ecology response:

We agree that it is odd that the gas produced from the decomposition of municipal solid waste is considered to be a 'renewable resource', while the municipal solid waste itself is not a renewable resource. However, we are clearly directed in RCW 80.80.040(3) to use the definition of renewable resource in RCW 18.280.020(18). The listing of renewable fuels in this regulation is directly copied from that definition. Municipal solid waste is not defined as a "renewable resource", therefore it is not a renewable fuel for this regulation.

**Definition of "upgrade"**

**Comment W-8**

The definition of upgrade, especially the phrase "includes the installation, replacement or modification of equipment that increases the heat input or fuel usage ...", appears to move the rule away from changes that are primarily intended to increase electric generation capacity into the area of steam demand. The primary purpose of the Camas Mill is to manufacture consumer products, and the manufacturing process is heavily steam-dependent. There are a variety of reasons (increased market demand for specific products, for example) where additional steam demand will occur. Many of these will have no linkage with increased electric generation capacity. Further, in the Camas Mill's unique arrangement with Pacificorp, plans to increase electric generation capacity are likely to be handled contractually, and will be easy to determine. The definition of "upgrade" does not need, nor should it include, the language referenced above.

Ecology response:

The definition of upgrade is in the law, RCW 80.80.010(18). We attempted to further clarify the meaning of that definition in our proposal.

Our understanding of the definition is that any activity undertaken by the owner/operator of the baseload generation or cogeneration facility that would increase the ability to extract energy from the fuel and convert it into electricity (or in the context of a topping cycle cogeneration facility steam also) or assure the long-term, safe operation of the electric generation facility would not trigger a need to demonstrate compliance with the EPS. However, if the changes also

result in an increase in the need to increase the heat input or fuel usage from that specified in an applicable air quality permit, then the change is a non-exempt upgrade that would require compliance with the GHG EPS.

Based on comments received, we will modify the definition to have a structure more like that of the law. This change does not change the determination that a change that increases fuel input would trigger the need to comply with the EPS.

"Upgrade" means any modification made for the primary purpose of increasing the electric generation capacity of a baseload electric generation facility or unit. ~~Upgrade includes the installation, replacement or modification of equipment that increases the heat input or fuel usage as specified in existing generation air quality permits in effect as of July 22, 2007.~~ Upgrade does not include:

- (a) Routine or necessary maintenance;
- (b) Installation of emission control equipment;
- (c) Installation, replacement, or modification of equipment that improves the heat rate of the facility; or
- (d) Installation, replacement, or modification of equipment for the primary purpose of maintaining reliable generation output capability that does not increase the heat input or fuel usage as specified in existing generation air quality permits as of July 22, 2007, but may result in incidental increases in generation capacity.

**Comment W-9**

Comment 5 – WAC 173-407-110 definition of “upgrade” - The structure of the proposed Upgrade definition arguably changes the core meaning of this statutory term. The literal interpretation of the proposed definition would penalize cogeneration facilities.

The commenter goes on to discuss specific issues related to the definition and Ecology’s proposed text.

**Ecology response:**

It is Ecology’s position that the definition of “upgrade” in the law was primarily to indicate what actions would not trigger the need to demonstrate compliance with the EPS. The inclusion of the exception to changes that also include or require an increase in fuel input was to assure that such projects did trigger the need to comply with the performance standard.

Notwithstanding the above, we agree that the first instance where we state that an upgrade that results in an increase in fuel usage could be misinterpreted in the context of a cogeneration facility such as the applicant’s. We also note that in spite of this, the definition as proposed could equally be misinterpreted in the context of a cogeneration facility such as the commenter’s. We are specifically including our interpretation of applicability of an upgrade that would trigger a

need by a cogeneration facility to comply with the GHG EPS in Appendix A to this CES.

Based on comments received, we propose to modify the definition to have a structure more like that of the law, as illustrated in the response above to Comment W-8.

## **SECTION 120 Facilities subject to the greenhouse gases emissions performance standard for Part II:**

### **Comments W-7, W-8, and W9**

As a group, these commenters question applicability of WAC 173-407 Part II and III, and RCW 80.80 to their cogeneration facilities. Each facility is uniquely configured either physically or by contracting relationships. Each facility uses biomass and fossil fuels and other waste fuels to power their cogeneration facility.

Commenter W-7 specifically asks that baseload electric cogeneration facilities utilizing renewable fuels be exempt from the rule. They believe that a full exemption is consistent with the language in ESHB 2815 (Chapter 14, Laws of 2008) Section 3(3).

Commenter 9 noted that WAC 173-407-120(5) should be amended to say: “A new baseload electric generation or new cogeneration facility becomes an existing baseload electric generation or cogeneration facility the day it commences commercial operation.” The suggestion is to improve clarity.

### **Ecology response:**

RCW 80.80 and WAC 173-407-120 grandfathers all currently operating baseload generation and baseload cogeneration facilities in the state. By language of the law, all currently existing facilities are in compliance until there is a triggering action. In the case of a cogeneration facility, a triggering action would be a non-exempt upgrade or a change in ownership.

Based on the question by these commenters on the status of existing generation facilities, we propose to amend WAC 173-407 as suggested by commenter W-9 to increase clarity of when an existing facility is required to meet the GHG EPS.

As for whether the paragraph of E2SHB 2815 cited by Commenter W-7 in any way modifies coverage under this rule to cogeneration plants using renewable fuels, we note that this law was passed long after the proposed language was filed with the Code Reviser's office. The language is related specifically to a subset of renewable fuel, not all renewable fuels listed in the definition of renewable fuel in Section 110 of our proposed rule. The definition of renewable fuel is separated from the definition of renewable energy source referenced in

RCW 80.80.040(3). We do not believe that the language of E2SHB 2815 modifies or changes the requirements of RCW 80.80.

WAC 170-407-120(5) is modified as follows:

WAC 173-407-120(5) A new baseload electric generation or new cogeneration facility becomes an existing baseload electric generation or cogeneration facility the day it commences commercial operation.

**Comment W-7**

The commenter specifically supports the allowance to use up to 10% fossil fuel (on an annual basis) and still qualify as a baseload generation or cogeneration facility using a renewable fuel.

Ecology response:

Thank you. This was our intent.

**Comment W-8**

WAC 173-407-120, *Facilities subject to the greenhouse gases emissions performance standard for Part II, (2)*, says the rule is not applicable to a “cogeneration facility or unit that is designed and intended to utilize a renewable fuel to provide at least ninety percent of its total annual heat input.” The rule provides no further elucidation about how one makes this determination. Many boilers in the pulp and paper industry are designed to accommodate multiple fuels, and we have an exemplary record of using renewable biomass fuels to supply the majority of our mills’ energy. The various GP LLC-owned entities (including GP Camas) are responsible for approximately 10% of the total US electricity generated by biomass. Nevertheless, the language noted above seems unnecessarily open-ended. The Camas Mill is above an 80% target at present, and the boilers were designed with the flexibility to meet a high biomass combustion target. However, fuel flexibility is of critical importance to the Camas Mill, Georgia-Pacific, and industry at large, and unforeseen circumstances could lead to a shift in fuel use. How would the Department of Ecology handle this situation, and how would we make the determination that a unit is designed and intended to use substantial quantities of renewable fuels?

Ecology response:

There is no exception for the use of fossil fuels in conjunction with renewable resources (fuels) to qualify for the automatic compliance provision in the law. Ecology proposed a de minimis fossil fuel usage in the regulation with the full knowledge that no electric generation facility is fueled exclusively with a renewable fuel. We chose the 10% value after review of de minimis fossil fuel usage criteria in other state and federal air quality regulations. 10% is a common minimum fossil fuel usage value to trigger emission standard applicability.

First the term “designed and intended” is a phrase borrowed from the legislative definition of ‘baseload electric generation’. As we understand this phrase and through application of compatible text of federal air quality regulations. It is our view that “designed and intended” for a renewable fuel fired system would mean that on an annual basis the facility is incapable of using more than 10 % fossil fuel through the design of the steam generating equipment or combustion units. For example, there are currently wood fired electric generation and cogeneration units in Washington, which have oil or natural gas burners which at maximum firing rate could not add more than 10% to the heat input requirements of the units. This would be indicative of a design intent. After the fact, a facility owner could request air quality permit limitations on its usage of fossil fuels such that the unit is subject to enforcement for using more than 10% fossil fuel on an annual basis. As part of the enforcement, the unit may also become subject to a number of federal air quality requirements that come into play when the fossil fuel use exceeds 10% on an annual basis.

Design intent would be represented by installation of a limited capability to utilize fossil fuel on a routine basis. Another view of intent would be through an air quality permit limitation the limiting the annual usage of fossil fuel.

***Comment W-7*** (Kimberly Clark)

**AND**

***Comment W-8*** (*Georgia Pacific-Camas*)

**AND**

***Comment W-9*** (*Weyerhaeuser*)

Commenters W-7, W-8 and W-9 asked for clarification of applicability of the proposed rule to their particular cogeneration facility.

*Ecology response:*

Appendix A of this document includes a response regarding applicability of the rule for each of the facilities in question.

***Comment W-9***

In comment 6, the commenter questions the inclusion of the word “or units” along with cogeneration facilities.

*Ecology response:*

The inclusion of ‘or units’ is to clarify that the situation where the cogeneration facility is comprised solely of a combined cycle combustion turbine system with no included steam turbine generator is also included. While not similar to the commenter’s facility, there are cogeneration facilities in Washington that are essentially single units. An example is a combustion turbine/generator with an

associated steam generator in the turbine flue gas ducting, and a steam line to some other industry. In this case the combustion turbine and steam generator are physically a single cogeneration unit.

**Comment W-9**

The commenter notes that “cogeneration facilities and units” is used interchangeably with “baseload cogeneration facility or unit”.

**Ecology response:**

Thank you for your comment. This appears to be an instance of inaccurate editing. We have edited the document and revised the usage of the terms, where appropriate, in all sections to meet context and number agreement.

**SECTION 130 Emissions performance standard under Part II:**

**Comment W-7**

The commenter “cannot support the emission performance standard language as currently written in WAC 173-407-130 (3) for Part II which reads: *“All base-load electric cogeneration facilities and units in operation on or before June 30, 2008, and operating exclusively on natural gas, waste gas, a combination of natural and waste gases, or a renewable fuel, are deemed to be in compliance with the emissions performance standard until the facility or unit is subject to a new ownership interest or is upgraded.”* It is generally recognized that cogeneration facilities firing renewable fuels cannot meet the emission standard of 1,100 lbs per megawatt regardless of ownership interest changes or upgrades. Minimally, Kimberly-Clark would like to see the reference to ‘renewable fuels’ deleted from this section so it becomes compatible with the previously supported applicability rule and WAC 173-407-120.”

**Ecology response:**

A primary aspect of including renewable fueled units within the cogeneration world is to allow them to utilize the compliance formula for cogeneration, rather than the formula for baseload generation units. It is our position that the use of the cogeneration formula is appropriate for all cogeneration units, not just those using natural gas or waste gas (aka refinery gas). By including renewable fueled cogeneration units we allow operations like this commenter’s to get credit for the equivalent electrical energy of the waste steam and heat recovered from the steam turbine/generator and the direct steam uses for mechanical equipment and process needs at the industrial plant. Were the electrical equivalent of the energy used within the industrial process ignored, cogeneration plants would have a much harder time demonstrating compliance with the GHG EPS, and we would not be furthering the goals to increase the opportunities to make beneficial use of the energy in wood and agricultural wastes produced in the state.

The intent is for “renewable fuels” in WAC 173-407-130(3) to be subject to the same 90 percent threshold that is contained in WAC 173-407-120(2). To make this connection clear, Ecology will add the following text to WAC 173-407-130(3):

For purposes of WAC 173-407-130, exclusive use of renewable fuel shall mean at least ninety percent of total annual heat input by a renewable fuel.

**Comment W-9**

Comment 9 -- WAC 173-407-130(1) omits a key phrase. The subsection should be reworded to say

Beginning July 1, 2008, all baseload electric generation and cogeneration facilities and units, subject to WAC 173-407-120, are not allowed to emit...

Discussion – WAC 173-407-120 serves as the Applicability section for the Part II regulation. Numerous performance requirements are presented in the sections which follow. Without the addition of the “subject to WAC 173-407-120” phrase, the implications could be that certain regulatory requirements in sections -130 to -240 apply to “all baseload electric generation and cogeneration facilities and units.”

Comment 10—WAC 173-407-130(1) – to support implementation of the performance standard, the regulation should provide a definition of “Total Greenhouse Gases” or, alternatively, use the term “Regulated Greenhouse Gases Emissions.”

**Ecology response:**

Comment 9: Ecology agrees with this clarification and will make the change to include reference to WAC 173-407-120.

Comment 10: While the law applies the term “total’ greenhouse gases, we have regulatory limited the emissions included in the standard to those non-fugitive emissions that are generated directly in the generation of electricity. Thus the use of our defined term “regulated greenhouse gases emissions’ is appropriate here.

We will make the following changes to the final rule:

WAC 173-407-130 Emissions performance standard under Part II.

(1) Beginning July 1, 2008, all baseload electric generation and cogeneration facilities and units subject to WAC 173-407-120, are not allowed to emit to the atmosphere ~~total~~ regulated greenhouse gases at a rate greater than one thousand one hundred pounds per megawatt-hour, annual average.

**Comment W-9**

Comment 11 – Important provisions in this regulation apparently become effective on July 1, 2008. There appears to be no phase-in time provided for “baseload electric generation and cogeneration facilities and units.” The result may well be immediate and on-going non-compliance. While deadlines in the statute create this dilemma, it is nonetheless unfair.

Discussion – If “baseload electric generation and cogeneration facilities and units” producing more than 25 MW do not already have a carbon dioxide CEMS in service, how would they be expected to comply with WAC 173-407-230(1)(c)(ii)(A) on the day the regulation comes into effect?

The WAC 173-407-130(1) Performance Standard for allowable greenhouse gas emissions is effective on July 1, 2008. It may be a challenging task to complete the technical evaluation of compliance with the Performance Standard for a complex CHP system (see Comment 6).

We suggest the rule include a compliance date of July 1, 2009 for all requirements. Alternatively, it could build in a compliance schedule available to regulated facilities if certain conditions are demonstrated.

**Ecology response:**

The Legislature established a compliance date of July 1, 2008 that is codified in Chapter 80.80 RCW. The statute does not provide for a phase-in period. Ecology does not have the authority to change the compliance date. However, a careful reading of the statute and rule will indicate that no requirements become effective for existing baseload generation and cogeneration units on July 1, 2008. This includes requirements to determine emissions of CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> from these facilities. Section 230 is only implemented when a facility has to demonstrate compliance with the GHG EPS.

Demonstration of compliance with the GHG EPS is not required until a triggering event occurs – a new generation facility, an existing facility has a non-exempt upgrade, an ownership change, or for baseload electric generating plants (not cogeneration facilities) a new long term contract.

No immediate compliance obligations exist for an existing electric generation facility or unit. Thus no delayed compliance date or provision for a compliance schedule is required.

**SECTION 140 Calculating greenhouse gases emissions and determining compliance for baseload electric generation facilities under Part II:**

**No Comments**



**SECTION 150 Calculating greenhouse gases emissions and determining compliance for baseload electric cogeneration facilities under Part II:**

No Comments

**SECTION 200 Requirement for and timing of sequestration plan or sequestration program submittals under Part II:**

**Comment W-4**

The requirement to meet this 1100 pounds per megawatt hour should start on the very first day of production and continue for every day of production. The allowance of a grace period of up to 5 years with no emissions regulation is ridiculous and unacceptable. First day, every day, is the only way!!!

**AND**

**Comment W-19**

Additionally, the allowance for plants to be able to go as long as five years before meeting this requirement and then only being required to make up the lost time OVER the life of the plant is unacceptable. The requirement to meet the 1,100# per MWH should be met from day one. No promises now and pay later.

Ecology response:

The law allows for sequestration to begin up to five years after start up in some cases. Chapter 80.80.040(11)(b) specifically allows for sequestration "commencing within five years of plant operation(.)"

**Comment W-13**

I am confused by the requirements in WAC 173-407-200 regarding the requirements to submit a "sequestration plan" and a "sequestration program." Based on this section, would a facility, such as the Waste-to-Energy facility, need to submit both a "sequestration plan" and a "sequestration program" if they enter into a new long-term financial commitment with an electric utility to provide baseload power and the facility does not comply with the EPS in effect at the time? What is the difference between a sequestration plan and a program?

The definition of "Sequestration plan" states "the sequestration will start after electricity is first produced, but within five years of the start of commercial operation." This is not clear to me how this would apply to the WTE plant because they started producing electricity and started "commercial operation" almost 20 years ago. I am assuming this is referring to the period of time after a new long-term contract is entered into, meaning that they have to start

sequestration no more than 5 years after the facility begins operation under a new contract. Is this correct?

The definition of "sequestration program" in WAC 173-407-110 states "demonstrate compliance with the emissions performance standard at the start of commercial operation"... and "with the sequestration starting on or before the start of commercial operation." This implies that they have to start the sequestration when the facility begins operation under a new contract.

I am not clear when a facility, such as the WTE facility, would have to start sequestration (i.e., no more than 5 years after entering into a contract or right after they begin operation under a new contract).

Ecology response:

There are no substantial differences between a "sequestration plan" and a "sequestration program" with the exception of the requirement of when sequestration begins. The criteria of a sequestration plan and a sequestration program is given in WAC 173-407-200(1) and (2) respectively. The primary difference is whether sequestration begins on or before the date the facility becomes subject to the GHG performance standard, or sequestration begins within 5 years after that date.

A power plant becomes subject to the rule (after July 1, 2008) if one of several triggering events occurs: "WAC 173-407-120(3) A baseload electric generation facility or an individual electric generating unit at a baseload electric generation facility is required to meet the EPS in effect when:

- (a) The new baseload electric generation facility or new electric generating unit at an existing baseload electric generation facility is issued a notice of construction approval or a site certification agreement;
- (b) The existing facility or a unit is upgraded; or
- (c) The existing facility or a unit is subject to a new long term financial commitment."

Under RCW 80.80.40(1) the EPS becomes effective on July 1, 2008 if one of the triggering events above occurs. Since the Waste-to Energy plant is a baseload electric generation plant, it is grandfathered into compliance until the owner/operator enters a new long term financial commitment or is upgraded. At that time, it would be subject to the EPS then in regulation.

## **SECTION 210 Types of permanent sequestration under Part II:**

**No Comments**

## **SECTION 220 Requirements for nongeologic permanent sequestration plans under Part II:**

### **Comment W-1, W-3, W-4, W-10, W-15, and V-5**

permitting up to 20% CO2 sequestration leakage, by not requiring monitoring equipment able to detect leakage under that amount as proposed in WAC 173-407-220(1)(c), is irresponsible, and defeats the purpose of 6001

**AND**

### **Comment W-6**

WAC 173-407-220 (1)(c) allows monitoring which shows leakage from sequestration at a threshold greater than 20%. This directly contradicts the standard elsewhere which aims at 99% permanent sequestration.

**AND**

### **Comment W-25**

SUBSECTION (i)(c) This section states, “the monitoring plan will be sufficient to detect losses of sequestered greenhouse gases at a level of no greater than twenty percent of the leakage rate allowed in the definition of permanent sequestration”.

The department should not hold other types of sequestration to a lesser standard than geologically sequestered greenhouse gases. We believe that the definition of permanence should apply here and not given an additional twenty percent leeway. As the definition of permanence says, the monitoring program should be designed to provide reasonable assurance that the project is meeting the permanence criteria. The law clearly directs sequestration to be safe and permanent. A leakage rate of 20% does not allow for a safe and permanent sequestration project and should not be allowed in these rules. The language should read as follows,

*(c) In order to monitor the effectiveness of the implementation of the sequestration plan, the owner or operator shall submit a detailed monitoring plan that will be able to detect failure of the sequestration method to place the greenhouse gases into a sequestered state. The monitoring plan will be sufficient to provide reasonable assurance that the project is meeting the definition of permanent sequestration. The monitoring shall continue for the longer of twenty years beyond either the end of placement of the greenhouse gases into a sequestration containment system, or the date upon which it is determined that all of the greenhouse gases have achieved a state at which they are now stably sequestered in that environment.*

**AND**

**Comment V-10**

We would also like to see in the sequestration portion, especially when you are talking about the non-geologic sequestration methods, in the monitoring section, it appears that it will only be detected, that leaks will only be detected if it is a 20 percent leak. We think that is way too huge. It should be in compliance with the definition of permanent. If there is a 1 percent leak, then we need to know about that 1 percent and that is the maximum percent leak that we should even be considering or worrying about. So, that needs to be changed.

**Ecology response:**

Several commenters expressed their opinion on the proposed wording of WAC 173-407-220(1)(c). They specifically objected to *twenty percent* in the sentence. *“The monitoring plan will be sufficient to detect losses of sequestered greenhouse gases at a level of no greater than twenty percent of the leakage rate allowed in the definition of permanent sequestration.”*

This section refers to non-geologic sequestration, a technology that is far from being implemented. All known technologies that would fit in this section are only at the concept stage. It will be many years before this portion of the rule will be used. The twenty percent figure was recognition that the technology would be in its infancy at the time it would be first used. Ecology expects that sometime in the future, as these unknown technologies become better defined, the rule would require amendment to better reflect the realities of what ever might be developed as non-geologic sequestration.

Technologies that will be developed for non-geologic sequestration will be available for use at some point in the future. Ecology now believes that this leak detection rate should be determined at the time of the permit issuance.

Therefore we are modifying the rule to say:

WAC 173-407-220(1)(c) In order to monitor the effectiveness of the implementation of the sequestration plan, the owner or operator shall submit a detailed monitoring plan that will be able to detect failure of the sequestration method to place the greenhouse gases into a sequestered state. The monitoring plan will be sufficient ~~to detect losses of sequestered greenhouse gases at a level of no greater than twenty percent of the leakage rate allowed in~~ to provide reasonable assurance that the sequestration provided by the project meets the definition of permanent sequestration. The monitoring shall continue for the longer of twenty years beyond either the end of placement of the greenhouse gases into a sequestration containment system, or the date upon which it is determined that all of the greenhouse gases ~~has~~ have achieved a state at which ~~it is~~ they are now stably sequestered in that environment.

The two word changes in the last sentence are made to clarify poorly written text in the proposed rule.

**Comment W-25**

\* SUBSECTION (1)(a)(ii) The section should be amended to read as follows,

*(ii) Closure and post-closure financial assurances. The owner or operator shall establish a closure and a post-closure letter of credit to cover all closure and a post-closure expense respectively. The owner or operator must designate ecology or EFSEC, as appropriate, as the beneficiary to carry out the closure and post-closure activities. The value of the closure and post-closure accounts shall cover all costs of closure and post-closure care identified in the closure and post-closure plan. The closure and post-closure cost estimates shall be revised annually to include any changes in the sequestration project and to include cost changes due to inflation. The obligation to maintain the account for closure and post-closure care survives the termination of any permits and the cessation of injection. The requirement to maintain the closure and post-closure account is enforceable regardless of whether the requirement is a specific condition of the permit.*

Ecology response:

Thank you for proposing these clarifications. We will adopt your proposed language, with some minor modifications for better sentence structure.

**SECTION 230 Emissions and electrical production monitoring, recordkeeping and reporting requirements under Part II:**

**Comments W-1, W-3, W-4, W-6, W-10, W-15, and V-5**

We appreciate:

The tying of the permitted emission of 1100 pounds of CO2 per megawatt hour to net deliverable electrical production, rather than gross generation by a particular plant. This is as it should be, and it should not be altered.

Ecology response:

Thank you for your comments.

**Comments W-19 and V-7**

1100# per megawatt hour being used against net deliverable electric production is a solid platform to build standards on going forward. However, this should read ‘1100 # per megawatt hour or the technology equivalent on a two year cycle requiring upgrades.’

Ecology response:

The legislature clearly indicated that the 1100 pound per megawatt standard is subject to revision on a 5 year cycle. The revision is to be done by rule by the

Department of Community Trade and Economic Development rather than Ecology. The law does not include any provisions for a source to be subject to ever changing emission requirements. Such a concept is also counter to other tenets of current air quality law and permitting requirements. For example, air pollution law has an underlying concept that a requirement to install new equipment should be implemented when a facility builds new equipment or when an existing piece of equipment is being upgraded. So the requirement to upgrade a power plant for compliance with this law and rule is when an upgrade is made or when a new plant is built. The legislature added more language to the law that required compliance with the EPS on two more triggering events, entering into a long term financial commitment and when there is a change in ownership.

No change will be made.

**Comment W-8**

Georgia-Pacific would like the Department of Ecology to be aware of problems associated with use of CO<sub>2</sub> continuous emission monitors (CEMs) for boilers burning renewable biomass fuels. While the proposed regulations hint that CEMs may not be required in all cases (we believe that 40 CFR Part 75 allows use of fuel records in some instances), use of CEMs for biomass firing is inappropriate. In contrast to fossil fuels, measurement of biomass entering boilers is less precise, relying on weigh belts or other devices. Further, biomass is not a homogeneous fuel, unlike fossil fuel. Accordingly, we believe the best measurement/calculation method is activity data (fuel records, for example) times an emission factor. This methodology is in widespread usage across the world; in fact, the European Union allows either direct measurement or use of fuel records for its emission trading program, with no bias one way or the other. The same flexibility should be allowed here.

**Ecology response:**

40 CFR Part 75 allows the usage of emission factors and fuel usage information instead of CO<sub>2</sub> CEMS. We recognize that a CO<sub>2</sub> CEM alone is not sufficient to determine the mass of CO<sub>2</sub> emitted and that either an exhaust gas flow monitor or the use of F-factors will be required to determine mass CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> emission.

We note that the commenter's discussion appears to support the use of a CO<sub>2</sub> CEMs rather than fuel records as better able to accommodate the multiple fuels utilized in their facility.

**Comment W-9**

Comment 12 – WAC 173-407-230 – The requirement for installation of a carbon dioxide continuous emission monitoring system should be withdrawn. The commenter then explains its rationale for removal of the requirement.

Ecology response:

This section of rule on monitoring of the direct emissions of GHG must be able to account for emissions of the regulated greenhouse gases from any baseload power plant or cogeneration facility in Washington. By the terms of the law, this can range from a very small unit to a 1400 MW coal fired power plant. A number of other existing regulatory programs come into play when a facility has a generator nameplate capacity of greater than 25 MW. Most notable is the federal Acid Rain program and its detailed monitoring and reporting program requirements. We will not go into details of the applicability of that program here. A reader should go to the EPA Clean Air Markets Division web site for information on program applicability.

Most specifically, for facilities producing 25 MW or more we have established a preference to use a continuous emission monitoring system for determine annual CO<sub>2</sub> emissions. These are the size facilities, which if subject to the federal Acid Rain Program, are subject to the same preference to utilize a continuous CO<sub>2</sub> monitoring system. However, we have included provisions to utilize other options as allowed by the federal program. Specifically the use of emission factors accompanied by fuel usage monitoring is allowed as an alternate approach. This is the approach which we would also advocate for many smaller facilities and is included in the text for CO<sub>2</sub> monitoring for facilities smaller than 25 MW.

The alternatives reflected in the Acid Rain Program include options such as the commenter advocated of a source specific emission factor. We do note that as the fuel mix changes in a missed fuel system such as the commenter's, the site specific CO<sub>2</sub> emission factor will also change as the fuel composition changes. It is this very variability of fuel mix into their boilers that would advocate for a continuous emission monitoring system for accurate monitoring of CO<sub>2</sub> emissions.

We are not deleting our preference for use of a CO<sub>2</sub> CEM system for monitoring CO<sub>2</sub> emissions and we acknowledge that the use of such a system may require installation of exhaust gas flow monitoring equipment.

**Comment W-11**

Our understanding of the commenter's position is that the net electrical generation associated with the power island should be used rather than the net generation that is placed into the local electrical distribution network.

In the commenter's case, they propose to operate synthetic gas fired combustion turbines identical to those used in natural gas fired combined cycle plants. A portion of the electricity generated at the power island constitutes parasitic load, necessary in order to operate the supporting systems. Under no reasonable scenario would this power come from offsite. The commenter also intends to operate a collocated plant where it will manufacture synthetic gas from coal as well as a CO<sub>2</sub> injection plant where CO<sub>2</sub> will be sequestered in deep basalt

formations. The synthetic gas manufacturing and CO<sub>2</sub> injection facilities will require significant amounts of electricity that can be provided either directly from the power plant (i.e., behind the meter distribution) or purchased from the local electrical distribution network.

The commenter believes that using the net power sold onto the electrical distribution network as the measure of electrical output unfairly penalizes facilities that generate their own electricity as opposed to buying it off the electrical distribution network. The commenter points out that it is more efficient for facilities to provide power “behind the meter” as it avoids line loss. The commenter also provides an example plant configuration where a nonparasitic load could reduce the power output available for sale and make compliance with the emission performance more difficult.

The commenter suggests the following revision to WAC 173-407-230(1)(a) and WAC 463-85-230(1)(a):

(a) Electrical output: Electrical output as measured at the point of connection with the local electrical distribution network or transmission line, as appropriate. Measurement will be on an hourly or daily basis and recorded in a form suitable for use in calculating compliance with the greenhouse gases emission performance standard. Electricity that is neither delivered to the electrical distribution network or transmission line, nor consumed for purposes of operating the power generation facility, shall be included in determining the electrical output;

Ecology response:

The legislature’s intent was to reduce the emissions of GHG from electrical generation sources, not to penalize generation sources that provide electricity “behind the meter” to non-power island operations. CO<sub>2</sub> sequestration and syngas manufacturing is occurring at sites in the country that are either co-located or are miles from the facility burning the syngas or generating the CO<sub>2</sub>. It is not Ecology’s intent, nor does it serve legislative intent, to treat a facility differently that chooses to manufacture “synthetic” gas, manufacture methane from synthetic gas or sequester its CO<sub>2</sub> at or near its combined cycle power plant.

Currently, one way in which synthetic gas manufacturing and CO<sub>2</sub> injection is actually occurring is practiced by the Dakota Gasification Company at its plant in Beulah, North Dakota. This plant was constructed to produce synthetic natural gas by gasifying coal excavated at a nearby lignite mine. The facility has been in operation for 8 years and makes 54 bcf of synthetic natural gas/year. CO<sub>2</sub> from the plant is separated and delivered via a 204-mile pipeline to the Weyburn oil field in Saskatchewan, Canada where EnCana, the field's operator, injects the CO<sub>2</sub> for enhancing recovery of the oil in the field. The synthetic natural gas is delivered via a 34 mile dedicated pipeline onto the Northern Border pipeline



where it can travel all the way to Chicago before being used. A power plant burning that natural gas would not subtract from its electrical output the electricity used to power Dakota Gasification's syngas plant or the electricity used to power EnCana's injection system. The economics of this facility make this approach feasible and appropriate for the plant owners.

However, it is also not appropriate to completely exclude all parasitic loads from calculation of the EPS. Because the number of MWh produced is increased when the parasitic loads are not subtracted from the gross electrical production, more total annual GHG emissions can occur while the facility remains in compliance with the GHG EPS. For example, assume a facility has a net electrical output of 700 MW, a gross output of 850 MW, operates 24 hours/day every day of the year, and just meets the EPS of 1100 lb/MWh. Using the net electrical output would allow the electric generating plant to have annual greenhouse gas emissions of approximately 3.3 million tonnes. In comparison, using the gross electrical output as a basis would allow annual greenhouse gas emissions of approximately 4 million tonnes, 0.7 million tonnes per year more. As can be seen, the difference in annual CO<sub>2</sub> emissions allowed by using the gross electrical output rather than the net electrical output does not assist the state in reducing or even minimizing the increase in the emissions of GHG from electrical generation sources as required by other sections of RCW 80.80.

To resolve this issue, Ecology believes it is appropriate to take into account true parasitic load when calculating compliance with the EPS, but not load associated with transportation and injection of carbon dioxide. We view parasitic load as that load associated with the running of the power generation facility, including emission controls. For IGCC facilities, parasitic load would include load associated with separation and compression of carbon dioxide sufficiently to transport it to a sequestration facility. The sequestration facility may be at the site or the power plant or may be at a distant location. Therefore including the load associated with CO<sub>2</sub> separation and compression in calculating the EPS does not provide an advantage to facilities that inject off-site. Load associated with transportation and injection of carbon dioxide is not directly associated with power generation or emission controls, and so would not be considered parasitic load for purposes of calculating compliance with the EPS.

As other new project proposals and currently existing power plants become subject to the provisions of this law and regulation, those plants which are not natural gas fired combined cycle plants will also be required to utilize significant portions of the electricity produced to support previously unnecessary process equipment such as oxygen plants for pure oxygen based combustion boilers, and various CO<sub>2</sub> separation, cleaning, and compression technologies to separate CO<sub>2</sub> and prepare it for transport and underground injection of CO<sub>2</sub> for permanent sequestration. There is no reason to treat a facility that chooses to utilize the IGCC process differently than a facility that chooses to utilize a boiler and the pure oxygen process for its power plant.

In evaluating compliance with the GHG performance standard the combined cycle plant burning pipeline natural gas, a coal based boiler project and an IGCC facility should be evaluated using the same metric. Electrical output should be the gross output of the generators minus plant operating loads (fans, compressors, cooling systems, pulverizers, fuel preparation processes, etc) but not including the load associated with transport and injection of the separated CO<sub>2</sub>. Electricity delivered behind the meter to CO<sub>2</sub> transport and injection activities should be considered as part of the power plant's net output electrical output.

**Comments W-1, W-3, W-4, W-10, W-14, W-25, V-4, V-5, V-6, V-7**

To synopsize the comments:

The commenters feel that not including the lifecycle emissions from the fuel used in generation of electricity is not in compliance with the terms of RCW 80.80.040(5) requiring "the total emissions associated with producing electricity be included." The commenters suggest the boundaries of total emissions should be from point of extraction from the ground through emission through the stack of the power plant and includes an example of the boundary based on use of liquefied natural gas which might be produced in a foreign country and transported to Washington. At least one commenter also contrasts the differences in statutory language between RCW 80.70 and RCW 80.80.

**AND**

**Comments W-15 and W-19**

The emission limitations should apply to all emissions related to the entire lifecycle of the fossil fuel utilized in Washington Power plants, including emissions related to mining and transportation of the fuel to the plant itself. Commenter 15 specifically asks that the emissions from extracting coal in Wyoming and shipping it to the Port of Wallula be accounted for.

**AND**

**Comment V-2**

First I'd like to say that we do have to register that we were disappointed that these rules chose to measure greenhouse gas emissions associated with electric generation not on a life cycle basis so not looking at all emissions coming from the fuel source from extraction to combustion, we realize that a compromise was made and we do support these rules and that compromise but would like to register that that was a disappointment.

**Ecology response:**

The scope of what to include in the emissions was discussed during the rule development process. While several of the stakeholders believed inclusion of 'lifecycle' emissions should be included, analyses using coal transport from Wyoming to Washington was demonstrated to be a trivial emission rate

compared to the direct emissions from the coal combustion process itself. The ability to determine the extraction and transport emissions for natural gas and oil fired combustion is even more difficult due to the multiple locations and distances the fuel may come from. In evaluating the impacts of transportation of coal from Wyoming to an example 1000 MW coal fired power plant in Kalama Washington we estimated that the round-trip emissions of the locomotives would be 108,360 tonnes CO2 per year, or less than 1% of the uncontrolled CO2 resulting from combusting the coal in the power plant.

For example, natural gas used in an electric generating station located at Kalama may come from Central or Northern British Columbia, or may come from gas field in Wyoming. The user of the gas has no way of knowing where their fuel came from, even if they believe they have purchased a quantity of gas from a particular supplier/gas field. Depending on where the gas came from, it is subject to different gas cleaning processes, and a different number of gas compressor stations. How would a particular plant know which sources to include within their calculation, and how much of the emissions from those sources to include?

We note that in order to implement the greenhouse gas reporting requirements in the recently passed law (E2SHB 2815) Ecology will be required to develop or adopt methodologies that are only now being completed that would look at the 'life cycle' emissions from generating electric power from fossil fuels and other fuels. At such time as we received the first reports under this program and find that the emissions from the other portions of the fuel extraction and transport process are significant we will amend this rule to include those emissions.

## **SECTION 240 Enforcement of the emissions performance standard under Part II:**

### **Comment W-14 and V-4**

And lastly, we strongly endorse enforcement of the greenhouse gas emissions by the revocation of operating licenses for a year or more to preventing them from exceeding standards by simply paying fines and continuing to do business as usual.

### **Ecology response:**

Thank you for your support. This provision was included to emphasize the importance of reduction of emissions of GHG.

### **Comment W-4**

d. that enforcement of the laws is the **top priority**. These new regulations will be meaningless without **strict enforcement**. The current FFA debacle with airline safety is a classic example of tough regulations with inadequate enforcement. Periodic site inspections are totally inadequate and unacceptable because the technology exists to continuously monitor the efficiency of all emissions and scrubber systems.

Ecology response:

Your proposal is beyond the scope of the authorizing legislation. However, Continuous Emissions Monitors are used in circumstances where they are appropriate. In this case a power plant can determine the amount of carbon dioxide that is emitted through use of continuous emission monitoring or by recording the amount of the fuel used. For recording fuel use would be number of cubic feet of fuel gases used; the number of gallons used; and for solid fuel, the type and weight of the fuel used.

**Comment W-20**

On page 29, at WAC 173-407-240(f), the word “upsets” is used. We have not been able to find a definition for “upsets,” and it is not precisely clear to us what an “upset” is. We presume it refers to some sort of equipment failure event? The penalties for avoidable upsets are sufficiently strong that we believe a definition should be provided.

Ecology response:

Thank you for your comment. The section was adopted from WAC 173-400-107. Upset is a term that means an unexpected failure to meet a standard (in this case the EPS). The cause could be equipment failure, human errors, etc. We are not going to add the definition to the rule at this time, due to administrative constraints.

**Comment W-25**

NEW SECTION WAC 173-407-240 Enforcement of the emissions performance standard under Part II

SUBSECTION (2) This section allows that a revised sequestration plan by submitted no later than one hundred fifty calendar days after the due date established. We believe that sixty days would be more reasonable an expectation. One hundred and fifty days is too long to wait for a revised plan, and the project proponents should be working quickly to rectify any problems with the plan.

Ecology response:

If after a full year of a facility being unable to meet its obligation to fully sequester, the problem is likely to be extensive. Smaller problems that come up during a period of a year should be able to be remedied during the annual reporting period. Larger problems may take longer to solve. We are giving the facilities enough time to fully explore these large problems and create lasting solutions.

**Comment W-25**

SUBSECTION (3)(c) This section states that failure to meet a benchmark should be reported by January 31 of the year following the year following the year of the

event or as part of the routine monitoring reports. We believe that giving either option is fine, yet waiting till January of each year is insufficient. What if the event occurred in February? We suggest that if a missed benchmark is not covered by a routine report, it should be reported within 60 days of the event.

Ecology response:

This date was chosen because we see the requirement to sequester being an annual requirement. Internal record keeping will allow sequestration facilities to monitor progress on a more frequent basis and do what needs to be done to come back to the standard by the end of the reporting period (annually).

## **PART III**

### **SECTION 300 Procedures for determining the emissions performance standard of a long-term financial commitment and addressing electricity from unspecified sources and specified sources under Part II:**

**Comments W-1, W-3, W-4 and W-10**

Permitting of unspecified source contracts for Washington utilities will dilute the purpose and intent of 6001 by allowing polluting power from other jurisdictions to be supplied in Washington, defeating our goals and responsibilities as good citizens of the region and globe.

The rules should be expanded to provide that Washington utility contracts require the specification of power sources for all power provided to Washington utilities, so that these sources can be clearly understood and properly regulated under 6001 and that Washington State utilities cannot evade our state's regulations by contracting to buy "dirty" power from out of state facilities.

**AND**

**Comment W-4**

I oppose "unspecified power," favor full disclosure in power contracts, and oppose averaging various sources. All sources should be disclosed, and emissions from any specific source should be required to meet the 1100 lb. Limit of total emissions.

**AND**

**Comment W-6**

So that Washington State utilities can not evade our state's regulations by contracting to buy "dirty" power from out of state facilities, we oppose "unspecified power," favor full disclosure in power contracts, and oppose

averaging various sources. All sources should be disclosed, and emissions from any specific source should be required to meet the 1100 lb. Limit of total emissions.

**AND**

**Comment W-14**

We do not want Washington based utilities to be able to mix dirty coal generated energy from elsewhere which is allowed by the current regulations which allow utilities to not report this "unspecified" power.

**AND**

**Comment W-19**

The DOE CR-102 does not meet either the intent of letter of the law used in the RCW. The idea that up to 43% of a unspecified contract can be from unidentified or known dirty coal sources is unacceptable. Allowing the use of plants producing emissions of 2600#/MWH with hydro or nuclear or gas production is not the legislature's intent as you can see from comments by bill sponsors on the floor. Their comments about "eliminating polluting power" are meant to be taken across the board and not just within Washington state. There intent is to eliminate the use of sources that do not enhance the reduction of GHG, period.

April 18, 2007, the Olympian printed, "Legislature passes bill targeting climate change" by Rachel La Corte, The Associated Press. The article states "Under the measure, any new coal fired plant would have to be able to inject into the ground any emissions of GHG – primarily CO2 – in excess of 1,100 pounds per MWH. And utilities would be prevented from entering into contracts with plants that don't meet the same cap."

**AND**

**Comment W-20**

We are concerned that some of the comments made by the Northwest Energy Coalition have merit. If it is true that the intent of the legislation is to prohibit, in effect, long term contracts by Washington utilities with generators supplying power from conventional coal plants with carbon dioxide emissions rates well above the 1100 lbs/MWh allowed by law, then there is, indeed, some risk that a contract that meets the formula might have upwards of 40% of electricity from coal in the fuel mix. We believe that this risk is low because utilities are faced with other constraints on their power purchases such as the requirements of I-937 to acquire increasing amount of renewable energy. Since the risk is low but real we recommend that Ecology monitor the power purchases made by utilities under the proposed WAC 173-407-300 to see if unspecified sources that are likely to be coal based grow to levels that threaten to undermine the Emissions Performance Standard overall. CTED is willing to help Ecology with monitoring.

We also recommend working with the original proponents and legislative sponsors of ESSB 6001 in the 2007 legislative session to clarify in the 2009 session those definitions and provisions dealing with unspecified sources that have made it difficult to write a rule that fully implements the apparent intent of the law.

## **AND**

### **Comment W-25**

The current proposal for dealing with long-term financial commitment does not meet the intent or letter of the law. The proposal inappropriately allows utilities to blend any combination of specified and/or unspecified resources in long-term financial contracts to meet the EPS. For example, it would allow contracts with up to 43% of dirty fossil fuels that would not meet the emissions performance standard, to meet the EPS by mixing that dirty power with zero-carbon-emission energy from sources like nuclear and hydro. This proposed rule would also allow a contract that blends a specified pulverized coal plant producing emissions at 2600 lbs/MWh with a specified efficient natural gas plant producing emissions at 800 lbs/MWh (e.g., 84% of the contract is for the gas plant and 16% is for the coal plant at a total emissions of 1088 lbs/MWh). The proposed rule not only deals with “unspecified resources” in a manner inconsistent with the law, but allows a loophole for all long-term contracts by allowing blending of all resources in contracts.

To be consistent with Chapter 80.80 RCW, specified and unspecified resources must be addressed in a way that meets the intent section of the chapter... RCW 80.80.005 clearly lays out the Legislature’s intent to reduce greenhouse gas emissions and address the global problem of climate change.

### **Alternate proposal**

We understand that there are flaws in the law as it is written. We understand that developing a methodology to deal with unspecified resources is complicated. We also understand that the Bonneville Power Association (BPA) brings uniqueness to Washington state power purchases, and complicates the way “unspecified resources” can be addressed. Yet, the law does not allow for the blending of contracts.

If nothing else, the department should remove the allowance for specified resources to be blended to meet the EPS. After the blending of contracts and specified resources is disallowed, we recommend an alternative way to address unspecified resources.

We believe that the purchase of unspecified resources should be limited to 12% in all power contracts. A limit on the use of “unspecified resources” is practicable based on historic uses of “unspecified resources” by BPA and Investor Owned Utilities (IOUs).

This alternative is more consistent with the law than the currently proposed section, because it incorporates the whole chapter of the law -- including the intent section -- whereas the current proposal does not. This proposal deals with unspecified resources in a manner consistent with the law, accommodates BPA's procurement practices, maintains an equal playing field for consumer owned utilities and IOUs, can be applied in a straightforward manner, and is easy to administer and implement.

**AND**

**Comment W-28**

(1) Your EPS draft is NOT, -- NOT --, consistent with the intent of SB 6001 and HB 2815. Your draft proposal would allow nearly 50% of dirty fossil fuels (those which do NOT meet acceptable EPS) to be used if partnered with such very low emission sources as hydro power. The legislature did NOT so intend: this is an end run on the bills passed by the WA Legislature and is VERY anti-environmental. Repeat: this was NOT the intent of the legislature, therefore, it seems logical that a VERY biased DOE management has made an unauthorized, inappropriate, inaccurate, and "global warming is no problem" decision to circumvent the intent and the letter of the laws passed by the WA Legislature. The sequestration issue, which is real, just may have been emphasized to draw attention from the highly significant primary issue which is the need to reduce global warming gases. Shame!!

**AND**

**Comment V-1**

The main concern that we have deals with one section in the law that deals with contracts and unspecified resources. As the state moves forward in developing more comprehensive climate reduction regulation we think it's really important that this law deals with unspecified resources in a manner that's consistent with the law and with the letter of the law, the intent of the law and that can also be used setting precedence because it is the first rule that deals with unspecified resources but if there's a good chance that unspecified resources will be dealt with subsequent rules.

We believe the rule inappropriately allows utilities to blend any combination of specified and unspecified resources in long term contracts to meet BPS. So for Washington who has a high percentage of hydro, this could mean that a contract could include up to 43 % of dirty fossil fuels because they're averaged together in contract so if you're mixing unspecified resources that are dirty with hydro which is a large end of Washington's mix you could get a lot of dirty fossil fuels into contract and we think that this is definitely not what the legislature intended to allow in this emissions performance standard especially because in the intent section of the law it really does clearly state that an objective is to reduce climate



pollution. We're afraid this could allow creative contracting that would allow to utilities and power generation to emit high levels of carbon dioxide.

We propose that instead of allowing up to 43% of unspecified resources in a contract that ecology could try to limit the amount of unspecified resources. We've talked with utilities and have come up with a figure of 12% to limit unspecified resources. This would allow utilities to make it reasonable and practical to meet the emissions performance standard but it would not allow up to 43% in unspecified resources. It would allow less (12%). It could eventually drive people to use less unspecified resources. That's how we came up with 12% and we think that unspecified resources should be limited to 12% in the formula that Ecology is currently using but we do want to allow some exception to accommodate the uniqueness of Washington power supplies and we would do this by exempting contracts that have power from the Federal Columbia River Power System. This would allow for the clean power that Washington uses and traditionally uses to be in contract with unspecified resources.

**AND**

**Comment V-4**

We do not want Washington based utilities to be able to mix dirty coal generated energy from elsewhere which is allowed by the current regulations which allow utilities to not report this "unspecified" power.

**AND**

**Comment V-5**

So that Washington state utilities cannot evade our state's regulations by contracting to buy "dirty" power from outside of state facilities, we oppose unspecified power, favor full disclosure in power contracts and oppose averaging various sources. All sources should be disclosed and emissions from any specific source should be required to meet the 1100 pound limit of total emissions.

**AND**

**Comment V-7**

I am sure you have had contracts on this matter, RCW 80-80-04(9) authorizes the Department of Ecology to deal with unspecified sources. The DOACR 102 does not meet either the intent of letter or the letter of the law used in the RCW. The idea that up to 43 percent of an unspecified contract can be made up from unidentified or known dirty sources is unacceptable. Allowing the use of plants producing the emissions of 2600 pounds per megawatt hour or greater and mixing this with hydro or nuclear or gas production is not the legislatures intention as you can see from comments by Bill sponsors on the floor. Their comments about eliminating polluting power are meant to be taken across the

board and not just within Washington State. Their intent is to eliminate the use of sources that do not enhance the reduction of greenhouse gases. In the April 2007 Olympian printed "Legislature passes bill targeting climate change by Richelle Laquarte the Associated Press" The article states, "Under the measure any new coal fired plant would be able to inject into the ground any emissions of greenhouse gases primarily CO2 in excess of 1100 pounds per megawatt hour. Utilities would be prevented from entering into contracts with plants that don't meet the same cap."

**AND**

**Comments V-10**

The next issue that I want to address is the unspecified resources. The current draft proposal for dealing with unspecified resources does not meet the intent or letter of the law. The proposal inappropriately allows the utilities to blend any combination of specified and or unspecified resources in long term financial contracts to meet the EPS. For example, it could allow contracts with up to 43 percent of dirty fossil fuels that would not meet the emissions performance standard on their own. To meet the EPS by mixing the dirty power with zero carbon emissions energy from sources like hydro is not appropriate. The legislature did not intend for utilities to comply with these goals by contracting for up to 43 percent of fossil fuel based powers and simply diluting those impacts through creative contracting. Ecology must find another way to address unspecified resources.

**Ecology response:**

RCW 80.80.040(9) states that Ecology shall, "to the extent practicable" address long-term purchases of electricity from unspecified sources. The decision to adopt the formula in Section 300 was reached after much discussion with stakeholders. There were a broad range of opinions and recommendations from stakeholders regarding how to treat unspecified sources. Some stakeholders recommended staying silent on unspecified sources in the rule since the statute allowed Ecology to address this issue "to the extent practicable". Other stakeholders suggested using California's rule as a model, which limits the use of unspecified sources to 15% of forecast energy production for specific situations, such as to meet power needs during a forced outage or scheduled maintenance. Some stakeholders recommended not allowing any unspecified sources of power in a contract while others suggested that there be little or no restrictions on the amount of unspecified sources in a contract. Utilities (both investor owned and publicly owned) told the advisory committee that from year to year they were unable to predict how much unspecified sources they would need. The markets for electricity are both long term and short term. Even within a long term commitment there needs to be provisions for unspecified sources. There can be short term interruptions of power from a specified source due to weather related events, unscheduled maintenance requirements, and other types of service

interruptions. At these times, the demand does not stop and power must be obtained to avoid interruptions in power supply.

The commenters are correct that Section 300 allows unspecified sources to be used when calculating the EPS for long term financial commitments. The commenters are also correct that due to the high amount of hydro power in this state (with zero pounds of GHG emissions per megawatt hour), specified and unspecified power sources can be averaged with the hydro power to reach an average of 1,100 pounds of GHG emissions per megawatt hour. The actual percentage that would be included in a long term commitment for unspecified sources or high emitting sources is unknown. The 43% and 50% figures cited by the commenters are an extreme possibility. Historically the Bonneville Power Administration has had no more than 12% unspecified sources.

As one commenter noted, the risk is of a long-term contract including a large percentage of coal based power as unspecified is low because utilities are faced with other constraints on their power purchases such as the requirements of I-937 to acquire increasing amount of renewable energy. These current constraints, as well as a policy shift by some utilities to shift to cleaner fuel sources and to reduce emissions of GHG, will place some constraints on a provider's ability to include large amounts of coal power in contracts as the market currently operates.

The electrical generation picture in this state and elsewhere is not favoring additional coal plants. The current economics of building coal plants has lead to many proposals of coal plants being canceled. The Bonneville Power Administration has said that if they should need to build new power plants, they would not choose coal. In the long run new coal plants are not likely to be built.

A commenter raises the concern that this approach to unspecified sources could be precedent setting and could set the standard for how specified and unspecified sources are addressed in future rules. Ecology does not consider this approach to specified and unspecified sources to be precedent setting and is not bound by this rule for future rule making. As noted above, the statute directed Ecology to address unspecified sources to the extent practicable. Ecology felt a responsibility to address unspecified sources within the rule and to not be silent on the issue. Under the short statutory deadline to adopt a rule by June 30, 2008, Ecology worked with stakeholders to develop an approach that limits unspecified sources within long-term contracts. This time weighted averaging approach limits GHG emissions while acknowledging the unique requirements for providing power in Washington state. Future rules addressing unspecified sources will not be bound to this approach.

**Comment W-23**

Electrical companies have significant amounts of electricity from unspecified sources in their supply portfolio. In PSE's current Request for Proposals for electric supply, PSE has received over 1,600 MW of bids in the form of Power Purchase Agreements with the electricity from unspecified sources. This 1,600 MW represents over 30% of the total MW bid into PSE's current RFP. Given that this represents a substantial amount of potential power in PSE's and the regions portfolio, it is imperative that "electricity from unspecified sources" apply to an "electrical company". PSE recommends that Ecology clarify that "electricity from unspecified sources" can apply to both a consumer-owned utility and an electrical company. This use of electricity from unspecified sources is a provision of the law that can be utilized by both an electrical company and by a consumer-owned utility.

Suggested Rule Language: The following procedures are adopted by the department to be utilized by the department under RCW 80.80.060 and to be available to and utilized by an electrical company and the governing boards of consumer-owned utilities pursuant to RCW 80.80.070 when ..."

**Ecology response:**

The commenter suggests adding text that would say that RCW 80.80.070 would be utilized by an electrical company. RCW 80.80.070 specifically applies to consumer owned utilities. "Electrical company" is defined in Chapter 80.80 RCW as a company owned by investors and is addressed in RCW 80.80.060. The existing text of WAC 173-407-300(1) currently references both RCW 80.80.060 and RCW 80.80.070 to ensure that long-term financial commitments by either investor owned or consumer owned utilities for specified and/or unspecified power are included.

RCW 80.80.060 requires the WUTC to consult with Ecology and states that Ecology shall determine compliance of investor owned contracts with the EPS. Therefore, WAC 173-407-300(1) uses the wording "...to be utilized by the department under RCW 80.80.060...". RCW 80.80.070 states that the governing board shall make the compliance determination for consumer owned utilities. Therefore, WAC 173-407-300(1) uses the wording "...utilized by the governing boards of consumer owned utilities pursuant to RCW 80.80.070...".

**Comment W-5**

We understand the purpose of WAC 173-407-300 is to specify a method to calculate the greenhouse gas emissions attributable to a long-term financial commitment supported by multiple sources of power based on a weighted average of the emissions produced by each source - whether specified or unspecified. We agree with this approach. The statute requires only that the Department address long-term purchases of electricity from unspecified sources "to the extent practicable" and in a "manner consistent with this chapter." We believe including a method for calculating the emission characteristics of power purchases from unspecified sources is consistent with the chapter because otherwise these sources of power would be omitted from the scope of emission

performance regulation. The approach proposed is practical and straight-forward. It is well-suited to ensure utilities and regulators will be able to evaluate compliance for these sorts of power resources. The UTC expects to use this method, or a comparable formula, to evaluate compliance with the emissions performance standard for investor-owned utilities.

Ecology response:

Thank you for your comments.

**Comments W-22 and W-27**

In addition we propose that the default value (when non-measured for actual plant and when imputed for “unspecified sources” for the emissions for pulverized coal be amended to 2,250 lbs/MWh. We have provided an explanation below this section and an attached spreadsheet referencing our data and demonstrating our analysis.

Ecology response:

Thank you for your view on the basis for the unspecified source and pulverized coal factor. The factor that you propose is the average emission rate of baseload plants in the Western Interconnect region. The rule text you quote in your explanation indicates that we are to use the emissions of an average coal plant, not the average emissions of a number of coal plants.

If we were to use the average emissions of a number of plants as proposed, the average can be calculated at least 2 different ways. Commenter W-27 provided the E-Grid electrical production and CO<sub>2</sub> emissions information for power plants in the Western Interconnect region. This commenter used the total CO<sub>2</sub> emissions and total MW produced by all plants operating at a 60% or greater capacity factor to reach its proposed value. Another method would be to average the lb CO<sub>2</sub> /MW values for these same plants. This second method results in a average of 2301 lb/MWh, approximately 50 lb/MWh higher.

Even staying within the limitation of plants that in 2004 operated with a capacity factor of 60% or higher, the E-Grid data indicate a number of plants emitting above 2500 lb/MWh. These are ‘average plants’ in that they cover the size and age range of coal fired power plants existing in the region. They also utilize a number of different coals. When rounding their annual average lb CO<sub>2</sub>/MWh values to the same level of significant digits as the EPS, the emissions from these plants would be 2500 or 2600 lb/MWh.

The law is clear that one of its aims is to reduce emissions of GHG. It is our opinion that the use of a lower default emission value for coal and unspecified sources would do little to accomplish that goal. It would however increase the flexibility of the power providers to include unspecified power in long term contracts, and increase the amount of unspecified power in those contracts. As

a result we are retaining the proposed 2600 lb/MWh default value for pulverized coal plants and for unspecified sources.

**Comments W-5, W-20, W-21, W-22, and W-27**

As a group these commenter's support a proposed revision to the formula given in WAC 173-407-300(5) and accompanying minor text changes to be consistent within the section. The revision is proposed fully in commenter W-5's letter, repeated in 2 other letters, and supported by the others.

Briefly, the commenters find the proposed formula to be mathematically inconsistent in that as written, the units calculated by the equation on the right side of the equal sign do not match the units on the left side.

They have proposed to revise the formula with differing units and concepts than the proposal, though the result is still in lb/MWh.

**Ecology response:**

We have revised the formula to be mathematically consistent with the text in WAC 173-407-300(4). Our revision will result in the same lb/MWh value as the negotiated calculation that came out of the stakeholder process, and was used for the economic analysis. The change in the formula results in no large scale changes to terms elsewhere in this section of the rule.

**SECTION 310 Relationship of ecology and Washington utilities and transportation commission under Part II:**

**Comment W-25**

We believe that the rules developed here are important to ensure the EPS to be adequately enforced as required by the law. RCW 80.80 explicitly provides for the public utilities to be audited for compliance by the Auditor, and final enforcement by the Attorney General. Public utilities in WA are audited every 1-3 years, depending on their size. This audit would not allow for the EPS to be adequately enforced as required by the law.

Auditing is an after-the-fact assessment, and RCW 80.80 is intended to stop a contract before it is signed. Thus RCW 80.80 also refers to Ecology "developing and implementing" the emissions performance standard (80.80.040(9)), and developing rules to "implement and enforce" the standard (80.80.040(10)). Consumer owned utilities must "consult with the department" before entering a contract (80.80.070). We believe that the rules must require the public utilities to do an up front assessment with Ecology, then the Auditor is responsible for the after the fact checking. We believe that the draft rules included in the CR- 102 are straightforward and cleanly follow the letter of the law.

Ecology response:

Ecology agrees with your comments.

**SECTION 320 Relationship of ecology and the governing boards of consumer-owned utilities under Part II:**

**Comment W-21**

RCW 80.80.070(2) directs the governing boards of consumer-owned utilities to make a determination as to whether a long-term commitment under consideration by the consumer-owned utility complies with emissions performance standard established under RCW 80.80.040. The governing board is to make this determination "pursuant to this chapter and after consultation with (DOE)".

The proposed rule WAC 173-407-320 includes a provision that appears contradictory to the requirements of RCW 80.80.070(2) because it implies that ecology, and not the governing board, will ensure compliance with the emissions performance standard calculations established in WAC 173-407-300. Therefore, we propose the following changes to WAC 173-400-320(1):

WAC 173-407-320 Relationship of ecology and the governing boards of consumer-owned utilities under Part II. (1) RCW 80.80.070(2) requires the governing boards of consumer-owned utilities to "review and make a determination on any long-term financial commitment by the utility, pursuant to this chapter and after consultation with the department, to determine whether the baseload electric generation to be supplied under that long-term financial commitment complies with the greenhouse gases emissions performance standard established under RCW 80.80.040." During this consultation process, ecology shall ~~ensure that~~ assist the governing boards ~~are utilizing with the utilization of~~ the method in WAC 173-407-300 to determine whether the long-term financial commitment for baseload electric generation meets the emissions performance standard. Ecology's assistance will be limited to that assistance necessary for the board to interpret, clarify or otherwise determine that the proposed long-term financial commitment for baseload electric generation will comply with the emissions performance standard.

Ecology response:

We agree that your suggested change clarifies our intent. The revisions you propose will clarify the intent and ensure that there will be less for readers to misinterpret. Ecology will make these changes.

**Comment W-27**

We understand - and support - the purpose of WAC 173-407-320 to be to ensure that the governing boards of consumer owned utilities have assistance available from the Department to clarify or interpret the procedures of WAC 173-407-320 when the governing boards make their determination of whether proposed long-term financial commitments meet the emissions performance standard.

Ecology response:

Ecology thanks you for your comments.

**SECTION 400 Severability:**

**No Comments**

<b>Economic Analysis</b>
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**Comment W-19**

Penalizing new plants by not requiring retro fitting of existing plants. Existing plants in Washington state must be retrofitted to meet new standards or phased out on a DOE stated timeline with no exceptions. To state that these plants cannot be upgraded is to set the table for the same conversation ten years down the road on new plants going in under 6001. This is not acceptable and regulations should be expanded to deal with the old plants.

Ecology response:

Your proposal is beyond the scope of the authorizing legislation. ESSB 6001 specifically applies to new long term financial commitments and new plants built after July 1, 2008.

**Comment W-25**

Creating a perverse incentive for Washington utilities to purchase power from out-of-state would not only be contrary to the goal of reducing GHG emissions, but also would be contrary to the goal of protecting Washington electricity consumers from higher costs, including those associated with future carbon emissions.

Ecology response:

Ecology's analysis of this issue indicates the reverse. If there is a cost shift for consumers of electricity it will take place earlier because of the law and rule.

**Comment W-25**

\* SUBSECTION (6) Because there is no way to ensure that taxpayers will not be called to cover a potential cost, the following suggestion is very important to include in this rule. The following language should be added to the end of section 6

*The department retains the right to require operators to undertake subsequent monitoring or other necessary remedial actions after the completion of the post-closure period if a breach or potential breach in the containment system is identified, or if additional post-closure activities by the*



*operator may become necessary to ensure the permanence of the sequestration or the protection of public health or the environment.*

Ecology response:

The cost of carbon capture is high. It is unlikely that carbon capture and sequestration will be cost effective under this rule and law without substantial technological improvements. Ecology believes therefore that the scenario you analyze is unlikely.

**Comment W-25**

\* SUBSECTION (7)(c) Because it is not clear whether the cost estimate is the net present value of the future stream of closure/post-closure activities (i.e. a discounted cost in current dollars) or a current engineering cost estimate (i.e. not discounted). If it is the latter, and depending on the magnitude of costs associated with closure/post-closure, the investment "hit" on a company of posting 100% cash up-front could be significant. Therefore this section should read,

*The cost of the closure and post-closure activities shall be calculated as net present value figures using current cost of hiring a third party to close all existing facilities and to provide post-closure care, including monitoring identified in the closure and post-closure plan.*

Ecology response:

The cost of carbon capture is high. It is unlikely that carbon capture and sequestration will be cost effective under this rule and law without substantial technological improvements. Ecology believes therefore that the scenario you analyze is unlikely.

**Comment W-27**

Accordingly, in a separate attached spreadsheet from the US Environmental Protection Agency's egrid database containing 2004 reported CO<sub>2</sub> emissions data, we have calculated the average CO<sub>2</sub> emissions from all coal plants operating within the footprint of the Western Electric Coordinating Council, also known as the Western Interconnection. We filtered the database to include all plants that operated with a 60% capacity factor or greater, were greater than 100 MW nameplate capacity, and were not cogeneration units. These criteria point to coal plants that reasonably can be expected to be "designed and intended to operate" as baseload electric generation. We then summed up the total MWhs generated by all those plants and divided by the total CO<sub>2</sub> emissions to obtain an average emissions rate across the fleet.

The result, as detailed in the attached spreadsheet, equals 2,248 lbs/MWh and we recommend that the Department adopt 2,250 lbs/ MWh as the default rate for pulverized coal and unspecified sources.

Ecology response:

Ecology does not find that your data actually supports your number. Ecology notes that you have selected only coal plants here, and while we understand your logic we disagree. You also on select plants with greater than 100 MW name place capacity. The law applies to other energy sources that generate CO2 emissions and other levels of capacity. Therefore Ecology would not have selected the breakdown the way that you did.

Using just the plants you have selected, your energy weighted average generates a value lower than either the median plant (2,282 lbs/MWh) or average of plant averages (2,301 lbs/MWh) would suggest. Further the maximum for the plants you select is 2,597.

Your data outside of those selected has plant annual lbs/MWh emissions from many plants that are higher than emissions of plants you selected. Had Ecology used this method to generate the value you suggest, the public may have been able to support a claim of sampling bias.

**Comment W-28**

(2) Sequestration ... as I understand, although it was technically possible with some reservations but was not justified economically or environmentally.

Ecology response:

The statement about economic feasibility is consistent with the findings that were cited in the economic analysis.

Some US experts have predicted that a workable, low risk, financially acceptable system is at least a decade off.

It is difficult to predict the trajectory of research and development of the new carbon capture technology that would be necessary for geologic sequestration to be viable. Ecology cannot know whether it will be viable in a decade or not.

#### ***IV. Summary of public involvement opportunities***

Please provide a summary of public involvement opportunities for this rule adoption:

List or describe:

◆ **hearing dates and locations**

Two hearings were held:

1. Ecology Headquarters Building, Lacey  
April 8, 2008, 6:00 pm  
16 people attended  
3 people testified

2. Spokane County Public Health Center  
April 10, 2008, 6:00 pm  
15 people attended  
8 people testified

◆ **mass mailing pieces (i.e., FOCUS sheet, news releases)**

- A press release was issued and posted on Ecology's Laws and Rules web site.
- An email notice went out to the following:
  - An email list serve for this rule (58 subscribers),
  - A general Ecology email list serve (1,471 subscribers)
  - A Climate Change list serve (788 subscribers).

◆ **advertisements and/or newspaper announcements**

- Notice for these hearings was published in the Washington State Register on March 19, 2008.
- Legal notices were published in the Spokesman Review and Daily Journal of Commerce on March 19, 2008
- The hearing notice was posted on Ecology's Laws and Rules web page and the Publications and Notices web page.

## **V. *Appendices***

<b>Appendix A</b>	<b>Law and Rule Applicability to Specific Facilities</b>
<b>Appendix B</b>	<b>Written Comments Received During Comment Period</b>
<b>Appendix C</b>	<b>Transcript and List of Individuals Testifying at Hearings</b>
<b>Appendix D</b>	<b>Public Notices</b>
<b>Appendix E</b>	<b>Final Rule Text</b>