

## **Appendix B**

W-1

**Pritchett, Nancy (ECY)**

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**From:** Sandra Cannon [cannon@ecopurchasing.com]  
**Sent:** Friday, April 11, 2008 11:03 AM  
**To:** Fiksdal, Allen (CTED); Pritchett, Nancy (ECY)  
**Subject:** 6001 Rulemaking  
**Attachments:** coal, 6001 Rulemaking, talking points, cpwg,2020.doc

We have the same concerns as those of the Coal Plant Working Group and are in full support of their recommendations in the attached file.

Sandra Cannon, Chair  
Walla Walla Area Resource Conservation Committee  
Tel. 509-525-8849

*Avoid Waste, Purchase Smart - EcoPurchasing*

W-7

## 6001 Rulemaking

### COAL PLANT WORKING GROUP WALLA WALLA 2020

#### Talking Points

1. We are citizens concerned about the effects of coal plants on our county and on global warming and climate change impacts on our state and in general.

2. The purpose of 6001, as we understand it, is to promote renewable energy, and to limit CO2 and other greenhouse gas emissions, which are continuing to grow.

3. Any new coal or fossil fuel plants or contracts should be held to the highest efficiency and sequestration standards, and should not be permitted to contribute further to greenhouse gas emissions, or to other pollution streams.

4. We appreciate certain provisions of the proposed rules, we are concerned about other portions, and we believe some provisions should be added.

5. We appreciate:

a. 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.

b. the provisions that the maximum emission limitations of 6001 are in addition to the separate mitigation requirements of Washington law (Chapter 80.70 RCW).

6. We are concerned that

a. 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.

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 CO2 "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.

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c. 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,

d. 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,

e. 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

f. all contaminants in the injected CO2 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 CO2 could become a dumping ground for other significant pollutants.

7. We believe the rules should be expanded to provide:

a. that the emission limitations shall apply to all emissions related to the entire life cycle of the fossil fuel utilized in Washington power plants, including emissions related to mining and transportation of the fuel to the plant itself/. For example, the coal to be used for the proposed coal plant at Walllula in Walla Walla County is to be mined in Wyoming, and is proposed to be shipped by rail to Walllula. The emissions related to the extraction of the coal and its shipment to Walla Walla should be included in the calculations of the full emissions of the plant in applying the statutory limitations.

b. 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.

8. 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.

9. 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.

**Daniel N. Clark**  
4-10-08

W-2

**Pritchett, Nancy (ECY)**

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**From:** Josh Johnson [josh.johnson@ci.longview.wa.us]  
**Sent:** Friday, April 11, 2008 8:30 AM  
**To:** Fiksdal, Allen (CTED); Pritchett, Nancy (ECY)  
**Subject:** Citizen Comment

Mr. Allen Fiksdal and Ms. Nancy Pritchett,

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. — Josh Johnson, 2987 Madrona, Longview, WA 98632.

Pritchett, Nancy (ECY)

From: Fiksdal, Allen (CTED)  
Sent: Thursday, April 17, 2008 1:24 PM  
To: Pritchett, Nancy (ECY)  
Subject: FW: Comments on ESSB 6001

I received this yesterday.

Allen Fiksdal  
Washington State  
Energy Facility Site Evaluation Council  
PO Box 43172  
Olympia, WA 98504-3172

Phone: 360-956-2152  
Fax: 360-956-2158

Visit the EFSEC web site at: [www.efsec.wa.gov/](http://www.efsec.wa.gov/)

-----Original Message-----

From: Chris Howard [mailto:chrish@bmi.net]  
Sent: Wednesday, April 16, 2008 8:45 PM  
To: Fiksdal, Allen (CTED)  
Subject: Comments on ESSB 6001

As a citizen of Walla Walla County and a member of the Coal Plant Working Group I am submitting these comments in reference to ESSB 6001. It is my hope that these comments will be considered seriously by the rule makers in order to protect the health and well being of the present and future generations.

1. We are citizens concerned about the effects of coal plants on our county and on global warming and climate change impacts on our state and in general.
2. The purpose of 6001, as we understand it, is to promote renewable energy, and to limit CO2 and other greenhouse gas emissions, which are continuing to grow.
3. Any new coal or fossil fuel plants or contracts should be held to the highest efficiency and sequestration standards, and should not be permitted to contribute further to greenhouse gas emissions, or to other pollution streams.
4. We appreciate certain provisions of the proposed rules, we are concerned about other portions, and we believe some provisions should be added.
5. We appreciate:
  - a. 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.
  - b. the provisions that the maximum emission limitations of 6001 are in addition to the separate mitigation requirements of Washington law (Chapter 80.70 RCW).
6. We are concerned that
  - a. 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.

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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 CO2 "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.

c. 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,

d. 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,

e. 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

f. all contaminants in the injected CO2 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 CO2 could become a dumping ground for other significant pollutants.

7. We believe the rules should be expanded to provide:

a. that the emission limitations shall apply to all emissions related to the entire life cycle of the fossil fuel utilized in Washington power plants, including emissions related to mining and transportation of the fuel to the plant itself/. For example, the coal to be used for the proposed coal plant at Walllula in Walla Walla County is to be mined in Wyoming, and is proposed to be shipped by rail to Walllula. The emissions related to the extraction of the coal and its shipment to Walla Walla should be included in the calculations of the full emissions of the plant in applying the statutory limitations.

b. 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.

8. 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.

9. 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.

Christopher Howard  
734 University  
Walla Walla, Wa. 99362

W-4

**Pritchett, Nancy (ECY)**

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**From:** Scott [parkerwawa@bmi.net]  
**Sent:** Thursday, April 17, 2008 4:16 PM  
**To:** Pritchett, Nancy (ECY)  
**Subject:** ESSB 6001 regulations

April 14, 2008

To whom it may concern:

I am a citizen of Walla Walla and am very concerned that the regulations being written for ESSB 6001 have legal clarity so are not ambiguous and also restrict emissions to the maximum. In general, I want EFSEC and the DOE to apply very stringent standards across the board as they relate to all emissions, sequestration, and especially enforcement of these standards. This is absolutely critical to the health and welfare of the citizens. For example, the clear intent of ESSB 6001 is to limit CO2 and other greenhouse gas emissions. These "other greenhouse gases" need to be defined for clarity and each gas given a maximum limit rather than lumped together with a single capture percentage. They should each be individually weighted and restricted by toxicity when figuring the required amount of emissions to be scrubbed, captured and/or sequestered. For example, **mercury** has an airshed of 100 miles and **never** breaks down to be removed from the environment. Consequently, mercury is much more harmful locally than CO2 when released into the atmosphere. Because of this, mercury should be required to have 99-100% capture. The current law in Washington State allows **39 pounds/year** which becomes a buildup in excess of 1500 pounds of mercury over the lifespan of each coal-fueled power plant. These are currently legal levels but are also **toxic** levels which cannot be allowed.

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 CO2 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.

WAC 173-407/130 & WAC 463-85-100 state: "Beginning July 1, 2008 new baseload electrical generation and cogeneration facilities are not allowed to emit to the atmosphere total greenhouse gases at a rate greater than 1100 pounds per megawatt hour, annual average."

My understanding is that this limit on greenhouse gas emissions in the regulations is presently tied to the net or deliverable power produced by a facility. I agree with this approach.

In addition to the tying of the permitted emission of 1100 pounds of CO2 per megawatt hour to net deliverable electrical production, I also agree with the provisions stating that the maximum emission limitations of 6001 are **in addition** to the separate mitigation requirements of Washington law (Chapter 80.70 RCW).

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!!!**

In addition, I am concerned:

a. 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." I believe this language should be changed to read,

"Permanent sequestration" means the retention of greenhouse gases in a containment system using

H.W.

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.

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 CO<sub>2</sub> from an existing coal plant should be used for testing rather than pure, food-grade CO<sub>2</sub>. This scrubbed and captured CO<sub>2</sub> 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.

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.

c. 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.

d. 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,

The intent of the Legislature is clear that the emissions performance standard applies to long-term contracts signed by Washington electric utilities, whether those contracts are for generation located in Washington state or outside Washington state. To ensure clarity on this issue, I would recommend these rules define the scope of the term "local jurisdiction" as it is used in the definition of "power plant." The term "local jurisdiction" is referenced in RCW 80.80.010(17) in the definition of "power plant" but is not defined separately nor is it used elsewhere in RCW 80.80.

For clarity I 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".

e. with allowing up to 20% CO<sub>2</sub> sequestration leakage,

WAC 173-407-220 (1)(c) allows monitoring which only registers leakage from sequestration at a threshold greater than 20%. This allowance is irresponsible, defeats the purpose of 6001 and directly contradicts the standard elsewhere which aims for 99% permanent sequestration.

This regulation should require monitoring equipment to detect even the slightest leakage of sequestered gas.

f. with regard to WAC 463-85-240 **Enforcement of the emissions performance standards on schedule**, I favor the addition of the following language in section (1) (b): *Revocation to operate for a one year period will be automatic if the source fails to meet performance standards for any two years in a five year period.* I believe this is necessary so that the facility does not make a practice of exceeding standards and making fines simply a cost of doing business.

7. I would like to see the rules expanded to provide:

a. that the emission limitations shall apply to all emissions related to the entire life cycle of the fossil fuel utilized in Washington power plants, including emissions related to mining and transportation of the fuel to the plant itself. For example, the coal to be used for the proposed coal plant at Wallula in Walla Walla County is to be mined in Wyoming, and is proposed to be shipped by rail to Wallula. The emissions related to the extraction of the coal and its shipment to Wallula should be included in the calculations of the full emissions of the plant in applying the statutory limitations.

b. that Washington utility contracts require specifying the power sources for all power provided to Washington utilities, so that Washington State utilities cannot evade our state's regulations by contracting to buy "dirty" power from out of state facilities. 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.

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.

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.

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 its own disposal regulation and detailed regimen in the manner of the regulations required for asbestos disposal.

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.

The Walla Walla Valley, the Mid-Columbia Valley and the Yakima Valley make up most of Eastern Washington and all three valleys share these same air quality issues as well as vast beds of underground basalt.

Consequently, this air quality issue related to sequestration and coal-fueled power plants is potentially huge for all three of these valleys which comprise most of Eastern Washington. For example, several new coal plants may each have emissions within your guidelines but there has to be a maximum allowable air quality standard to limit the sum-total of emissions from "legal" coal plants.

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 its 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.

Our communities will be directly affected by the clarity and quality of these regulations and especially of their enforcement.

Sincerely,

Scott Parker D.D.S.

1771 Sturm Ave., Walla Walla 99362

509-529-7715



W-5

STATE OF WASHINGTON  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

1300 S. Evergreen Park Dr. S.W., P.O. Box 47250 • Olympia, Washington 98504-7250  
(360) 664-1160 • TTY (360) 586-8203

April 8, 2008

Ms. Nancy Pritchett  
Washington State Department of Ecology  
Air Quality Program  
PO Box 47600  
Olympia, WA 98504-47600

Re: Comment on Proposed WAC 173-407-110 and WAC 173-407-300

Dear Ms. Pritchett:

We appreciate the opportunity to participate in the Department of Ecology's (DOE's) rulemaking to implement RCW 80.80 and to comment on specific aspects of the proposed rule. We have two comments.

**1) Comment on proposed WAC 173-407-110**

The proposed rule reads:

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

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.



Ms. Nancy Pritchett  
April 8, 2008  
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## 2) Comment on proposed WAC 173-407-300

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.

However, we found the formula in the proposed subsection (5) to be confusing. To clarify how the weighted average is calculated, we propose the following clarifications to WAC 173-407-300.

**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.** (1) 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 the governing boards of consumer-owned utilities pursuant to RCW 80.80.070 when evaluating a potential long-term financial commitment when the long-term financial commitment includes electricity from unspecified sources, electricity from one or more specified sources, and/or provisions to meet load growth with electricity from unspecified and/or specified sources.

(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 **timeenergy-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 MWh delivered under the contract for that year.**

(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 **timeenergy-weighted** 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 **timeenergy-weighted** 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.

Ms. Nancy Pritchett  
April 8, 2008  
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(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

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

where:

EPS = Emissions performance standard  
F = EPS of each type of source expressed as MW  
T = Percentage of time used for that source  
Total Hours = Total hours that power was available to customers in the year (8,760 or less)

$$\frac{WEF(t) = EF1 * MWh1 + EF2 * MWh2 + EF(n) MWh(n)}{\text{Total MWh}(t)}$$

Where:

WEF(t) = Weighted emissions factor in lbs/MWh  
EF(n) = Emissions Factor for source "n" in lbs/MWh  
MWh(n) = MWh generated by each source "n"  
Total MWh = Total MWh delivered in year (t)

Thank you for the opportunity to comment on proposed WAC 173-406. Please contact Dick Byers (360)664-1209 or [dbyers@utc.wa.gov](mailto:dbyers@utc.wa.gov) with questions regarding these comments.

Sincerely,



Carole J. Washburn, Executive Secretary  
Utilities and Transportation Commission

EFSEC Presentation April 10, 2008  
Spokane County Public Health Center

Norm Osterman,  
1032 Pomona Street  
Walla Walla, WA 99362  
509-525-9754  
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Member, Coal Plant Working Group, Walla Walla, WA  
<http://www.coalconcerns.org>  
email: [coalconcerns@charter.net](mailto:coalconcerns@charter.net)

In writing regulations to put ESSB 6001 into effect, please keep in mind that the clear intent of that law was to limit CO2 and other greenhouse gas emissions. The Coal Plant Working Group of Walla Walla wants EFSEC and the DOE to apply stringent standards across the board as they relate to greenhouse gas emissions, sequestration, enforcement standards, and other matters. Locally we are not the only ones to feel this way. An attached letter from the Walla Walla County Commissioners to the Port of Walla Walla Commissioners states in part:

*(We would, on behalf of the county.... feel compelled to make every effort to ensure that if an IGCC (Integrated Gasification Combined Cycle ) plant was ever to be built in the county, it would be held to the highest possible technological and environmental safety standards. We believe that the Port Commissioners share our concerns for our citizens, and hold the project to the highest possible safety standards, even if those standards are in excess of those established by EFSEC (Energy Facility Siting Evaluation Committee) or DOE (Department of Ecology), for the highest possible scrutiny on emissions.*

WAC 173-407/130 & WAC 463-85-100 state: " Beginning July 1, 2008 new baseload electrical generation and cogeneration facilities are not allowed to emit to the atmosphere total greenhouse gases at a rate greater than 1100 pounds per megawatt hour, annual average." Our understanding is that the limit on greenhouse gas emissions in the regulations is presently tied to the net or deliverable power produced by a facility. This is the approach we favor. Also, 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 CO2 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.

Regarding WAC 173-407-110, we believe that the "permanent sequestration" definition should 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.

We favor the requirement that emission standards include the entire process of mining and transporting coal from the source to the coal-fueled power generating facility in addition to its use as a fuel in that facility.

The AKART regulation in proposed WAC 173-218-115 (2)(e) is inadequate. We believe all contaminants other than CO2 should be required to be removed, not just a reasonable effort made, otherwise the sequestration could become a dumping ground for pollutants other than CO2.

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.

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.

In regard to WAC 463-85-240 **Enforcement of the emissions performance standards on schedule**, I favor the addition of the following language in section (1) (b): *Revocation to operate for a one year period will be automatic if the source fails to meet performance standards for any two years in a five year period.* I believe this is necessary so that the facility does not make a practice of exceeding standards and making fines simply a cost of doing business.

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.

# COUNTY OF WALLA WALLA

STATE OF WASHINGTON

OFFICE OF COMMISSIONER COURT

March 24, 2008

Port of Walla Walla Commissioners  
c/o Port of Walla Walla  
310 A Street  
Walla Walla, WA 99362

Re: Carbon sequestration project

Dear Commissioners

This Board of Walla Walla County Commissioners wishes to congratulate you on your firm stance in assuring that all questions are answered prior to allowing carbon sequestration testing on Port land. We applaud you for ensuring ample opportunities for public participation, and your outreach efforts by meeting in the community with residents on such a controversial issue. While we do feel the need to look at alternative sources of energy, it is important to this board that we take into consideration the concerns of our constituents and possible impacts to environment before being in a position to make an informed decision on allowing the project to moving forward or not.

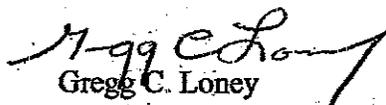
If in fact the carbon sequestration project proponents provide information to the Port's satisfaction and there is a track record of success, we would, on behalf of the county, still feel compelled to make every effort to ensure that if an IGCC (Integrated Gasification Combined Cycle) plant was ever to be built in this county, it would be held to the highest possible technological and environmental safety standards. We believe that Port Commissioners share our concerns for our citizens, and hold the project to the highest possible safety standards, even if those standards are in excess of those established by EFSEC (Energy Facility Siting Evaluation Committee) or DOE (Department of Ecology) for the highest possible degree of scrutiny on emissions.

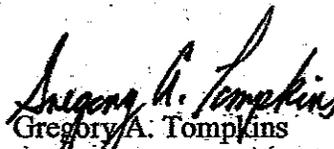
Thank you for what you do for our county.

Sincerely,

WALLA WALLA COUNTY BOARD OF COMMISSIONERS

  
David G. Carey  
Chair

  
Gregg C. Loney  
Member

  
Gregory A. Tompkins  
Member

c: Jim Kuntz, Executive Director, Port of Walla Walla

P.O. BOX 1506 • WALLA WALLA, WASHINGTON 99362-0316 • www.commissioners@co.walla-walla.wa.us  
PHONE: (509) 524-2505 • FAX: (509) 524-2512

District No. 1  
GREGG C. LONEY

District No. 2  
DAVID G. CAREY

District No. 3  
GREGORY A. TOMPKINS

Questions for Nancy Pritchett  
Department of Ecology  
EFSEC/DOE Public Hearing  
April 10, 2008

Norm Osterman  
1032 Pomona  
Walla Walla, WA 99362

[nosterman@hotmail.com](mailto:nosterman@hotmail.com)

Hi Nancy,

My first question concerns sequestration plans. Will a new facility which is permitted after July 1, 2008 get the five year window before sequestration must begin? If such a facility has the advantage of the five year window, do they have to make up over time the amount of greenhouse gases which were not sequestered during the first five years? -

In the case of an IGCC plant, does the plant have to show that toxic substances like mercury will not mix with with the sequestered green house gases?

Does a coal-fueled facility have to account for the disposition of every ounce of toxic materials like mercury, selenium and thorium which may be trapped in carbon bed filters and then disposed of in some fashion?

Will there be DOE watchdogs to check on matters such as mercury emissions and other toxic and polluting materials, wastewater, etc. If there will be oversight, how often will inspections be done?

April 11, 2008

Nancy Pritchett  
Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

**Subject: Proposed WAC Chapter 173-407-130 Rules**

Dear Ms. Pritchett,

Kimberly-Clark Worldwide, Inc. appreciates the opportunity to provide the following comments on the Departments of Ecology's 'Carbon Dioxide Mitigation Program, Greenhouse Gases Emission Performance Standard and Sequestration Plans and Programs for Thermal Electric Generating Facilities' (OTS-1278.2).

Kimberly-Clark finds an incongruity within the current proposed rules as they pertain to cogeneration facilities which utilize renewable fuels. The specific issue requiring clarification is whether a base-load electric cogeneration facility utilizing renewable fuels is *exempt* from this rule (per WAC 173-407-120) or is it simply *in compliance* with emission standards until certain future events occur (per WAC 173-407-130). Kimberly-Clark supports the *exempt* status which we believe is consistent with the Governor's recently signed climate change bill (E2SHB2815) which states in part, "*... emission of carbon dioxide from industrial combustion of biomass in the form of fuel wood, wood waste, wood byproducts, and wood residuals shall not be considered a greenhouse gas as long as the region's silvicultural sequestration capacity is maintained or increased*" (Sec 3.3).

Kimberly-Clark's Everett Mill and the Snohomish Public Utility District #1 exercised responsible leadership with the introduction of a biomass cogeneration project in 1995. Under a long-term operating agreement signed by the parties, the District owns the facility, including the 37 megawatts of base-load electric cogeneration, while Kimberly-Clark operates and maintains the facility and has rights to the residual steam in support our tissue manufacturing operations. The operating agreement includes terms specifically addressing capital investment obligations and facility ownership. These contractual terms were expressly designed to respond to a dynamic energy market and to balance economic benefits and risks. The proposed WAC 173-407-130 rules jeopardize certain economic and risk management features contained in this long-term contract. If the rules are adopted as currently written, it intrudes on the parties' ability to effectively manage this resource and could ultimately result in a permanent shutdown of the facility.

Kimberly-Clark requests that the following comments be considered in addressing the proposed rules.

1. Kimberly-Clark supports the proposed WAC 173-407-110 Part II expanded definition of "renewable fuel" as including: *"By-products of pulping or wood manufacturing processes, including but not limited to bark, wood chips, sawdust, and lignin in spent pulping liquors; ..."*. Kimberly-Clark operates a pulp manufacturing operation in conjunction with its tissue mill operations. The spent liquor from the pulp mill operation represents a 30 to 40 percent share of the fuel consumed for cogeneration power.
2. Kimberly-Clark also supports the proposed applicability rule stated in WAC 173-407-120 (2) for Part II which reads: *"This rule is not applicable to any base-load electric generation facility or unit or 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. Kimberly-Clark 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.

Thank you for the opportunity to comment and for your consideration. If you have any questions regarding these comments, I'd be glad to discuss them further with you. My contact information is included below.

Sincerely,

*Gary Sitzman*

Gary Sitzman  
Operations Consultant

Kimberly-Clark Worldwide, Inc.  
2600 Federal Ave.  
Everett, WA 98201  
Phone: 425-259-7311 Fax: 920-225-3688  
Email: [gsitzman@kcc.com](mailto:gsitzman@kcc.com)

W-8



**Georgia-Pacific**

**CONSUMER PRODUCTS (CAMAS) LLC**

401 NE Adams Street, Camas, WA 98607

Telephone: (360) 834-3021

**CERTIFIED MAIL  
RETURN RECEIPT REQUESTED**

April 16, 2008

Ms. Nancy Pritchett  
Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, Washington 98504

Subject: Proposed Carbon Dioxide Mitigation Program, Greenhouse Gas Emissions Performance Standard and Sequestration Plans and Programs for Thermal Electric Generating Facilities

Dear Ms. Pritchett,

Georgia-Pacific Consumer Products (Camas) LLC (GP) owns and operates a pulp and paper mill in Camas, Washington. We offer for Ecology's consideration the following comments on the above-referenced rule proposal. We are concerned that the proposal may affect the unique cogeneration facility housed at the mill when such does not appear to be the intent of the statute. Our situation is complicated by the fact that while GP owns two of the three boilers that provide steam to the cogeneration turbine (the third is owned by NRG Energy, Inc. and is leased to Georgia-Pacific), the 56 megawatt (MW) (nameplate) turbine itself and all of the electricity it generates are owned by Pacificorp, an Oregon utility, and all the electricity is sent to the Oregon grid. All three boilers provide steam to the cogeneration turbine through common high and medium pressure steam headers. We also find the proposed regulations difficult to interpret, and are unclear as to the applicability of various provisions to our situation. We offer the following brief comments in the hope that the Washington Department of Ecology (WDOE) can provide more clarity in the final rule so that we can understand how we are, or might be, affected.

**Applicability Criteria and Key Definitions are Unclear**

It is difficult for our company experts to determine how, or even if, various provisions of the proposed rule apply to the Camas Mill. For example, there is no definition of "fossil-fueled thermal electric generating facility". The Camas cogeneration system turbine is provided steam by three boilers feeding a common header; the vast majority (over 80%) of the steam results from combustion of renewable biomass fuels. However, we are unsure whether use of a small amount of fossil fuel (as much as 15 to 20%) makes us a "fossil-fueled thermal electric facility".

8-W

Ms. Nancy Pritchett

-2-

April 16, 2008

In Part II, "power plant" refers to a facility that is "permitted as a single plant by the energy facility site evaluation council or a local jurisdiction." With our unique situation where the boilers are regulated by the WDOE and the turbine is owned by a separate entity, it is not clear if the definition applies. Applicability of the rule appears in most cases to be limited to units of at least 25 MW in size, but some reporting provisions appear to be applicable to units less than 25 MW (see p 25, WAC 173-407-230, 1(c)(ii)(B)). We believe that the proposed rule provisions would only apply to our situation if 1) we increase electrical generation capacity by at least 25%; 2) we increase CO<sub>2</sub> emissions by at least 15%; and/or 3) we change ownership. In case 2), we would assume that the change in CO<sub>2</sub> emissions would be measured solely from the boilers supplying steam to the turbine and any CO<sub>2</sub> generated from renewable fuels would be exempt, but the rule isn't clear on that point. While we recognize that Georgia-Pacific's Camas Mill may be unique in the state due to its complex ownership arrangements and may require a site-specific applicability determination, it would be particularly useful if the WDOE could prepare some "plain English" applicability criteria, especially for the manufacturing sector with its widespread use of cogeneration. The United States Environmental Protection Agency (USEPA) now publishes its environmental rules in a plain English format that is much easier to follow. We would be happy to work with you to develop this format.

### **Renewable Fuel Criteria are Unclear**

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?

### **Definition of "Upgrade"**

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.

### **Measurement Issues**

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.

### **Dual Ownership Issues**

The proposed rule is silent on how to handle the unique situation we have at Camas, where Georgia-Pacific owns two of the three boilers that provide steam to the cogeneration turbine and operates all three boilers, but Pacificorp owns and operates the turbines generating electricity, and the electricity is sent to the Oregon grid. GP respectfully suggests that only in the case where WDOE and the Washington Energy Facility Site Evaluation Council regulate less than the entire "system" involved, from the generation of steam through the output of electricity, such operating units should be specifically exempted. This would greatly reduce both the uncertainty and the difficulty

of allocating responsibility between two or more owners/operators of the entire system. Otherwise, a series of difficult questions arise. Would the electric generating turbine even be subject to the rule in this situation? Who would be responsible for carbon mitigation? Who is responsible for monitoring and recordkeeping? Who is responsible for reporting? If the Department believes these issues are too complex to address in the final rule, we would be happy to meet with you to discuss a site-specific applicability determination.

We appreciate the opportunity to provide these comments for the record. We would appreciate the opportunity to meet with you to discuss these issues more thoroughly.

Sincerely,

Michael D. Tompkins  
Vice President

MDT/jm

cc:

S. R. Young - GP/Camas  
T. V. Le - WDOE/Olympia

bcc:

B. K. Carson - Camas  
G. W. Kaiser - Camas  
S. D. Bryant - Camas  
G. A. Collins - Camas  
M. J. Eisele - Camas  
A. G. Jackson - Camas  
S. I. Maxwell - Camas  
P. L. Zirngibl - Atlanta  
D. P. Roberto - Legal/Atlanta  
S. D. Matchett - Legal/Atlanta  
C. A. Whitaker - NACP/Camas  
B. T. Champion - NACP/Atlanta  
P. A. Sato - Salem  
R. C. Kaufmann - Washington, D. C.

File: II.A.3

(ENV 58-48)



CH 3E28  
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Federal Way, WA 98063-9777  
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April 17, 2008

Nancy Pritchett  
Air Quality Programs  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504

Subject: Proposed WAC 173-407-100 through WAC 173-407-400 -- *Greenhouse Gases Emissions Performance Standard and Sequestration Plans and Programs for Baseload Electric Generation Facilities Implementing Chapter 80 80 RCW*

Dear Ms. Pritchett:

The Weyerhaeuser Company respectfully submits the following comments on the referenced proposed regulation.

### **Background**

Weyerhaeuser owns a major manufacturing facility in Longview, Washington producing a variety of pulp and paper products, and dimension softwood lumber. In addition, four independent companies are located on or adjacent to the Weyerhaeuser millsite and are dependent upon utility support provided by Weyerhaeuser to varying degrees; i.e. process steam, process water and wastewater treatment services.

Weyerhaeuser operates a topping-cycle cogeneration system which is fully integrated with the set of manufacturing facilities. Five steam generating units burning six fuel types, supply steam at two header pressures to four turbine generators rated at 62 MW electricity production, and process steam to support the manufacturing activities. The electricity is sold to Eugene Water and Electric Board through a short-term contract. Weyerhaeuser has submitted FERC Form No. 556 "Self-Certification of Qualifying Status for an Existing Cogeneration Facility" on this Longview system. This system is pictorially represented in an attachment to this letter.

### **Chapter 80.80 RCW Greenhouse Gases Emissions**

Weyerhaeuser closely followed the development of this legislation in the 2007 session, specifically to evaluate its possible applicability to the Longview mill cogeneration system. Our review of the legislation signed by Governor Gregoire supported a conclusion that it would impose no new regulatory obligations on the Longview system as it is presently configured and operated.

P. W

## Proposed WAC 173-407-100 through -400

The objective of this rule-making is to implement chapter 80.80 RCW. A review of the proposed rule suggests the Longview cogeneration “facility or unit” may be subject to the greenhouse gas performance standard, GHG monitoring and certain other requirements. We believe this possible outcome arises from an imprecise translation of statutory requirements into the proposed WAC 173-407 language. Most of our comments touch on these concerns. Other comments seek to confirm our understanding of the rule language or to suggest language to clarify meaning.

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.

Discussion – The substantive requirements in the statute and regulation apply to “baseload electric generation” and “cogeneration facilities.” The term “power plant” helps to define these facilities. The statutory language literally indicates that power plants permitted by the Department of Ecology cannot be baseload electric generation facilities or cogeneration facilities.

We do note the Department of Ecology is identified in chapter 80.80 RCW with responsibilities for developing reports (-020), developing an “output-based methodology” to account for both thermal and electrical energy outputs of cogeneration facilities (-040), and developing evaluation criteria for the carbon sequestration plan (-040), among other responsibilities.

Comment 2 – WAC 173-407-110 definition of “Baseload electric generation” – 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 cogeneration facilities.” Ecology should simply utilize the definition of baseload electric generation provided in the statute, and not seek to fill assumed statutory gaps with the creation of new terms and definitions.

Discussion – The chapter 80.80 RCW definition of baseload electric generation makes no mention of cogeneration facilities. A “cogeneration facility” has a separate definition. Subsequent uses of the “cogeneration facility” term in the statute appear to always distinguish that set of facilities from baseload electric generation facilities. See, for example, the distinct requirements for baseload electric generation in RCW 80.80.040(1) and (2), and cogeneration in RCW 80.80.040(4).

Given this clear statutory construction, on what authority does Ecology rely to propose the inclusion of cogeneration facilities in the definition of baseload electric generation? While the term “power plant” is common to both category definitions, this cannot be counted as

justification to consolidate (or adjust) these definitions to effectively force a much broader set of regulatory requirements on cogeneration facilities.

Assuming Ecology can overcome the issue with statutory definitions, there is another problem with the second sentence in the baseload electric generation definition. That sentence reads:

“For a cogeneration facility, the sixty percent annual capacity factor applies to only the electrical production intended to be supplied for sale.”

As described in the small business economic impact statement developed for this proposed rule, the “sixty percent annual capacity factor” criterion refers to equipment “operating time”<sup>1</sup> and actual generation against a nameplate capacity.

Consideration of operating time and capacity factor does not work well for cogeneration facilities. Note initially that the “annual capacity factor” concept is not a component of the “cogeneration facility” definition in the statute. What is Ecology’s direct authority for adding the consideration of capacity factor as an element in defining cogeneration facilities? Combined heat and power systems will have a primary responsibility to produce steam for a manufacturing operation. An examination of the end use of the fuel input energy to the steam boilers – as electrical generation or thermal energy – would be relevant. A cogeneration system in which a significant percent of the fuel energy input to the steam generating unit(s) is directed to electricity generation and sales, would better define a baseload electrical generation facility.

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, non-condensable gases, crude sulfate turpentine, and methanol; or”

Discussion – The intent of the “included, but not limited to” language is apparently to be inclusive of all renewable biomass-based fuels generated by the forest products industry. The suggested additions to the list simply represent examples of manufacturing by-products that are routinely burned.

Comment 4 – 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?

<sup>1</sup> Page 10, Washington State Register, Issue 08-06-021, March 19, 2008

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.

Discussion – The definition of Upgrade is critically important. It serves as a trigger which might require a baseload electric facility or cogeneration facility to be subject to the Performance Standard, and possibly monitoring, GHG sequestration and other substantive requirements.

The first sentence in the RCW 80.80.010(18) definition of Upgrade provides the key concept.

“means any modification made for the primary purpose of increasing the electric generation capacity of a baseload electric generation facility. ....”

In simple terms, an Upgrade can only occur with the physical addition or modification of a turbine generator such that generation capacity is increased.

Ecology’s proposed regulation definition positions a subordinate exclusion statement in such a way that it could be applied to undercut this core concept. This qualification appears as the second sentence in the definition and reads

“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.”

The problem here is the implication that some change in fuel type or fuel addition into a steam generating unit would constitute an Upgrade. The agency should not confuse steam generation with electricity generation. Within a complex cogeneration system there might be good reason to increase heat input or fuel use (and if necessary to obtain CAA permits) to satisfy manufacturing process steam demands. Producing more steam does not necessarily increase electric generating capacity however.

We suggest that the second sentence be removed. Note that the same sentence appears later in the proposed rule definition. The context and meaning of the sentence in this position is still not clear (the result of a confusing statutory definition). We suggest Ecology should modify the sentence to unambiguously preserve the core concept of the statute. This would work:

“Upgrade does not include:

- (a)
- (b)
- (c) Installation, replacement, or modification of equipment for the primary purpose of maintaining reliable electricity generation output capacity (as specified in existing generation air quality permits as of July 22, 2007), or which results in incidental increases in generating capacity.”

Comment 6 – The WAC 173-407-120 use of the term “cogeneration facilities and units” needs to be clarified. What is the purpose for adding “units” to the phrase?

Discussion – “Cogeneration Facility” is a defined term in the statute and proposed regulation. It is only in subsection -120 that the definition is expanded to “cogeneration facilities and units.” The implication is that Ecology intends to direct regulatory requirements to a subset of equipment or activities within the “facility.”

This can only create regulatory confusion for an integrated cogeneration facility. For example, WAC 173-407-120(2) exempts from the Performance Standard those “cogeneration facilities and units” utilizing renewable fuels. Note that our Longview mill combined heat and power system consists of five steam generating units and four turbine generators. Some of these units burn “renewable fuels” and/or “natural gas or waste gas” and some do not, and at fuel feed rates that routinely vary. Steam is produced at two header pressures and directed to the turbine generators. These multiple units, multiple fuel types and changing conditions would make any computations for a “unit” very difficult.

Here are two practical questions:

The Performance Standard in WAC 173-407-130 applies to “cogeneration facilities and units.” The implication is that Ecology may intend for the standard to apply to individual turbine generators. What is the intent? Is the rule expectation that Longview would produce computations on the “pounds GHG/MW-hr” for each turbine generator, or on the integrated CHP system?

WAC 173-407-230(1) requires that “cogeneration facilities and units” monitor certain greenhouse gases. Since the Longview system produces more than 25 MW of electricity would each of the five steam generating units supplying steam to electric turbine generators be expected to install a carbon dioxide CEMS?

Comment 7 – WAC 173-407-120 seems to use “cogeneration facilities and units” interchangeably with “baseload electric cogeneration facility or unit” (see subsections (1), (2) and (5) vs. (4))

Discussion – Is the different use of terms intentional? Note that both terms are defined in the statute.

Comment 8 – 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.”

Discussion – This suggestion simply adds clarity.

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

- (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...

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.”

Discussion – The Performance Standard and definition of Greenhouse Gases appear in chapter 80.80 RCW and have been faithfully incorporated in WAC 173-407-110 and -130.

In subsection -230 the measurement of greenhouse gases is limited to Regulated Greenhouse Gases Emissions. So is, in fact, the Performance Standard really on the basis of 1100 pounds Regulated Greenhouse Gases Emissions per megawatt-hour?

In recognition that the six greenhouse gases have different global warming potentials, total GHG are typically reported in CO<sub>2</sub> equivalents (CO<sub>2</sub>e). We assume the 1100 pound GHG/megawatt-hour Performance Standard was intentionally matched to the uncorrected mass of only carbon dioxide, nitrous oxide and methane.

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.

Comment 12 – WAC 173-407-230 – The requirement for installation of a carbon dioxide continuous emission monitoring system should be withdrawn.

Discussion – The regulatory value of a continuous data stream on carbon dioxide stack gas concentration is not worth the cost of CEMS installation and upkeep. The units of the Performance Standard are mass greenhouse gas per megawatt-hour. Computation of carbon dioxide mass requires a measure of stack gas flow and those data will only be generated during required source test events. Source testing for these baseload electrical generating facilities may occur on a monthly or quarterly frequency. What is the use for carbon dioxide concentration information for time periods not matched to measured gas flows?

A better approach for this rule would be to require the source-specific derivation of a carbon dioxide emission factor. This could be developed with only a few monitoring events. Alternatively, there are a number of compilations of GHG emission factors produced by industry and regulatory agencies that could serve to reasonably quantify these emissions. See, for example, the appendices to the draft California Air Resources Board “*Regulation for the Mandatory Reporting of Greenhouse Gas Emissions*,” suggested December 5, 2007 amendments.

At some point in the next one to two years we expect there will be a federal or regional regulatory obligation to produce a GHG emission inventory by facility. Ecology should be content with an emission factor approach until that time. We also note that chapter 80.80 RCW does not apparently specify the installation of CEMS technology.

Sincerely,

Ken Johnson  
Regulatory Affairs Manager

6001 Rulemaking

COAL PLANT WORKING GROUP  
WALLA WALLA 2020

Talking Points

1. We are citizens concerned about the effects of coal plants on our county and on global warming and climate change impacts on our state and in general.
2. The purpose of 6001, as we understand it, is to promote renewable energy, and to limit CO2 and other greenhouse gas emissions, which are continuing to grow.
3. Any new coal or fossil fuel plants or contracts should be held to the highest efficiency and sequestration standards, and should not be permitted to contribute further to greenhouse gas emissions, or to other pollution streams.
4. We appreciate certain provisions of the proposed rules, we are concerned about other portions, and we believe some provisions should be added.
5. We appreciate:
  - a. 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.
  - b. the provisions that the maximum emission limitations of 6001 are in addition to the separate mitigation requirements of Washington law (Chapter 80.70 RCW).
6. We are concerned that
  - a. 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.
  - 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 CO2 "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.

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c. 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,

d. 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,

e. 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

f. all contaminants in the injected CO2 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 CO2 could become a dumping ground for other significant pollutants.

7. We believe the rules should be expanded to provide:

a. that the emission limitations shall apply to all emissions related to the entire life cycle of the fossil fuel utilized in Washington power plants, including emissions related to mining and transportation of the fuel to the plant itself. For example, the coal to be used for the proposed coal plant at Wallula in Walla Walla County is to be mined in Wyoming, and is proposed to be shipped by rail to Wallula. The emissions related to the extraction of the coal and its shipment to Walla Walla should be included in the calculations of the full emissions of the plant in applying the statutory limitations.

b. 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.

8. 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.

9. 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.

**Daniel N. Clark**  
**4-10-08**

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April 17, 2008

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Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7534

Allen Fiksdal  
Energy Facility Site Evaluation Council  
P.O. Box 43172  
Olympia, WA 98504-3172

**Re: Comments on Draft Sequestration Regulations**

Dear Nancy and Allen:

Thank you for the opportunity to comment on the proposed regulations related to the sequestration of carbon and the implementation. I am submitting these comments on behalf of United Power, the developer of the Wallula Energy Resource Center ("WERC"). United Power has been an active stakeholder in the rule development process and we applaud the work that Ecology and EFSEC have done in drafting these rules. However, we have a few key concerns about sections of the proposed rules that could have unintended consequences that ultimately would impact projects, such as WERC, that are key to establishing Washington as a leader in the effort to reduce greenhouse gas emissions while also establishing America's energy independence. With that in mind, we present our comments below.

WAC 173-407-005 & WAC 463-85-005 (Work In Unison)

As you know, the legislature clearly stated its expectation in passing ESSB 6001 that chapters 80.70 RCW and 80.80 RCW work "in unison." For the reasons stated below, we believe that the proposed language is not consistent with either this legislative intent or sound environmental policy. We recognize the challenges in applying these two very different requirements. However, we believe that an alternate approach exists to that proposed which gives full meaning to the legislature's intent and ensures the best overall outcome for the environment. If Ecology and EFSEC are not comfortable adopting our recommended approach, we suggest that WAC

Oregon  
Washington  
California  
Utah  
Idaho  
Colorado  
Minnesota

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173-407-005 and 463-85-005 be removed from the final rules. These provisions are not necessary to the rest of the rule package and could benefit from further discussion.

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 per tonne to a third party or through self-directed mitigation projects. An 80.70 mitigation project can include process changes, equipment shutdown or other activities, so long as they are "permanent." However, "permanent," as it is defined under 80.70, means that the reductions will occur for the life of the corresponding increase. In other words, under 80.70 a source can implement a process change or equipment shutdown so long as that change or shutdown lasts as long as the project seeking the mitigation.<sup>1</sup> 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.<sup>2</sup> Under 80.80, the concept of permanent sequestration is that the emissions are sequestered such that they never reach the atmosphere. Simply shutting down equipment or other activities that avoid emissions for the life of the project are inadequate under 80.80 even if they are adequate under 80.70.<sup>3</sup> Therefore, with one narrow exception, 80.80 requires that generation occur in such a manner that GHG emissions in excess of the EPS never occur, while

<sup>1</sup> For example, The Climate Trust advertises the projects that it has funded with CO<sub>2</sub> mitigation dollars. There are three terrestrial sequestration projects identified on its web page. One has a life of 50 years, one of 99 years and one of 100 years. After those time periods expire, there is no certainty that the CO<sub>2</sub> will remain sequestered.

<sup>2</sup> 80.80 expressly does not allow for options such as terrestrial sequestration as 80.80.40(7) specifies that the only emissions not counted towards the EPS are those emissions "produced by baseload generation" and subsequently permanently injected or otherwise permanently sequestered.

<sup>3</sup> The one exception for 80.80 applies where a source was already under consideration by EFSEC at the time the bill was passed. 80.80(14). In that unique circumstance, and after a good faith effort to implement a sequestration plan, the source can pay another WECC generation asset to decrease emissions—potentially through a plant shutdown. This alternative is closer to 80.70 in that a source can pay another source to reduce its emissions. This option potentially shifts GHG emissions from one WECC source to another if, as is explicitly allowed under 80.70, the reduction is the result of a shutdown of equipment.



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80.70 allows a source to comply via mitigation that can simply tie up carbon on a short term basis (e.g., terrestrial sequestration).

The intent of 80.80 was to ensure that every generating asset took steps to mitigate its CO<sub>2</sub> emissions—a goal that should be assessed as part of the evaluation of compliance with 80.70. A reasonable interpretation of the “in unison” statutory language is to apply 80.70 to ensure that measures are being taken to mitigate CO<sub>2</sub> impacts while applying the 80.80.40(1) EPS to ensure that the maximum project emissions do not exceed a ceiling. A project that permanently sequestered 20 percent of its CO<sub>2</sub> emissions at 60 percent load would satisfy both statutes so long as its ultimate emission rate equaled less than the 80.80.40(1) EPS.

Unifying the two statutes in this manner gives meaning to the underlying goal of both. Self-directed sequestration projects implemented or directly overseen by the project owner and that result in truly permanent CO<sub>2</sub> sequestration provide the greatest benefit to the environment. Other types of mitigation projects do not guarantee the same level of permanence or provide the same means of long term monitoring. Therefore the joint goal of 80.70 and 80.80 should be to maximize the scope of such projects. The way to do this is to encourage generation facilities to invest in a self-directed geologic sequestration projects by basing the 80.70 mitigation requirement on the total carbon dioxide emissions prior to permanent sequestration. If that self-directed sequestration project results in both emissions below the 80.80 EPS and mitigation equal to that required by 80.70, then the project owner should be considered in compliance with both statutes. This approach incentivizes owners to utilize permanent sequestration methods rather than simply opt for mitigation—particularly mitigation that, by statute, can be purchased at well below market rates for a ton of CO<sub>2</sub>.

Applying 80.80 and 80.70 in the manner we describe does not result in inequity between natural gas fired power plants and IGCC plants engaging in sequestration. The purpose underlying 80.70 was to ensure that each power plant subject to the mitigation requirement did something to minimize its impacts. However, as noted above, this mitigation need not result in truly permanent reductions in emissions. In addition, the amount paid by a plant is capped at a dollar level that is well below market price of a ton of CO<sub>2</sub>. Thirdly, there was no ceiling on CO<sub>2</sub> emissions. As a result of these three factors, if a baseload natural gas plant were to pay for mitigation, it would mitigate substantially fewer tons of CO<sub>2</sub> than a baseload IGCC plant that started with a higher emission rate, but permanently sequestered CO<sub>2</sub> to reduce its emissions to meet the 80.80 standard. As a result, the IGCC plant, which is using a plentiful domestic fuel source, ends up paying the full cost to permanently sequester a large amount of GHGs to meet the 80.80.40(1) standard. By contrast, a natural gas fired power plant pays a substantially lower amount (capped at \$1.60/tonne) to mitigate a small fraction of its CO<sub>2</sub> emissions—potentially



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through projects such as terrestrial sequestration that would not be considered permanent under 80.80.

The proposed WERC project offers perspective into the unintended consequences associated with requiring 80.70 and 80.80 compliance to be additive. The WERC power island will have a net output of 886 megawatts ("MW") when parasitic load associated with operating the power island is subtracted. The project that has set 65% CO<sub>2</sub> reduction as its goal, bringing the plant to an emission rate that is substantially lower than that which would result from applying 80.80 and 80.70 in series rather than in unison. This lower emission rate is based on the greatest level of reduction that the technology can reasonably achieve and not a particular interpretation of the interplay of the two statutes. The sequestered CO<sub>2</sub> is anticipated to remain out of the atmosphere for millennia, not the 50 to 100 years that can occur under the 80.70 mitigation program. As a result, the WERC approach is preferable to the type of mitigation a natural gas fired power plant would pay for under 80.70. However, achieving this lower sequestration rate comes at a significant added operating cost. Even at the rate set in 80.70 for payment in lieu of sequestration, the project would face an additional up front cost of approximately \$22.3 million.<sup>4</sup> If the project is required to make a roughly \$22.3 million mitigation payment, it is likely to have to make up that cost by decreasing the level of sequestration that it achieves. If WERC were to then pay a third party rather than achieve sequestration in excess of that necessary to meet the 1,100 lb/MW-hr standard, less than permanent mitigation projects would get financed and permanent sequestration would not occur. This would be a net detriment for the environment.

We believe that the best way of addressing the two statutes is to recognize the preferred outcome of permanent, well monitored sequestration. Where a self-directed project is implemented that results in permanent sequestration, then those reductions should be counted equally towards 80.70 and 80.80 compliance. Where compliance with 80.80 is to be achieved through some means other than a self-directed project employing permanent sequestration, then 80.80 should first be complied with and then 80.70. This ensures that the proper incentives are in place to engage in the safest, surest and most permanent sequestration.

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<sup>4</sup> The \$22.3 million figure was calculated, consistent with the statute, by taking 60 % the net output and calculating emissions for 30 years based on an emission rate of 1,100 lb/MWh. 20 percent of this total was then taken as the mitigation amount. At \$1.60 per ton, this equates to a \$22.3 million mitigation payment if the least cost mitigation method is employed (i.e., payment to a third party provider with the price cap established in 80.70.020(5)).



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As an alternative to the changes we suggest, Ecology and EFSEC could choose not to promulgate WAC 173-407-005 and WAC 463-85-005 at this time. ESSB 6001 required that EFSEC and Ecology implement those rules necessary to implement the greenhouse gas emission performance standard by June 30, 2008. These rules do not need to address the issue of how 80.70 and 80.80 RCW interact and, given the rapidly developing world of greenhouse gas regulation, it would be prudent to not memorialize their relationship in statute. We believe that this relationship may best be evaluated on a case-by-case basis, taking into account the specific facts at hand. Therefore, as an alternative to revising the proposed regulations to acknowledge that self-directed sequestration projects should count equally towards 80.70 and 80.80 compliance, we believe that Ecology and EFSEC should delete WAC 173-407-005 and WAC 463-85-005 from the final rule package.

Definition of "Electrical Output":

WAC 173-407-230(1)(a) and WAC 463-85-230(1)(a) define "electrical output" as being measured "at the point of connection with the local electrical distribution network or transmission line, as appropriate." Compliance with the greenhouse gas emissions performance standard is determined based on the total emissions divided by the total MWh produced in that year. WAC 173-407-140(2)(a) (as proposed). Although the term "total MWh produced" is not defined in the proposed rule, we assume that it is intended to be equivalent to "electrical output." Assuming this is the correct reading of the proposed rules, the definition of "electrical output" imposes a tremendous penalty on a facility that is serving an on-site or "over the fence" load. We agree that parasitic load associated with a power plant should not be counted as part of the electrical output as that is power necessary to generate the ultimate output. However, if that power plant chooses to send power "over the fence" to a collocated facility, or some other power consumer, the plant should not be penalized for doing so. Regardless of whether the electricity is sold to the grid or passed to an associated onsite industrial application, that output should be considered part of the power plant's "electrical output." We understood that there was broad consensus within the stakeholders group that any other approach would not allow consistent comparison between power plants.

Counting electricity used on-site as part of the "electrical output" is a very important issue in relation to IGCC plants. All energy facilities have a certain amount of inherent parasitic load associated with running operating systems necessary to operate the power island. IGCC plants have two additional potential uses of electricity. First, electricity can be used to power the collocated gasification plant. Second, electricity can be used to power a geologic sequestration injection system. Either load can be served by either the power generation facility or by electricity imported off the grid. In the latter case, the generation facility would export its



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generation onto the grid and then accept electricity back from the grid. Doing so would necessarily be inefficient as there would be significant line loss as a result of the wheeling of the power out to the grid and then back into the gasification and/or sequestration plant.

United Power strongly urges Ecology to revise the definition of electrical output as the net output of the power generation facility. There are several reasons for this. First, as noted above, this approach encourages the most efficient means of powering the gasification and injection operations. Second, this approach is most consistent with the goal of wanting to ensure that the full emissions of a source are matched up with the full generation so as to best compare different generation sources. The fact that a syngas fired power plant has its gas processing plant collocated with the power plant should not cause it to be more heavily regulated than a natural gas fired power plant that has its gas processing plant located in Canada. Third, defining electrical output to include only electricity sent to the grid discourages onsite use of power and, in the case of an IGCC plant with geological sequestration, creates artificial incentives for third parties to own and operate the geologic sequestration facilities. There is no reason to create artificial incentives for such a structure. Furthermore, given the cost of developing and maintaining a geologic sequestration plant, it is quite possible that additional facilities requiring sequestration could locate near an operating IGCC plant and contract for CO<sub>2</sub> sequestration services. In such a situation it would be inappropriate to make the IGCC plant responsible for the full power load associated with the injection system. Finally, plants such as the Wallula facility are planning to inject significantly more CO<sub>2</sub> than is required in order to meet regulatory compliance requirements. If the power associated with injection were held against the facility in determining compliance by subtracting it from the gross generation, there would be a serious disincentive for this additional sequestration. In short, there are multiple reasons for defining "electrical output" to mean the generation, net of power island parasitic load, from the power island.

A simple example may serve to make this point best. Power Plant A and Power Plant B each generate 100 MW of electricity after subtracting out parasitic load and each emit 100,000 lbs of CO<sub>2e</sub> each year. Power Plant A sends its 100 MW over the grid to Seattle, several hundred miles away, and after line losses, about 90 MW is available for use. Power Plant B sends 50 MW to Seattle and uses the other 50 MW to power an onsite widget plant. As there is 10% line loss on the power sent to Seattle and 0% line loss on the power used at the collocated widget plant, 95 MW of electricity is made available for use by Power Plant B. Under the proposed rule, Power Plant A would comply with the 1,100 lb/hr emissions performance and Power Plant B would not even though the plants have identical emissions and A results in 90 MW usable electricity while B results in 95 MW usable electricity. The reason is that under the proposed rule the plants must determine compliance by dividing their emissions by the amount of electricity placed on the grid.



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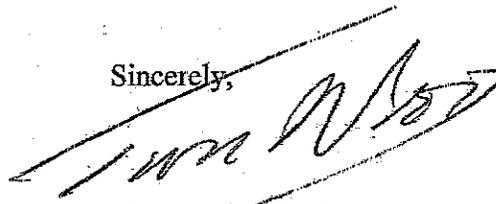
Power Plant A would divide its emissions by 100 MW and Power Plant B would divide its emissions by 50 MW. Power Plant A's emission rate is 1,000 lb/MWh and Power Plant B's emission rate is 2,000 lb/MWh. This makes no sense.

Consistent with this discussion, we suggest that WAC 173-407-230(1)(a) and WAC 463-85-230(1)(a) be revised to read as follows:

(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;

We appreciate this chance to provide comments. Please contact me if you have any questions regarding these suggestions.

Sincerely,



Thomas R. Wood

cc: Robert Divers

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Howard J. Feldman  
Director

Regulatory and Scientific Affairs

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Email feldman@api.org

April 17, 2008

Ms. Nancy Pritchett  
Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

Submitted Via Email (mpri461@ecy.wa.gov)

Dear Ms. Pritchett,

API appreciates the opportunity to comment on Washington's Department of Ecology (WDOE) proposed amendments to Chapter 173-218 WAC establishing permitting requirements to protect groundwater from contamination due to permanently storing emissions underground. API represents nearly 400 member companies involved in all aspects of the oil and natural gas industry and API believes geologic sequestration of CO<sub>2</sub> is a promising technology for mitigating CO<sub>2</sub> emissions.

**Industry Experience**

In developing rules, WDOE should be aware of and make use of the considerable experience the oil and gas industry and its regulating agencies have in processing, transporting and injecting CO<sub>2</sub>. In the U.S., there are already 3,500 miles of long distance pipelines transporting CO<sub>2</sub>. Over the past 35 years the oil and gas industry has injected over 10.8 trillion cubic feet (0.6 billion MT) of CO<sub>2</sub> into oil and gas reservoirs to enhance oil production. The current injection rate is about 30 million tons of CO<sub>2</sub> per year.

Oil and gas companies are involved in many different types of CO<sub>2</sub> injection projects, accounting for the vast majority of CO<sub>2</sub> being injected today. Enhanced oil recovery (EOR) using naturally sourced CO<sub>2</sub>, EOR projects using captured CO<sub>2</sub>, and CO<sub>2</sub> storage projects. Many more projects are in the planning stage.

Many API member companies are actively engaged in a variety of research consortia, funding research at major universities and conducting independent research to address the technical and policy questions surrounding geologic storage of CO<sub>2</sub>. The Carbon Dioxide Capture Project, The DOE Regional Partnerships, the Gulf Coast Carbon Center, CO<sub>2</sub>Remove, and the Global Climate and Energy Project are some prominent examples.



## **Recommendations**

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.

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.

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.

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.



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. If you have any questions, please call Steve Crookshank of API's Policy Analysis at (202) 682-8542.

Sincerely,

A handwritten signature in black ink, appearing to read "Howard Feldman", written in a cursive style.

Howard Feldman  
Director, Regulatory and Scientific Affairs

# **Recommendations for the Regulatory Management of Geologic Sequestration of CO<sub>2</sub> under the UIC Program**

## **March 28, 2008**

### **Introduction**

This document contains the views of an ad-hoc CO<sub>2</sub> Workgroup regarding regulatory recommendations to the U.S. Environmental Protection Agency for the geologic sequestration of CO<sub>2</sub>. The Workgroup is a multi-stakeholder effort comprised of representative from state UIC and oil and gas agencies, environmental non-governmental organizations (NGO's), oil and gas exploration, production and service companies, national laboratories and public power companies. While this document was developed with participation by and input from several member states of the Ground Water Protection Council (GWPC), it does not represent an official position of the GWPC.

Funding for this project, including contributions of in-kind services, was provided by the American Petroleum Institute, U.S. Department of Energy, American Public Power Association, Environmental Defense, Argonne National Laboratory and Bryan Cave L.L.P.

We would like to thank all of the workgroup members and other contributors who volunteered their time and expertise to the development of this document.

Workgroup recommendations were developed through a consensus process in which technical, legal and regulatory expertise was applied to a series of alternative approaches to regulation of geosequestration in a number of topic areas. Each series of alternatives was evaluated on the basis of the following criteria:

1. The intent of the approach
2. The technical merit and practical applicability of the approach
3. The consistency of the approach with the language of the Safe Drinking Water Act (SDWA), Section 1422 provisions and current Code of Federal Regulation (CFR).

The alternatives were also considered in light of comments from GWPC member states collected in response to a separate questionnaire that was circulated to obtain views for the development of recommendations to EPA. These comments are summarized in the body of the document under the "Comments" heading. Because these comments were collected separately from the assessment of alternatives, there may not be a direct correlation in some cases.

In many cases the recommendations of the workgroup mirror or emulate 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.

The document is organized as follows for each topic area:

- Alternative Approaches
- Comments (State Regulatory Agencies)
- Workgroup Recommendation
- Recommendation Rationale

Appendix A contains additional comments received by the workgroup during and following the recommendations development process.

This document addresses alternative approaches to regulatory requirements in the following topic areas:

1. **Geologic Characterization**
2. **Fluid Movement**
3. **Area of Review (AOR)**
4. **Well Construction**
5. **Operation**
6. **Mechanical Integrity Testing**
7. **Measurement Monitoring and Verification**
8. **Well Closure**
9. **Financial Responsibility**

## **1. Geologic Characterization**

### **Alternative Approaches 1.1: Geologic System**

A geologic system comprised of:

- A receiving zone of sufficient depth, area extent, thickness, porosity, and permeability;
- Lithologic description.
- Geological name.
- Thickness and depth.
- A trapping mechanism that is free of major non-sealing faults;
- A primary confining system of sufficient regional thickness and competency to allow injection at proposed rates and volumes without initiating or propagating fractures in the confining zone; and
- Where conditions warrant, a secondary containment system that extends to the base of the lowermost USDW and is completely redundant of the primary confining system and could confine the injected CO<sub>2</sub> should the primary system fail, **OR**

A secondary containment system that extends to the base of the lowermost USDW and is completely redundant of the primary confining system and could confine the injected CO<sub>2</sub> should the primary system fail.

### **Comments 1.1**

1. Based upon a GWPC survey, most states (AL, CA, FL, IN, KS, NM, OH, WA) view proper site selection as an extremely high priority. States that did not specifically reference proper site selection as a major concern, typically, indicated that they were confident that current State UIC Program practices and rules ensured adequate evaluation of industry-proposed sites.
2. All surveyed states recognize the need to define reservoir-specific storage characteristics. Colorado and Nebraska are specifically concerned with CO<sub>2</sub> solubility and geochemical reactions in the injection reservoir as they could affect storage properties at large scale sequestrations operations. While applicants are required to submit geochemical data, presumably to establish baseline geochemical information for USDW's, there does not appear to be a corresponding requirement for primary or secondary containment systems.
3. Florida commented that regulations should detail site selection requirements, and should include data and interpretation from a "regional and local context."
4. The applicant should also provide depth, areal extent, thickness, porosity, permeability, lithology (including facies relationships) for the primary and secondary confining system as well as secondary containment systems.
5. Ideally, proposed sites should have secondary containment systems that serve as monitoring formations between the primary and secondary confining systems. However, it is recognized that not all sites have, or need, secondary containment systems.

6. Regulations should be flexible enough to accommodate differences in regional and state, geologic conditions. States such as Nebraska, have extremely thick, regionally-extensive confining systems, but not necessarily secondary containment systems. Therefore, the more general standard (highlighted) is favored, so as not to preclude permitting of facilities in other-wise geologically ideal settings.
7. Is there any language in the UIC regulations that precludes injection of CO<sub>2</sub> within the ZEI of Class I industrial or hazardous waste injection wells? If not, perhaps that should be included as a siting prohibition or addressed in regulations as a consideration of siting, AOR, fate and transport modeling, etc.
8. The regulations for non-EOR injections for geologic sequestration in a saline reservoir should include a determination by the appropriate State jurisdictional agency that the injection operation will not adversely affect future development of oil and gas reserves or commercially valuable mineral deposits. For example, Texas law requires determination that a permitted injection well will not impair oil and gas or other mineral rights, or endanger any oil or gas reservoir. (It is recognized this requirement would be outside the scope of the SDWA.)

### **Workgroup Recommendation 1.1**

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.

### **Recommendation Rationale 1.1**

The elements listed in the recommendation are considered essential for the proper characterization and usage of a site for geologic sequestration. With respect to confinement, it was the consensus of the workgroup that although secondary confinement zones may seem be desirable, a requirement for secondary confinement was impractical because:

- The definition of "confining zone" allows for consideration of multiple formations to the extent necessary to provide adequate confinement because it includes: "a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone." We believe the definition of confining zone also includes the conceptual framework for zones that could be used for monitoring.
- The adequacy of the confining zone is more critical to the suitability of a site than the presence of secondary confinement
- A secondary confinement system may not be present and the lack of such a system should not automatically disqualify a site from consideration where there is an adequate primary confinement system;

The term transecting transmissive was added to narrow the scope of the information provided to only those structural features that could be considered potential pathways for fluid migration. Although the workgroup struggled with the technical aspects of determining transmissivity it was still believed that this was the only practical way to limit the dataset to an appropriate level of detail.

Additionally, the workgroup felt it appropriate to include the reactivation of faults as a consideration with respect to injection rates and volumes.

Finally, the workgroup inserted the word "integrity" in place of "competency" because in rock mechanics rock types such as Sandstone or Limestone are considered more competent than rocks such as Shale, but Shale typically provides a better confining layer than Sandstones because its lower vertical

permeability gives it a greater ability to prevent the transmission of fluids upward through the rock matrix and its ductile character allows it to flex or flow rather than break under stress.

### **Alternative Approaches 1.2: Site Information**

Provide information on the geologic structure of the proposed site, including:

- Maps and cross sections of local geologic structure.
- Identification of faults and fractures and determination that they would not interfere with containment.
- Information on seismic history and the presence/depth of seismic sources.
- Identification of surface exit points of potential release of CO<sub>2</sub>; including all man-made surface structures that are intended for human occupancy.

### **Comments 1.2**

1. Indiana recommends that regulations preclude permitting operations at locations at known fault zones. Applicants should be required to list distances to the nearest known fault(s).
2. Most surveyed states recognize the importance of identifying any faults within the AOR or ZEI that transect the primary and secondary containment units. If faults transect the injection reservoir, applicants could provide data demonstrating that fault plans are non-transmissive. Some states indicate that they would need technical guidance to make such determinations.
3. Mississippi specifically recommends a 3D Seismic Survey for identification of faults in the AOR or ZEI.
4. What is meant by "surface exit points"? Are we asking the applicant to provide an up-to-date map of every house, business, etc. within an AOR that may exceed 100 square miles? Extremely onerous. This will constantly change during the 30 - 50 year life span of a major project. What value does this serve? The last bullet appears to address conduits to the surface, and ignores conduits to USDW's, oil and gas bearing zones, or other commercially valuable mineral deposits.
5. Add a requirement for identification of all water wells (or, wells with public-domain records); or a specified subset of wells. (Note: See Workgroup Recommendation 3b for information relative to this comment)

### **Workgroup Recommendation 1.2**

Provide information on the geologic structure and hydrologic properties of the proposed site, including:

- Geological names and Lithologic descriptions of the injection zone, confining zone, and interspersed formations;
- Maps and cross sections of local geologic structure;
- Known faults and fracture zones in the confining zone and an assessment of their effect on confinement;
- Tectonic seismic history showing the location, depth and magnitude of seismic events

### **Recommendation Rationale 1.2**

The workgroup felt that a requirement to provide information on all faults and fractures for the proposed site would be impractical as it would necessitate extensive seismic surveys. Similar to recommendation 1.1, the workgroup revised the proposed language to reflect "known faults and fracture zones" but also added a provision for the assessment of their potential to affect confinement. The outcome from these assessments could be used to determine if a fault or fracture zone was transecting and transmissive as noted in 1.1. With respect to the seismic history, it was believed that the importance of this provision centered less on the sources of seismicity and more on the location, depth and magnitude of seismic events as these are better predictors of potential future seismic activity that could result in a loss of confinement.

### **Alternative Approaches 1.3: Site Characterization**

Characterize the overburden and subsurface structures, and trapping mechanisms based on:

- Data on the size, capacity, porosity, and permeability of the receiving formation and the confining systems, including any geology/facies changes, based on geologic cores, outcrop data, 3-dimensional seismic surveys, and well logs.
- Geomechanical information on fractures, stress, rock strength, and in situ fluid pressures within the cap rock and storage reservoir.
- Maps and cross sections illustrating regional geology.

### **Comments 1.3**

1. Would this language require applicants to run 3-D seismic surveys, regardless of project size; or simply require analysis of existing seismic data? While some surveyed states (In.) support requiring 3-D seismic surveys, others favor a more general approach that indicates the type of data needed for submission, leaving the permitting agencies to determine the details.
2. Geomechanical information will be very sparse on saline reservoirs and, in particular, predictions of values and distance from wells which can be logged and cored could be very unreliable.
3. "Do state UIC regulators have the expertise to evaluate 3-D seismic results?"

### **Workgroup Recommendation 1.3**

Characterize the overburden and subsurface structures, and confining zone within the AOR based on:

- Data on the areal extent, thickness, porosity, and permeability of the injection zone and confining zone, including any geology/ facies changes, based on geologic cores, outcrop data, seismic surveys, well logs or other data acceptable to the Director;
- A estimation of the capacity of the injection zone using a methodology acceptable to the Director;
- Geomechanical information describing natural and induced fractures, stress, rock strength, and in-situ fluid pressures within the confining zone;
- Maps and cross sections illustrating regional geology, including the regional stress state.

### **Recommendation Rationale 1.3**

The key change to the proposed language in this recommendation is the removal of the provision for 3-D seismic. The workgroup was concerned that limiting seismic to 3-D profiles was not advisable because of the potential costs, availability, and evaluation capability limitations inherent to 3 dimensional seismic surveys. It was also felt that the regulatory authority should have the ability to specify other forms of data acceptable for characterizing the geologic features in the AOR.

### **Alternative Approaches 1.4: USDW Information**

Provide the geologic name and depth of all USDWs that may be affected by the injection.

Provide geochemical information on subsurface aquifers, including all USDWs:

- Baseline geochemistry.
- Maps and cross sections of USDWs, **OR**

Provide geochemical information on subsurface aquifers, including all USDWs:

- Baseline geochemical data on water-rock- CO2 geochemistry and mineral reactions.
- Maps and cross sections of USDWs.

## **Comments 1.4**

Question: What is meant by "geochemical information"? Is this requirement intended to establish baseline ground-water chemistry, aquifer-lithologic properties, for USDW's within the AOR/ZEI; or both. Is it intended to provide a basis for modeling/predicting water-rock-CO2 reactions as they relate to SDWA water-quality standards?

## **Workgroup Recommendation 1.4**

Provide the geologic name, depth, maps and cross sections of all USDW's that may be affected by the injection

Provide geochemical and hydrogeologic information on the injection zone, the confining zone, subsurface aquifers, and all USDWs within the AOR including:

- Baseline fluid chemistry and geochemistry
- Baseline data on porosity, permeability, formation pressure, and specific storage or, a poroelastic parameter acceptable to the Director.

## **Recommendation Rationale 1.4**

In addition to geochemical information, the workgroup felt it was critical to provide hydrogeologic information on not only aquifers and USDWs but also on the injection zone, and confining zone as monitoring in formations within these zones may play a critical role in any evaluation of the success of confinement. Further it was felt that the information to be submitted needed to be constrained to a specific area and that the AOR seemed to be the most reasonable and practical boundary for this purpose.

## **Alternative Approaches 1.5: AOR Information**

Provide information on the area of review:

- Maps and cross sections of the AOR.
- List of penetrations into the injection zone.
- List penetrations of secondary containment system.

## **Comments 1.5**

None

## **Workgroup Recommendation 1.5**

*Recommendation incorporated into 3.2*

## **Recommendation Rationale 1.5**

*See Recommendation 3.2*

## **2. Fluid Movement**

### **Alternative Approaches 2: Fluid Movement**

The well must be constructed, operated, maintained, and plugged such that injection activities will not cause movement of any fluids into a USDW.

## Comments 2

1. Is this the appropriate standard? Should the rules simply prohibit movement of fluid into a USDW that causes a violation of primary MCLs or poses a public health risk? Language should be consistent with the 144.12 An endangerment standard. Further, 144.12 (b) only applies to classes I, II and III; the interpretation of allowance of no fluid movement into a USDW is problematic, particularly where a non-USDW injection zone transitions horizontally into a USDW at distance from an injection well. See GWPC position on "no fluid movement" interpretation.
2. The terms confining zone and confining bed defined in the CFR are nearly synonymous with one another. Consequently, the term confining zone should be redefined in the CFR as "a system of strata containing confining beds capable of preventing vertical fluid migration and non-confining beds capable of being used to monitor leakage through a confining bed". **OR**

Add the term Confining System as follows: Confining system means "a sequence of confining and non-confining beds capable of preventing vertical fluid migration and capable of being used to monitor leakage through a confining bed"

## Workgroup Recommendation 2

Wells must be constructed, operated, maintained, converted, plugged, and abandoned in a manner that prevents the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons.

## Recommendation Rationale 2

The critical consideration in this recommendation is the standard to be applied to the movement of fluid. The workgroup agreed that the current regulations at 40 CFR 144.12(a) established a fluid migration standard that was both practical and appropriate for this purpose and should be applied. Consequently, this standard was applied in this recommendation and throughout the other recommendations in the document. Additionally, the workgroup felt that the addition of "converted" to the list of activities to which fluid migration prevention applied was appropriate to deal with those cases where a well may have served another purpose but was going to be used for injection of CO<sub>2</sub> for geologic sequestration.

## 3. Area of Review (AOR)

### Alternative Approaches 3.1: AOR Determination

The AOR may be determined by calculating a fixed radius or by modeling, **OR**

The AOR should be determined based on state-of-the-art techniques (e.g., modeling) that define, in three dimensions, the extent of the CO<sub>2</sub> plume and associated pressure front for a specified period of time (e.g., 100 years) based on proposed injection rates and volumes. Models must account for the buoyant, two-phase nature of the injected CO<sub>2</sub>, **OR**

The AOR should be determined using state-of-the-art models that define, in three dimensions, the extent of the CO<sub>2</sub> plume and associated pressure front for a specified period of time (e.g., 10,000 years) based on proposed injection rates and volumes. Models must account for the buoyant, two-phase nature of the injected CO<sub>2</sub>.

### **Comments 3.1**

1. Based upon a GWPC survey, this is an area of significant state-concern. For deep saline-reservoir projects models will likely be based on formations with few penetrations (ideal) and therefore inadequate information to formulate an adequate subsurface geologic interpretation (catch 22). California points out that they approved a gas storage project in the LA Basin based upon 3-D seismic surveys, but the project was eventually terminated due to leakage.
2. Florida comments that the focus of AOR/ZEI reviews should be "deep" wells, with less emphasis placed on "shallow" wells and surface features.
3. Ohio EPA comments – This may be one of the most critical aspects of regulatory development. Regulations need to specify appropriate modeling using accurate site specific information for inputs to better ensure accurate area of review determinations. Poorly abandoned borings and wells in the AOR are the most likely pathways for the CO<sub>2</sub> to breach the confinement zone, further emphasizing the need for an accurate determination. Due to the number of facilities that may be interested in CO<sub>2</sub> sequestrations, interference between pressure zones from nearby injection may need a greater consideration than in the past.
4. AOR reviews should include evaluations of underground mines, and especially the quality of plug jobs for well penetrations in the affected areas of underground mines. (Again, falls outside scope of SDWA)
5. Washington has developed the following definition to define the AOR/ZEI boundary. "The boundaries of the geologic sequestration project which shall be calculated to include the area containing 95 percent of the injected CO<sub>2</sub> mass, 100 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 1 percent per year, whichever is greater, or another method approved by the department."
6. Texas law requires determination of 99% sequestration of CO<sub>2</sub> for 1,000 years; such requirement may impact considerations of AOR, modeling of fate and transport, monitoring, etc.
7. Other reviewers also commented that the AOR boundary should be defined based upon plume/pressure front stabilization criteria vs. an arbitrary timeframe (or, whichever is greater).
8. It seems possible or likely that the size and shape of the AOR determined in the characterization phase will change during the life of the project as MMV and modeling progress. We need to recommend that the regulations be flexible enough to handle changes to the AOR. As long as the changes are not the result of a leak out of the primary confining system.

### **Workgroup Recommendation 3.1**

The AOR should be determined and re-evaluated during the life of project as necessary, based on generally accepted and site relevant techniques, such as modeling, that define, in three dimensions, the maximum extent of the modeled CO<sub>2</sub> plume and associated pressure front. Any models used must account for the buoyant nature and specific properties of separate phases of injected CO<sub>2</sub>, and the multi-phase nature of fluids within the injection zone.

### **Recommendation Rationale 3.1**

The determination of the AOR is a critical factor in the development of regulatory implementation of CO<sub>2</sub> geologic sequestration. One of the Alternative Approaches limited the AOR by imparting an artificial time barrier and it was felt that this was not appropriate. Instead the workgroup recommended that the language reflect a "maximum extent" with respect to the plume and associated pressure front. It was believed that this would work better within a modeling regime, yet provide assurance that the full effect of CO<sub>2</sub> migration in the subsurface would be taken into account.

The workgroup clearly believed that using a fixed radius to establish the AOR was inappropriate for the geosequestration of CO<sub>2</sub>. However, it did incorporate the possible use of modeling as a means for determining the areal extent of the AOR because such techniques can be validated using measurements

gathered during the operational phase of a project and can provide a means for adjusting the AOR over time as needed to reflect real world conditions.

### **Alternative Approaches 3.2: Artificial Penetration Identification**

Identify all shallow and deep artificial penetrations (including active and abandoned wells) in the AOR. Provide a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require.

### **Comments 3.2**

Question: Penetrations of what? The focus should be evaluation of penetrations of primary and secondary containment systems and other penetrations identified by the risk assessment.

### **Workgroup Recommendation 3.2**

Provide information on the AOR including:

- Maps and cross sections
- A description of each artificial penetration of the confining zone, including active and abandoned wells, in the AOR. The description shall include all relevant available information on the well or penetration type, construction, date drilled, location, depth, record of plugging and/ or completion, and any additional information the Director may require.

### **Recommendation Rationale 3.2**

As with other recommendations, the workgroup believed that while a standard set of information was needed, the Alternative Approaches did not include sufficient flexibility for the regulatory authority to require additional information as needed. Consequently, the recommendation added a provision for a program Director to require information beyond the listing.

### **Alternative Approaches 3.3: Corrective Action Identification**

Review all available data on all abandoned wells in the AOR, determine if they have been plugged in a manner that prevents the movement of CO<sub>2</sub> or associated fluids based on reliable, recent plugging records, and identify those that need corrective action.

### **Comments 3.3**

Question: What types of abandoned wells? Does this include private, public, industrial, agricultural, geothermal well, etc.? Again, the focus should be evaluation of penetrations of primary and secondary containment systems and other penetrations identified by the risk assessment.

### **Workgroup Recommendation 3.3**

Review all available data on all abandoned wells in the AOR, assess if they have been plugged in a manner that prevents the movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons.

### **Recommendation Rationale 3.3**

The proposed language was too vague with respect to fluid migration. The workgroup applied the standards of 40 CFR 144.12(a) to provide the appropriate context for this provision. The issue of remedial action is dealt with in Recommendation 3.4.

### **Alternative Approaches 3.4: Corrective Action**

Remediate those wells in the AOR that pose the greatest risk to USDWs using corrosion resistant cements and other appropriate corrective action methods, **OR**

Remediate those wells in the AOR for which recent cementing data with a high degree of certainty do not exist, using corrosion resistant state-of-the-art cements, cements (e.g., latex-epoxy blend cements), and other appropriate corrective actions methods.

### **Comments 3.4**

1. Again, we need to clarify what types of wells would require corrective action? Question: Should we necessarily require corrective action of a well plugged with bentonite, or other naturally-corrosion resistant earthen plugging materials?
2. Remediation of "leaking" abandoned wells requires certain types of electric logs to identify the leak flow path characteristics such as its location and size to select the proper sealing method and material. In some cases cement is used and others require chemical sealants that penetrate and seal matrix permeability.

### **Workgroup Recommendation 3.4**

Remediate those artificial penetrations in the AOR, as necessary, to prevent the movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons.

### **Recommendation Rationale 3.4**

The proposed language used a subjective standard, "greatest risk" that was both impractical and open to overly broad interpretation. To resolve this issue, the language of 40 CFR 144.12(a) was applied to provide consistent and appropriate context to the fluid migration question.

Further the Alternative Approaches dealt only with wells. Other artificial penetrations such as mine shafts were not addressed. Consequently, the workgroup changed "wells" to "artificial penetrations" to account for all anthropogenically derived openings. Finally, the workgroup felt that establishing a standard for the materials used to remediate wells at this early stage of regulatory development was unwise and could have unforeseen negative consequences.

## **4. Well Construction**

### **Alternative Approaches 4.1: Well Construction and Fluid Movement**

The well must be cased and cemented to prevent movement of fluids into or between USDWs, **OR**

Surface casing drilled below the USDW shall be set 100 feet below the lowest USDW and cemented to the surface.

### **Comments 4.1**

The depth of surface casing below the USDW should be the discretion of the permitting agency.

### **Workgroup Recommendation 4.1**

The well must be cased and cemented to prevent the movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. The long-string casing shall be cemented above the top of the injection zone and confining zone. Appropriate logs and other tests shall be conducted during the drilling and construction of new injection wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director.

### **Recommendation Rationale 4.1**

The language of 40 CFR 144.12(a) was used to provide the appropriate context to the standard of fluid migration. However, the workgroup felt that a specific cementation standard for the cementing of the long string was appropriate provided it did not specify a depth but, rather, called for the cementation of long string to above the confining zones along with the submission of appropriate, professionally interpreted, logs to demonstrate the adequacy of cementation. Further, with respect to the verification of cementation called for in Alternative Approaches 4.2 the workgroup believed that establishing the use of specific logs such as a CBL or CET was not a good approach because geophysical logging technology is constantly changing. Therefore, it was believed that specifying "appropriate logs" was a more reasonable standard as this would allow the regulatory authority to accept logs that it believed were effective.

### **Alternative Approaches 4.2: Long String Cementing (See 4.1)**

The long-string casing may be cemented above the top of the injection zone with verification by CBL or CET, **OR**

The long-string casing and cement shall run the entire length of the well.

### **Comments 4.2**

1. Suggested alternative: The long string casing must be cemented between the top of the injection interval and at least 500 ft. above the secondary containment unit. The integrity and location of the cement must be verified using the best available technology capable of radially evaluating cement quality, identifying the location of channels or contaminated cement, and validating the casing-cement and cement-formation bonds through primary and secondary confining zones.
2. Some states suggest Class I hazardous well construction standards as a model. Others commented that this would be too prescriptive.

### **Workgroup Recommendation 4.2**

*Recommendation incorporated into 4.1*

### **Recommendation Rationale 4.2**

*See recommendation 4.1*

### **Alternative Approaches 4.3: Casing and Cement**

Casing, tubing, and drill pipe should be adequate to withstand the corrosive nature of the injected CO<sub>2</sub> and any impurities at the anticipated pressure, temperature and other operational conditions and meet API standards, **OR**

Casing, tubing, and drill pipe should be adequate to withstand the corrosive nature of the injected CO<sub>2</sub> and any impurities at the anticipated pressure, temperature and other operational conditions and be state-of-the-art and meet API standards.

### **Comments 4.3**

1. Suggested alternative: When wet CO<sub>2</sub> exposure conditions exist, use corrosion and stress resistant cements in zones where cement-CO<sub>2</sub> contact is likely or cement integrity is critical (e.g. cement zones through primary and secondary containment systems)."
2. Rules do not address well conversions.
3. Most reviewers do not want "state-of-the-art" to appear in the rules as a descriptive, as it tends to lead to litigation.
4. Remove "drill pipe" as it is not present in the well during CO<sub>2</sub> injection operations.

### **Workgroup Recommendation 4.3**

The casing and cement used in the construction of each newly drilled well shall be designed for the operating life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

- (1) Depth to the injection zone;
- (2) Depth to the bottom of all USDWs;
- (3) Injection pressure, external pressure, internal pressure, and axial loading;
- (4) Hole size;
- (5) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
- (6) Characteristics of injection fluid (chemical content, corrosiveness, and density);
- (7) Lithology of injection and confining intervals; and
- (8) Type or grade of cement
- (9) Planned well operations and operation results on casing/cement.

The tubing and packer, and annular fluid shall be designed for the expected service. In determining and specifying requirements for tubing, packer, or alternatives the following factors shall be considered:

- (i) Depth of setting and temperature at setting depth;
- (ii) Characteristics of injection and annular fluid (chemical content, corrosiveness, and density);
- (iii) Injection pressure;
- (iv) Annular pressure;
- (v) Rate, temperature, composition, and volume of injected fluid; and
- (vi) Size, weight, and grade of casing.

### **Recommendation Rationale 4.3**

The workgroup felt that the general standards listed in the Alternative Approaches should be expanded to incorporate the particular factors that affect the use of casing, tubing, packers and cement. The language recommended is consistent with similar requirements for Class I and Class II wells under the UIC regulations.

#### **Alternative Approaches 4.4: Tubing and Packer**

Inject through tubing and packer that is set at a depth opposite a cemented interval of the long string casing and set no more than 50 feet above the uppermost perforation or open hole for the CO2 storage reservoir.

#### **Comments 4.4**

1. The 50' standard is unnecessarily proscriptive. Indiana suggested 200' as a standard.
2. There is no reason, to require injection through perforations. In Ohio, as elsewhere, it is advantageous to develop Class I HaZ operations as open-hole completions.
3. The packer depth and end of tubing should be set high enough to permit logging assessment in the casing adjacent to the caprock(s) below the tubing.

#### **Workgroup Recommendation 4.4**

Inject through tubing and packer that is set opposite a cemented interval of the long string casing above the uppermost perforation or open hole for the injection zone at a depth acceptable to the Director.

#### **Recommendation Rationale 4.4**

The Alternative Approaches to establish a specific setting depth for packers above the uppermost perforations or open hole intervals was impractical in field application. In some cases the ability to set a packer within 50 feet above these intervals cannot be physically accomplished. The key is that wherever the packer is set it occurs within cemented long string casing and at a depth that is acceptable to the permitting authority. This provides the needed flexibility to establish a setting depth based on field conditions.

#### **Alternative Approaches 4.5: Cement (See 4.3)**

Use API standard cements recommended by technical support documents, **OR**

Use corrosion-resistant cement that can withstand extended contact with injected CO2 and associated impurities, e.g., phosphate-based non-Portland cements.

#### **Comments 4.5**

Comments are variable – no consensus. The results of additional sidewall core research (beyond Sacroc) is not public information yet. This remains a topic of considerable state concern. Comments range from: "For any new CO2 injection well, it makes sense to require CO2 and stress resistant materials, including cements," particularly adjacent to zones that will be exposed to hydrated-CO2 (through the upper confining zone.) However, Portland cements and cement-additive blends may also be adequate for cementing depending on conditions. It may be too proscriptive to rule out a major category of well cements. Since proper cement placement is more important than cement composition requirements, use the best cementing practices published in API RP 65 to ensure CO2 zone isolation. Until standards are published for CO2 resistant cement, use cementing company recommendations for the type of cement needed to resist the actual CO2 conditions present in the well. These recommendations should be supported by lab test data tested under the well's specific downhole conditions including temperature, pressure, pH, stress loads, etc.

#### **Workgroup Recommendation 4.5**

*Recommendation incorporated into 4.3*

## **Recommendation Rationale 4.5**

See recommendation 4.3

## **5. Operation**

### **Alternative Approaches 5.1: Injection Pressure**

Injection should be conducted such that the pressure during injection does not initiate new fractures or propagate existing fractures in the confining zone adjacent to the USDWs. Higher operating pressures may be allowed if approved by the permitting authority, **OR**

Injection should be conducted such that pressure in the injection zone does not exceed 90 percent of fracture pressure in any portion of the area defined by the anticipated pressure front. Injection may not initiate new fractures, propagate new fractures in the injection zone, or cause fluid movement into USDWs, **OR**

Injection should be conducted such that pressure in the injection zone does not exceed 90 percent of the fracture pressure in any portion of the area defined by the anticipated pressure front, or the capillary entry pressure at any point in the lower most portion of the primary confinement system. Injection may not initiate new fractures, propagate new fractures, or cause fluid movement into USDWs.

### **Comments 5.1**

1. We can think of no circumstances where it would be appropriate to inject at pressures capable of initiating or propagating fractures in the confining zone.
2. Permitting agencies should determine the appropriate safety factor.

### **Workgroup Recommendation 5.1**

Injection should be conducted such that the pressure during injection and storage does not initiate new transecting or transmissive fractures or propagate existing fractures in the confining zone, exceed the seal competence of the confining zone, or cause transecting faults that are not transmissive to become transmissive.

### **Recommendation Rationale 5.1**

The workgroup accepted the basic premise of the Proposal regarding fracturing of the confining zones. The workgroup believed there should also be a focus on the risk of exceeding the competence of the seal of the confining zone that otherwise non-transmissive faults could become transmissive, which can occur at pressures lower than those that would cause new fractures. However, the workgroup strongly disagreed with the idea that operating pressures above fracture pressure should be allowed by the permitting authority. Except for well treatment, pressures should be limited to below formation fracture or parting pressure. Allowing injection pressures above this could compromise the integrity of the confining zones; which would be unacceptable. The recommendation does not deal with the issue of thermal fracturing; which is a probably consequence of injecting supercritical CO<sub>2</sub> into formations where the temperature is well above that of the injectate. However, since there is probably no way to prevent this, it was felt it could not be addressed under this recommendation.

### **Alternative Approaches 5.2: Injection Depth**

Injection must be to a sufficient depth (i.e., at least 800 meters below the surface) so that the CO<sub>2</sub> remains in a supercritical state to avoid mechanical integrity concerns associated with phase change.

### **Comments 5.2**

This could preclude injection into depleted reservoirs.

### **Workgroup Recommendation 5.2**

*Delete requirement because there is no reason to limit injection of CO<sub>2</sub> to the supercritical phase and doing so could limit injection to saline aquifers that would otherwise be usable for geosequestration.*

### **Recommendation Rationale 5.2**

*The workgroup felt very strongly that this Possible Approach could cause significant problems for CO<sub>2</sub> geosequestration into shallow depleted oil and gas reservoirs and coal beds and was not necessary to the successful sequestration of CO<sub>2</sub>.*

### **Alternative Approaches 5.3: Operational Monitoring**

Monitor injection pressure, flow rate, injected volumes, and pressure on the annulus as specified by the permitting authority, **OR**

Throughout injection, continuously monitor injection pressure, flow rate, injected volumes, and pressure on the annulus between the tubing and the long string casing, **OR**

Throughout injection, continuously monitor, using state-of-the-art digital monitoring equipment injection pressure, flow rate, injected volumes, and pressure on the annulus between the tubing and the long string casing.

### **Comments 5.3**

None

### **Workgroup Recommendation 5.3**

Throughout injection, continuously monitor, without precluding the use of digital monitoring, the injection pressure, flow rate, injected volumes, and pressure on the annulus between the tubing and the long string casing.

### **Recommendation Rationale 5.3**

The use of digital monitoring equipment does not necessarily meet the definition of "continuous monitoring". However, it was felt that such equipment was not only acceptable but was, in many ways, superior to typical analog means of measuring such as continuous charts. It should also be noted that the monitoring of annular pressure is an alternate means of demonstrating mechanical integrity of the casing, tubing and packer without conducting standard annulus pressure tests on a periodic basis. The importance of this is captured by the comment related to the potential negative impacts of the SAPT on casing/ cement integrity discussed in topic 6.1 below.

#### **Alternative Approaches 5.4: Automatic Shutoff Equipment**

Equip with down-hole safety shutoff valves that engage if any operating parameters are exceeded.

#### **Comments 5.4**

None

#### **Workgroup Recommendation 5.4**

Equip injection wells with safety shutoff equipment that engages if any operating parameters are exceeded.

#### **Recommendation Rationale 5.4**

Originally, the workgroup was in favor of leaving the proposed language as is. However, upon further reflection, it was felt that limiting the equipment used to shut in injection to downhole valves was too restrictive and would have prevented the use of other, effective means of halting injection. Consequently, the recommendation was constructed to be more generic.

#### **Alternative Approaches 5.5: Odorants or Tracers**

Add an odorant or a tracer to the injected CO<sub>2</sub> to facilitate early detection of leaks or movement outside of the intended injection zone.

#### **Comments 5.5**

1. The idea may merit further discussion, or research to assess practicality;
2. Could create unintended subsurface contamination problems

#### **Workgroup Recommendation 5.5**

*The use of tracers is not recommended except under specific risk based site by site conditions.*

#### **Recommendation Rationale 5.5**

1. The idea may merit further discussion, or research to assess practicality but has not been sufficiently studied to develop regulatory language allowing or requiring the process.
2. Could create unintended subsurface contamination problem.
3. Due to the possibility of false positive results the use of tracers is not recommended until further research can be conducted.

#### **Alternative Approaches 5.6: Corrosion Monitoring Plan**

Develop a corrosion monitoring and prevention plan for all wells and surface facilities.

#### **Comments 5.6**

None

#### **Workgroup Recommendation 5.6**

Submit a corrosion monitoring and prevention plan for wells acceptable to the Director.

## **Recommendation Rationale 5.6**

The workgroup felt that preparation of a plan was not sufficient. Submission of the plan to the regulatory authority was necessary. Further, it was felt that surface facilities do not fall within the authority of the UIC program.

## **6. Mechanical Integrity Testing**

### **Alternative Approaches 6.1: Mechanical Integrity Demonstration**

GS wells must be monitored in a manner that protects USDWs from endangerment, **OR**

Demonstrate internal mechanical integrity, i.e., that there is no significant leak in the casing, tubing or packer (using a pressure test) at a frequency specified by the permitting authority, **OR**

Demonstrate internal mechanical integrity, i.e., that there is no significant leak in the casing, tubing or packer (using a pressure test) at least once per year. Use the best available technology to test for corrosion of the internal well casing, e.g., electrical resistivity logs to detect pitting and other casing problems, and televiwers to assess the integrity of the casing, **OR**

Demonstrate internal mechanical integrity, i.e., that there is no significant leak in the casing, tubing or packer (using a pressure test) at least once every six months. Use the best available technology to test for corrosion of the internal well casing, e.g., electrical resistivity logs to detect pitting and other casing problems, and televiwers to assess the integrity of the casing.

### **Comments 6.1**

1. Do not use "state-of-the-art" or "best available technology" as a descriptor in the regulations.
2. Some states favor continuous monitoring vs. periodic pressure tests. Therefore, Option 1 would allow permitting agencies to prescribe more protective requirements.
3. It may be advisable to prevent applied pressure from traditional mechanical integrity tests. Consider language that would permit monitoring by other means.

### **Workgroup Recommendation 6.1**

Demonstrate mechanical integrity using a method and at a frequency acceptable to the Director.

A well has mechanical integrity if there is no significant leak in the casing, tubing and packer and there is no significant fluid movement into a USDW through vertical channels adjacent to the injection wellbore.

### **Recommendation Rationale 6.1**

The workgroup felt that a two part demonstration of casing, tubing and packer integrity coupled with a demonstration of no significant fluid movement comprised an essential standard. However, the workgroup also discounted the notion that the method to use for demonstration Part I should, in all cases, be the SAPT. A recent study by SPE indicated that potential casing/ cement integrity issues could result from such tests. Consequently, while the term "pressure test" was removed in this recommendation, an alternate method of determining casing, tubing and packer integrity was proposed under recommendation 5.3 above.

### **Alternative Approaches 6.2: Fluid Movement Testing (See 6.1)**

Conduct a radioactive tracer survey of the bottom-hole cement using a CO<sub>2</sub> -soluble isotope at least once every six months.

#### **Comments 6.2**

Too prescriptive. Allow permitting agency to determine frequency or trigger events. There may be other tools that would provide necessary data.

#### **Workgroup Recommendation 6.2**

*Recommendation incorporated into 6.1*

#### **Recommendation Rationale 6.2**

*Although the scope of this recommendation was included in 6.1 the specific test called for in the Alternative Approaches was not noted. Instead, the workgroup referred the selection of test methods and frequencies to the discretion of the regulatory authority. This is consistent of numerous state UIC programs; which allow the selection of test methods to be set by regulation with provisions for other tests acceptable to the Director.*

### **Alternative Approaches 6.3: External Mechanical Integrity (See 6.1)**

Demonstrate external mechanical integrity, i.e., there is no significant fluid movement into a USDW through vertical channels adjacent to the injection well bore (using temperature or noise logs) at least once every six months.

#### **Comments 6.3**

Too prescriptive. Allow permitting agency to determine frequency or trigger events.

#### **Workgroup Recommendation 6.3**

*Recommendation incorporated into 6.1*

#### **Recommendation Rationale 6.3**

*Although incorporated into recommendation 6.1, the frequency of text and the method used to conduct tests should be left to the discretion of the regulatory authority.*

### **Alternative Approaches 6.4: Pressure Falloff Testing (See 7.4)**

Conduct a pressure fall-off test at least once every six months.

#### **Comments 6.4**

Too prescriptive. Allow permitting agency to determine frequency or trigger events. If the intent is to determine the change in skin damage or other property, it should be stated that way. Note that pressure fall-off may not be the preferred test method. Assuming the intent is to monitor the injection performance, the comment below is offered.

## **Workgroup Recommendation 6.4**

*Recommendation moved to 7.4*

## **Recommendation Rationale 6.4**

*See workgroup Recommendation 7.4*

## **7. Measurement, Monitoring and Verification**

### **Alternative Approaches 7.1: Baseline Determination**

Conduct baseline geochemical monitoring within the injection and confining systems before injection commences.

### **Comments 7.1**

If there is a secondary containment system, it would make more sense to monitor it vs. a confining system.

### **Workgroup Recommendation 7.1**

Conduct baseline geochemical analysis within the injection and confining zone before injection commences.

### **Recommendation Rationale 7.1**

The workgroup believes the EPA Proposed language is appropriate for the purpose of the regulation.

### **Alternative Approaches 7.2: Injection Fluid Monitoring**

Monitor the nature of injected fluids at a frequency sufficient to yield data representative of their characteristics, **OR**

Monitor the nature of injected fluids at a frequency sufficient to yield data representative of their characteristics and to demonstrate their compatibility with the well materials.

### **Comments 7.2**

1. Injectate tests should also be triggered by fuel-source or process changes that could reasonably be expected to change the concentration of specified impurities.
2. Permit could specify range of allowable impurities (e.g. H<sub>2</sub>S) based upon approved well construction practices.

### **Workgroup Recommendation 7.2**

Monitor the nature of injected fluids at a frequency sufficient to yield data representative of their characteristics and to demonstrate their compatibility with the well materials.

## **Recommendation Rationale 7.2**

The workgroup believed the nature of the fluids should not only be periodically monitored, but should also be evaluated for continued compatibility with the well materials. Consequently, the workgroup agreed with the language of the second Alternative Approaches for 7.2

## **Alternative Approaches 7.3: Geochemical Monitoring**

Monitor geochemical changes within the primary and secondary confining systems using a network of state-of-the-art monitoring wells (i.e., that are constructed of corrosion-resistant materials) whose number and location are sufficient to monitor geochemical changes.

## **Comments 7.3**

1. Commenter's expressed mixed emotions about this as a regulatory requirement. If boreholes present the highest-risk for out-of-zone migration, why require deep monitoring wells. Deep monitor wells may be useful in calibrating/validating models early in our learning curve, but may be overkill if required for all geo-sequestration projects regardless of size. Permitting agencies need site-specific flexibility. We should learn from demo-projects to determine the value and necessity of monitoring schemes.
2. Avoid the term "state-of-the-art."
3. Mirror the requirements of 40 CFR 146.13 (D)(1) that authorizes agencies to require monitoring plans that are based on site-specific risk analysis.
4. If permits are subject to periodic review or renewal, monitoring plans could be phased in and subject to periodic re-assessment.
5. Must distinguish between monitoring for wellbore leakage and determining the extent and direction of the plume. Seismic is considered the best option to determine the extent and direction of the plume when the conditions are appropriate for imaging.
6. Monitor wells are of limited use in determining the extent and direction of the plume.
7. Could the monitoring be done in the injection wells by logs or sensors if access is available to the casing above the injection zone?

## **Workgroup Recommendation 7.3**

Monitor geochemical changes of the confining zone using a network of monitoring that could be conducted from injection or observation wells, that are constructed consistent with the requirements of recommendation 4.3 and whose number and location are sufficient to monitor geochemical changes.

## **Recommendation Rationale 7.3**

The use of the term state-of-the-art is open to too much interpretation and could automatically call for products and services that while, state-of-the-art, are not yet commercially available and may not have been proven over time in the field. Consequently, the workgroup removed the term state-of-the-art both in this recommendation and wherever it appeared in any Alternative Approaches. Rather than specify corrosion resistant materials, the workgroup instead recommended construction based on the well construction criteria specified in Recommendation 4.3.

## **Alternative Approaches 7.4: Plume Monitoring**

Track the subsurface extent of the CO2 plume using geophysical techniques and/or down-hole CO2 detection tools, **OR**

Track the subsurface extent of the CO<sub>2</sub> plume using geophysical techniques (e.g., seismic, electrical, gravity, or electromagnetic surveys) or use of down-hole CO<sub>2</sub> detection tools.

#### **Comments 7.4**

Comments generally favored the less-proscriptive option, but some states haven't seen enough information on MMV monitoring methods to be convinced that they are necessary or reliable?

#### **Workgroup Recommendation 7.4**

Conduct monitoring to evaluate the injection zone performance using methods and frequencies acceptable to the Director.

#### **Recommendation Rationale 7.4**

The recommendation proposed by the workgroup is based not on a measurement standard but, rather, on a performance standard linked to comparisons of modeling and actual plume migration. It does not foreclose any potential means of monitoring but also does not call for a specific monitoring methodology. Rather, it embraces the idea that there may be multiple methods of conducting evaluations of the reservoir performance.

#### **Alternative Approaches 7.5: Monitoring Plan**

Develop and implement a plan for surface air monitoring and/or soil gas monitoring to detect leakage of CO<sub>2</sub> in the vicinity of the injection well, **OR**

Develop and implement a plan for surface air monitoring and/or soil gas monitoring to detect leakage of CO<sub>2</sub> in an area that reflects the surface "footprint" of the CO<sub>2</sub> plume, **OR**

Develop and implement a plan for surface air monitoring and/or soil gas monitoring to detect leakage of CO<sub>2</sub> in an area that reflects the surface "footprint" of the CO<sub>2</sub> plume, at all artificial penetrations within the AOR, and at other sensitive areas, e.g., in buildings and man-made surface structures that are intended for human occupancy.

#### **Comments 7.5**

1. Commenter's dislike all three options.
2. Unless a tracer or odorant was added to the injected CO<sub>2</sub>, how one can determine if the detected CO<sub>2</sub> was from leakage or from other ambient sources. Local atmospheric CO<sub>2</sub> fluctuates depending on time of day (e.g., presence or absence of sunlight to promote photosynthesis; number of vehicles emitting exhaust nearby, etc.)
3. Has air monitoring proven valuable at sites such as Weyburn? What lessons have been learned to date at research sites?
4. Required air and soil-gas monitoring appears to outside scope of SDWA.
5. None of the Alternative Approaches mention monitoring of groundwater.

#### **Workgroup Recommendation 7.5**

Develop and implement a plan for monitoring chemical and physical changes of USDWs within the AOR caused by leaking CO<sub>2</sub> or movement of fluids related to CO<sub>2</sub> injection.

### **Recommendation Rationale 7.5**

There were several key elements considered by the workgroup in developing this recommendation including:

1. The authority of the SDWA to call for air and soil monitoring
2. The need to monitor not only for CO<sub>2</sub> leakage but for fluids related to CO<sub>2</sub> injection including displaced brines -
3. The need to define a reasonable boundary for monitoring
4. The need to tie the monitoring program into demonstrated changes to the character of USDW's rather than broad/ generalized USDW monitoring

### **Alternative Approaches 7.6: Modeling and Reporting**

Report annually on the characteristics of injection fluids, injection pressure, flow rate, volume and annular pressure, and on the results of MITs, and ground water and atmospheric/soil gas monitoring, **OR**

Report quarterly on the characteristics of injection fluids, injection pressure, flow rate, volume and annular pressure, and on the results of MITs, and ground water and atmospheric/soil gas monitoring, **OR**

Report monthly on the characteristics of injection fluids, injection pressure, flow rate, volume and annular pressure, and on the results of MITs, and ground water and atmospheric/soil gas monitoring.

### **Comments 7.6**

1. Views on reporting frequency differ significantly.
2. We also need to consider how agencies will store, maintain and evaluate environmental monitoring reports and make information available upon public request. This could be complicated by projects that span state, or national boundaries, with differing monitoring and reporting requirements, as well as differing data management systems/capabilities.
3. Again the reporting of air or soil monitoring appears to be outside the scope of the SDWA.

### **Workgroup Recommendation 7.6**

Report annually, or at a frequency acceptable to the Director, the characteristics and cumulative volumes (annual and total) of injected fluids, injection pressures, injection rates, annular pressures for each injection well, the results of any mechanical integrity tests conducted during this time period, available site integrity monitoring results, the extent of the injected CO<sub>2</sub> and the pressure front based on current data.

Update site operations as appropriate and site modeling results annually, or at a frequency acceptable to the Director, to reflect current data. Compare the updated results to the previous results. Identify and explain to the Director any discrepancies between the updated results and the previous results.

### **Rationale 7.6**

The workgroup agreed that periodic reporting was necessary to proper regulation of geosequestration. However, the workgroup also recommended that the frequency of reporting be left to the discretion of the regulatory authority. The workgroup also deleted the reference to atmospheric/ soil monitoring as being outside the scope of the SDWA UIC program. Additionally, the workgroup believed periodic verification of modeling to evaluate performance was an important part of monitoring.

### **Workgroup Recommendation 7.7 (Moved from Post Closure Recommendation 8.6)**

Conduct post-closure monitoring, and associated modeling, for a period sufficient to demonstrate to the Director that fluid movement will not endanger USDWs.

### **Recommendation Rationale 7.7**

The workgroup determined that the most important elements of this recommendation revolved around:

1. The endangerment of USDW's rather than a strict fluid movement standard; and
2. That the demonstration on non-endangerment be designed to show that endangerment will not occur now or in the future as a result of geosequestration

## **8. Well Closure**

### **Alternative Approaches 8.1: Plugging Preparation**

Flush the well with a buffer fluid.

### **Comments 8.1**

None

### **Workgroup Recommendation 8.1**

Flush the well with a buffer fluid.

### **Recommendation Rationale 8.1**

The workgroup concurred with the alternative approach language.

### **Alternative Approaches 8.2: Well Stabilization**

Ensure that the well is in a state of static equilibrium with mud equalized prior to placement of the plugs.

### **Comments 8.2**

Precludes other options such as mechanical bridges (bridge plugs) to ensure state equilibrium.

### **Workgroup Recommendation 8.2**

Ensure that the well is in a state of static equilibrium prior to the placement of the final plug.

### **Recommendation Rationale 8.2**

The essential modification to the considered alternative language recommended by the workgroup was that static equilibrium need only be required prior to the placement of the final plug. Since the placement of packers, CIBP's and cement bridges are plugging methods that are at least as effective as mud, requiring the well be placed in a state of static equilibrium using mud prior to any plugging would preclude the use of other very effective plugging methods.

### **Alternative Approaches 8.3: Plugging Methods and Materials**

Plug the well with cement in a manner that will not allow the movement of fluids either into or between USDWs (or as required by the permitting authority), **OR**

Plug the well with cement in a manner that will not allow the movement of fluids either into or between USDWs. The cement used should be compatible with the injected CO2 and any associated impurities.

### **Comments 8.3**

Until API standards are published for CO2 resistant cement, use cementing company recommendations for the type of cement needed to resist the actual CO2 conditions present in the well. These recommendations should be supported by lab test data tested under the well's specific downhole conditions including temperature, pressure, pH, stress loads, etc.

### **Workgroup Recommendation 8.3**

Plug the well with cement in a manner that will prevent the movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. The cement used should be compatible with the injected fluids.

### **Recommendation Rationale 8.3**

The workgroup recommended that the language of 40 CFR 142 was the appropriate standard for demonstrating fluid movement. This is consistent with the other recommendation made by the workgroup on the topic of fluid movement.

### **Alternative Approaches 8.4: Plug Placement and Testing**

Place cement plugs by either: the balance method, dump bailer method, two-plug method, or an alternative approved method. Each plug used shall be appropriately tagged and tested for seal and stability.

### **Comments 8.4**

Alternative: Place cement plugs by an approved method. Each plug used shall be appropriately tagged and/or tested for seal and stability.

### **Workgroup Recommendation 8.4**

Place and test cement plugs by a method acceptable to the Director.

### **Recommendation Rationale 8.4**

The workgroup believed that simplifying this recommendation to take into account a multitude of plugging methods and testing regimes acceptable to the regulatory authority was a better way to require the placement and verification of plugs.

### **Alternative Approaches 8.5: Pre-plugging Mechanical Integrity Demonstration**

Perform MIT to ensure the integrity of that portion of the long string casing and cement that will be left in the ground after closure.

### **Comments 8.5**

1. Unclear whether this is referring to an internal or external test, or both.
2. Internal MIT may be unnecessary if the injection string is cemented to surface or the well has been continuously monitored or subject to frequent pressure tests.
3. New technology and field studies indicate that internal MIT pressures may exceed the tensile strength and fatigue limitations of many cement compositions and cause the cement sealing and structural integrity to fail the external MIT. This caution was published in API RP 90 and recommends an analysis of the cement properties to determine the maximum MIT pressure that can be used without damaging cement integrity.

### **Workgroup Recommendation 8.5**

Ensure the internal and external integrity of that portion of the long string casing and cement that will be left in the ground after closure.

### **Recommendation Rationale 8.5**

The workgroup recommendation is very similar to the Alternative Approaches. The only difference is that the workgroup recommendation leaves open the possibility that a demonstration other than a standard MIT could be used to make a demonstration of casing and cement integrity.

### **Alternative Approaches 8.6 Post Closure Monitoring**

Conduct post-closure monitoring to confirm that CO2 movement is limited to intended zones, **OR**

Conduct post-closure monitoring including: pressure fall-off test; seismic monitoring, if appropriate; monitoring in and above the injection zone and the USDW to confirm that CO2 movement is limited to intended zones. Post-closure monitoring should be performed for a sufficient time frame to ensure that there is no threat to USDWs and human health, **OR**

Conduct post-closure monitoring including: pressure fall-off test; seismic monitoring, if appropriate; monitoring in and above the injection zone and the USDW to confirm that CO2 movement is limited to intended zones. Post-closure monitoring should be performed for a time period that is twice as long as the injection period or until there is a 95 percent pressure die-off.

### **Comments 8.6**

None

### **Workgroup Recommendation 8.6**

*Recommendation moved to 7.7*

### **Recommendation Rationale 8.6**

*Recommendation moved to 7.7*

## **9. Financial Responsibility**

### **Alternative Approaches 9: Plugging and Post Closure Monitoring Assurance**

Provide through a performance bond, or other appropriate means, the resources necessary plug the well,  
**OR**

Demonstrate and maintain financial responsibility for closing the well and providing post-closure monitoring.

### **Comments 9**

1. Neither option addresses financial resources necessary for remediation or corrective action.
2. There may be development of other government-backed mechanisms to support the post-closure monitoring, and remediation requirements.

### **Workgroup Recommendation 9**

Demonstrate and maintain financial responsibility for closure of the well(s) and post-closure monitoring.

### **Recommendation Rationale 9**

The principal difference between the Alternative Approaches and workgroup recommendation is the recognition that financial responsibility could apply to more than one well and thus the post-closure monitoring would not be limited to the well but could potentially be project based. The workgroup recognizes that there may be costs not covered by this recommendation but which may need to be addressed in any discussion of long term liability.

## Appendix A

### Additional Comments

In addition to the comments received from the states based on a questionnaire sent prior to the workgroup's deliberations, several organizations submitted comments on the proposed language and workgroup recommendations. These were not included in the comments under each topic because in most cases they were received after the workgroup had reached initial consensus on the recommendations. In some cases the comments were considered critical enough to re-open discussion and were dealt with as noted in the workgroup responses below. In other cases, they are listed here to ensure completeness.

1. American Water Works Association (Submitted through the American Public Power Association)

Alternative Approaches 6.1: What exactly is meant by "monitored in a manner that protects USDWs from endangerment?" This is very vague and should include more detail. A reference should be provided to acceptable monitoring techniques or to a specific part of the regulation.

Alternative Approaches 6.3: A definition needs to be provided as to what constitutes "significant fluid movement into a USDW." The drinking water community will probably have a different definition than those who are operating the sequestration process.

Alternative Approaches 7.1: Need to provide clarification as to what is included in geochemical monitoring. We recommend that this include establishing baseline concentrations of compounds such as heavy metals, boron, and dissolved solids in the surrounding USDWs as well as the injection and confining systems. This will provide for the ability to observe if compounds from the confining systems are dissolving into solution due to changes in the surrounding aquifers. Monitoring should also apply to any redundant containment systems.

Alternative Approaches 7.2: Monitoring should also be triggered by changes in operation of the well, such as pressure changes or process modifications. Also need to provide clarification on frequency requirements as this can be interpreted many different ways. We suggest including an acceptable range of monitoring frequencies and include provisions to modify the frequency based upon the results of the monitoring. For example, if the monitoring shows changes beyond what was expected, the frequency should increase to allow for a better understanding of the changes that are occurring.

Alternative Approaches 7.3: Suggest also including monitoring of surrounding USDWs to look for potential changes due to CO<sub>2</sub> migrations. Monitoring the confining layers can show leakage but we also want to be able to observe the changes in the aquifers.

Alternative Approaches 7.5: Included in this section needs to be a requirement for establishing the baseline CO<sub>2</sub> profile prior to injection. While this does change over time, it will give a general idea as to the existing conditions. Once CO<sub>2</sub> injection has commenced, air monitoring should continue and should be focused around those areas that are pathways for CO<sub>2</sub>, such as artificial penetrations. This part of the regulation should also include provisions for monitoring of groundwater because it can be used in combination with the air monitoring to determine if leakage from the CO<sub>2</sub> plume has occurred. If high levels of CO<sub>2</sub> are observed in the air but not in the groundwater, it could be an indication that the CO<sub>2</sub> is a natural occurrence and is not coming from the CO<sub>2</sub> sequestration process.

Alternative Approaches 7.6: There is not a specific section in the Alternative Approaches in the monitoring section that addresses the long-term monitoring of groundwater. A specific provision

needs to be included in the regulation that addresses groundwater monitoring in the same way that Section 7.5 addresses atmospheric/soil gas monitoring.

This section should also require immediate reporting in the event of a process upset or sudden change or in the characteristics of any part of the sequestration process. This is required for other environmental systems and should also be included as part of the operation of a sequestration process.

Alternative Approaches 8.3: Both portions of this section should include the provision that the cement should be compatible with the injected CO<sub>2</sub> and other impurities. This is extremely important in protecting the purity of the USDWs.

Alternative Approaches 8.6: All post-closure monitoring needs to include a provision for long-term monitoring of the surrounding USDWs. The monitoring requirements should reference the MMV section so consistent and comparable results are obtained. We support an open-ended monitoring requirement (the second part of this section) as it is possible that adverse effects could be observed past the time limits suggested at the end of this section (twice as long as injection period or 95% pressure die-off).

Alternative Approaches 9.0: There are no provisions for remediation in the event that a CO<sub>2</sub> leak occurs. If a USDW is contaminated either by CO<sub>2</sub> or by the movement of a saline aquifer, the treatment costs could be extremely high and the affected utility should not bear these costs. The amount of the bond should include a portion to provide for treatment of the USDW due to contamination by the carbon sequestration process. The amount of the bond required for USDW remediation could be determined prior to the start of the project by modeling the processes that would be required of a water treatment plant to treat the contaminated USDW.

(Workgroup Response: The comments submitted by AWWA were specifically related to the Alternative Approaches rather than the workgroup recommendations. In some cases the issues raised by a comment were addressed in a workgroup recommendation and in some cases the comment was either outside the scope of the UIC program or was not intended to be addressed in the specific regulatory language Alternative Approaches; though it might be addressed in final regulatory elements).

## 2. Shell Exploration and Production Company

Comments 1.1, Item 5 - Throughout the document, references are made to primary and secondary confinement systems, and more generally, to "confinement system(s)". While the presence of a secondary confinement system might be an ideal situation, the absence of one should not condemn an otherwise suitable site. We suggest that this comment be expanded (or introductory text be added) to emphasize that the use of the term "confinement system(s)" throughout the Workgroup's document is not intended to imply that a secondary confinement system is necessary or required, but rather to accommodate one when it's present or is deemed necessary by the Director based on site-specific conditions.

(Workgroup Response: We all recognized that there are many sites where the thickness, areal extent and impermeability of a primary confining zone would likely be more than sufficient to qualify a site for use without the need for a secondary confining zone. However, the workgroup also felt that the definition of confining zone in the CFR sufficiently covered the issue of confinement by single and multiple zones and the addition of the term "secondary confinement" was not needed and could create confusion.

Workgroup Recommendation 3.1 - It's unclear whether the "CO2 plume" in this recommendation refers to free phase CO2 or includes CO2 dissolved in the water. We suggest that clarifying language be added.

(Workgroup Response: In this context the term "CO2 plume" was intended to describe the full travel distance of the plume from the injection site. Since the dissolved component of the plume would be within this boundary it is considered part of the plume).

Workgroup Recommendation 3.3 (first occurrence in black font) - Delete, since it is redundant to final Workgroup recommendation (in green font).

(Workgroup Response: Duplicative language in 3.3 was deleted.)

Workgroup Recommendation 4.2 - Current draft language is incomplete. We suggest deletion of existing text and insertion of "Recommendation incorporated into 4.1", since Workgroup Recommendation 4.1 appears to address this issue. Could consider adding language to call for verification of cement integrity and location using methods acceptable to the Director.

(Workgroup Response: Based on Shells comment to 4.2, the workgroup revisited the text and proposed to delete 4.2 and change 4.1 to read as follows: The well must be cased and cemented to prevent the movement of fluid containing any contaminant into a USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. The long-string casing shall be cemented above the top of the injection zone and confining zone. Appropriate logs and other tests shall be conducted during the drilling and construction of new injection wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director.

Workgroup Recommendation 5.4 - We question the appropriateness of down-hole safety shutoff valves for this application, and recommend revised language to say "When appropriate, equip with safety shutoff devices that engage if defined operating parameters are exceeded."

(Workgroup Response: See response to 5.4 under Anadarko Petroleum below)

Workgroup Recommendation 7.1 - Revise to say "When necessary, conduct baseline geochemical analyses..." to account for the fact that some suitable sites will not require geochemical monitoring within the confinement system(s) as mineralogy & fluid compositions are inert.

(Workgroup Response: The purpose of these requirements was to allow for monitoring of zones within and above the confining zone for changes that would indicate leaks. Stable composition of mineralogy and fluid composition would actually help facilitate monitoring of these zones (when necessary) for changes that would indicate seal leaks.

Workgroup Recommendation 7.3 - Revise to say "When necessary, monitor geochemical changes of the confinement system(s) using...", to account for the fact that some suitable sites will not require geochemical monitoring within the confinement system(s) as mineralogy & fluid compositions are inert, and for consistent terminology regarding confinement system(s).

(Workgroup Response: See response to 7.1 above)

### 3. BP AE

Alternative Approaches 5.1 - we say we can think of no circumstances where it might be appropriate to inject at pressures capable of initiating fractures. I can think of one from our past waterflood experience: the permitting of thermal fracturing in a thermally cooled injection zone. This can be acceptable and useful, as long as the fracture is constrained to grow horizontally in the inj interval. Since cooling may occur in CO2 injection, there is an injectivity enhancement associated with allowing controlled thermal fracturing. And in some situations it might be preferred to frac within the interval vs having to drill, complete and manage new incremental inj well(s). I can refer you to a couple of SPE papers on the subject.

(Workgroup Response: The purpose of Recommendation 5.1 was to deal with the issue of over pressuring of the injection zone; which could lead to fractures in the confining zone. The issue of thermal fracturing was discussed by the workgroup and while such fracturing should be discussed further, it was thought not to apply to this particular recommendation)

### 4. Anadarko Petroleum

The main issue APC has is Section 5.4 requiring down-hole safety shutoff valves. While versions of these valves are commonly used (mainly within the O&G industry for off-shore applications), there is no reason this type of flow shutoff device should be the only one allowed. There are many options (both surface and down-hole) that can achieve the desired safety results and control yet still allow for site-specific design.

(Workgroup Response: Recommendation 5.4 was modified to reflect the concerns expressed by this comment and those of Shell concerning this topic)

**Pritchett, Nancy (ECY)**

**From:** April Westby [AWestby@spokanecleanair.org]  
**Sent:** Friday, April 18, 2008 10:01 AM  
**To:** Pritchett, Nancy (ECY)  
**Subject:** Comments on proposed Part II of Chapter 173-407 WAC

Nancy,

I am submitting some questions / comments on the proposed Part II of Chapter 173-407 WAC on behalf of the Spokane Regional Clean Air Agency (SRCAA). We have a facility in our jurisdiction, the Waste-to-Energy (WTE) Facility (owned by the City of Spokane) that will potentially be affected by the new section of the rule. Since our agency is the primary air quality regulatory agency for this facility, I have attempted to read and interpret the new section of the rule and have the following questions / comments:

1) 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?

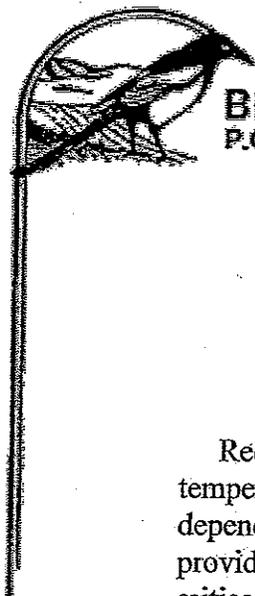
The definition of "sequestration program" in WAC 173-407-110 states "demonstrate compliance with the emissions performance standard at the start of commercial operation" and "with the sequestration starting on or before the start of commercial operation." This implies that they have to start the sequestration 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).

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.

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

April Westby, PE  
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**BLUE MOUNTAIN AUDUBON SOCIETY**  
P.O. BOX 1106, WALLA WALLA, WA. 99362

## 6001 Rulemaking (CR-102)

April 10, 2008

Spokane, Wa.

Reducing greenhouse gas emissions enough to avert a dangerous rise in global temperatures requires us to stop emitting carbon dioxide into the atmosphere. Our dependency on fossil fuels threatens our very survival in the long term. SB 6001 provides us, in Washington, with tools to help us do that. But these hearings are critical in determining whether it will be business as usual or a new day in our planning for the world that our children and grandchildren will inherit. Our actions now will have consequences for those who follow us. We must act responsibly.

SB 6001 is our lawmaker's intent to REDUCE greenhouse gas emissions and address the serious consequences of global warming. It was not the intent of the law to encourage future fuel based energy plants. Across the country planned coal fueled energy plants are being cancelled frequently now while over 100 hundred remain on the drawing boards. The federal government recently suspended a major loan program for coal fueled energy plants because of the uncertainties of global warming and the economics of their creation.

The Blue Mountain Audubon Society based in Walla Walla is the longest established conservation organization in S.E. Washington. We submit these comments because of our concern for the long term welfare of our environment. We are proud of our natural heritage and protective of some of Washington State's most significant bird watching sites in Wallula and the McNary National Wildlife Refuge, which are near the site of the proposed IGCC plant in Wallula.

We enjoy blue skies and bracing air on many days when we don't have inversions which bring us the stench of Tyson's meat processing and Boise Corporations container production facilities which are also adjacent to the proposed coal plant. We are seriously concerned by the additional assault on our environment.

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

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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.

There are enormous gaps in the sequestration regulations. We want the emission involved in the mining and transmission of coal for these plants to count in the total output of greenhouse gasses. By requiring 65% sequestration it does not really add up to that amount. No emissions below 20% are included, nor the mining and transportation emissions, nor ANY emissions during the first 5 years of production, every start up action, or during the construction of the plants. Those are enormous holes in the net which was created to stop and reduce these pernicious problems.

Our desires for a free or cheap fix for our energy needs are just that: desire. Reality shows that conservation measures, renewables and technological advances can contribute more to solving our problems without endangering the planet further. Rational scientific research and a committed public can and will secure our energy future. Coal in the ground is already 100% sequestered for millennium. Why not leave it there?

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?

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 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.

There is a famous saying that if you are not part of the solution you are part of the problem. We wish you luck and courage and acumen in accomplishing meaningful regulations for our citizens. Thank you.

Douglas C. Morton  
204 Newell  
Walla Walla  
Wa. 99362  
(509) 525-8070

# WALLA WALLA 2020

W-15

## Today's Vision for Tomorrow's Community

PO Box 1222, Walla Walla WA 99362, Tel. 509-522-0399

ww2020@charter.net, [www.ww2020.org](http://www.ww2020.org)

April 17, 2008

Washington State Department of Ecology  
Energy Facility Site Evaluation Council  
Olympia WA 98504

Re: Rulemaking under 6001

Ladies & Gentlemen:

The Walla Walla 2020 citizens group is concerned about our quality of life and about the specific effects of coal plants on our county, as well as their general impact on global warming and climate change both in our state and internationally.

While the citations in these comments are to the proposed Ecology rules, they apply equally to the proposed EFSEC rules, and these comments are directed to the proposed amendments to Chapter 173-218 WAC, Chapter 173-407 WAC, and to Chapter 463-85 WAC.

The purpose of SB 6001, as we understand it, is to promote renewable energy, and to limit CO2 and other greenhouse gas emissions, which are continuing to grow.

Any new coal or fossil fuel plants or contracts should be held to the highest efficiency and sequestration standards, and should not be permitted to contribute further to greenhouse gas emissions, or to other pollution streams.

We appreciate certain provisions of the proposed rules, we are concerned about other portions, and we believe some provisions should be added.

We appreciate:

a. 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.

b. the provisions that the maximum emission limitations of 6001 are in addition to the separate mitigation requirements of Washington law (Chapter 80.70 RCW).

We are concerned that:

a. 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

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can be proven to contain at least ninety-nine percent of the greenhouse gases for at least one thousand years.

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.

c. 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,

d. 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,

e. permitting up to 20% CO<sub>2</sub> 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

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.

We believe the rules should be expanded to provide:

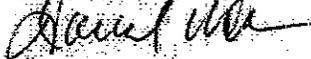
a. that the emission limitations shall apply to all emissions related to the entire life cycle of the fossil fuel utilized in Washington power plants, including emissions related to mining and transportation of the fuel to the plant itself. For example, the coal to be used for the proposed coal plant at Wallula in Walla Walla County is to be mined in Wyoming, and is proposed to be shipped by rail to Wallula. The emissions related to the extraction of the coal and its shipment to Walla Walla County should be included in the calculations of the full emissions of the plant in applying the statutory limitations.

b. 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.

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.

Best wishes,



Daniel N. Clark  
Vice-President

W-16

**Pritchett, Nancy (ECY)**

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**From:** Eames, Frederick R. [feames@hunton.com]  
**Sent:** Friday, April 18, 2008 12:40 PM  
**To:** Pritchett, Nancy (ECY)  
**Subject:** Comments on Proposed Carbon Capture and Storage Regulations  
**Attachments:** Washington State CCS Regulations Comments.DOC

Attached please find the comments of members of the CCS Alliance in response to Department of Ecology AO #07-11, establishing regulations under the State's Underground Injection Control program for carbon capture and storage projects in the State.

Should you have any questions about these comments, please contact:

Fred Eames  
Hunton & Williams LLP  
1900 K Street, N.W.  
Washington, D.C. 20006  
202/955-1500  
feames@hunton.com

Thank you very much.

<<Washington State CCS Regulations Comments.DOC>>

## Comments of Members of the CCS Alliance Regarding Proposed Washington Department of Ecology CCS Rules

Interested Members of the CCS Alliance submit the following comments in response to Department of Ecology AO #07-11, a proposal to adopt a greenhouse gases emissions performance standard for baseload electric generation and to establish criteria to implement and enforce the emissions performance standard. In particular, these comments focus on the proposed amendments to Chapter 173-218, amending the State's Underground Injection Control (UIC) program.

The CCS Alliance is a coalition conducting policy advocacy at the State and federal levels on risk mitigation issues related to carbon capture and storage (CCS). Its members include, among others, MidAmerican Energy Holdings Company, parent of PacifiCorp, whose operating company Pacific Power provides service to consumers in Washington; and the National Rural Electric Cooperative Association.<sup>1</sup> The group also includes a major property casualty insurer and reinsurer. The CCS Alliance is formed by companies and entities sharing a common interest in removing impediments to investment in and development of CCS technologies posed by risk and liability issues arising as a matter of law and public policy. The CCS Alliance's purpose is to consider ways of promoting the development and use of CCS technologies and to support efforts by the private sector, States, the federal government, nongovernmental organizations, and others to help ensure that these technologies are developed and widely, efficiently and cost-effectively deployed in furtherance of any greenhouse gas emissions reduction strategy implemented at the State, regional, or federal level.

### Commentary

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.

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<sup>1</sup> Pacific Power was a member of the Department of Ecology's ESSB 6001 Stakeholder Committee. See [http://www.ecy.wa.gov/laws-rules/activity/wac173407\\_218\\_meetings.html](http://www.ecy.wa.gov/laws-rules/activity/wac173407_218_meetings.html). Comments filed here by members of the CCS Alliance reflect many of the same concerns expressed during the stakeholder process last fall.

dl-W

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.<sup>2</sup> As such, a regulatory scheme should promote its construction and safe operation and avoid discouraging it.

### *Well classification*

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.

### *Regulation of CO<sub>2</sub> as a Hazardous Waste*

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

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<sup>2</sup> The Electric Power Research Institute's "prism analysis" of technologies that must be deployed to return U.S. carbon dioxide emissions to 1990 levels by 2030 allocates responsibility for bringing about the largest portion of reductions in carbon dioxide emissions below the "business as usual" scenario to CCS technologies. See "The Power to Reduce CO<sub>2</sub> Emissions: The Full Portfolio," Revis James, Richard Richels, Geoff Blanford, and Steve Gehl, Electric Power Research Institute, August 2007.

regulatory structure proposed by the IOGCC, and is directly contrary to one of its key recommendations, which is the treatment of CO2 as a commodity rather than a waste.

The IOGCC, led by States with familiarity with underground injection of CO2 for enhanced oil recovery, concluded that:

although contaminants and pollutants such as H2S, NOx, SO2 and other emission stream constituents should remain regulated for public health and safety and other environmental considerations, CO2, 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 CO2 following removal from regulated emission streams. The Task Force strongly believes that treatment of geologically stored CO2 as a waste using waste disposal frameworks rather than resource management frameworks will diminish significantly the potential to meaningfully mitigate the impact of CO2 emissions on the global climate through geologic storage.<sup>3</sup>

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.

#### *Sequestering 99 Percent for 1,000 Years*

Washington proposes that its permits will require that the site provide for "permanent sequestration" of CO2. 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 CO2 injection wells.

First, CO2 is not a dangerous gas, except potentially in very high concentrations.<sup>4</sup> 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 CO2 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 CO2 plume simply migrates beyond the

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<sup>3</sup> Interstate Oil and Gas Compact Commission, "Storage of Carbon Dioxide in Geologic Structures: A Legal and Regulatory Guide for States and Provinces," p. 11, September 25, 2007.

<sup>4</sup> Concentrations of greater than 15,000 parts per million can harm the environment and human health. See January 30, 2008 presentation of S. Julio Friedmann, Lawrence Livermore National Laboratory, to the California Air Resources Board, Chair's Air Pollution Seminar, accessed April 6, 2008 at <http://arb.ca.gov/research/seminars/friedmann/friedmann.pdf>.

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.<sup>5</sup> 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 that may cause adverse effects to human health and the environment, it is increasingly unlikely to do so over time.<sup>6</sup>

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.

#### *Design of Containment Facilities*

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

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<sup>5</sup> Id. At a February 28, 2008 U.S. EPA workshop in advance of the proposal of Underground Injection Control regulations, panelist Iain Wright of BP commented that at the Sleipner site, one of the world’s largest CCS facilities, CO<sub>2</sub> has been trapped by capillary action. This is the physical mechanism that, for example, causes water to become absorbed into a sponge.

<sup>6</sup> Id.

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.

### *Shutdown Ramifications for Non-Compliance*

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."<sup>7</sup> 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.<sup>8</sup> 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.

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<sup>7</sup> Proposed WAC Section 173-218-115 at 4(d)(iii).

<sup>8</sup> Closure proceedings may be delayed by 180 days upon written request. However, this may not correlate to the unknown length of time that may be required to resolve potential compliance issues.

There are less draconian means of reducing CO2 emissions. For example, during a period of interrupted injection, generating facilities relying on the injection site could purchase carbon offsets, rather than shut down.

#### *Interaction with Other Laws*

The CCS Alliance is concerned about potential liability for CO2 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 CO2 injections pursuant to the UIC program if the injections are done in compliance with the proposed regulations.

#### *Geologic Sequestration of Carbon Dioxide*

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 CO2 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 CO2 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 CO2, whether it be from industrial or natural sources.

#### *AKART for Removal of Pollutants*

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>."<sup>9</sup> 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.<sup>10</sup>

### *Monitoring*

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.

### *No Defined Post-Operation Financial Responsibility Period*

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.

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<sup>9</sup> Proposed Section 173-218-115 at (1)(b)(iii).

<sup>10</sup> See, e.g., August 17, 2007 presentation of S. Julio Friedmann, Lawrence Livermore National Laboratory, to the California Air Resources Board, Chair's Air Pollution Seminar, accessed April 15, 2008 at <http://arb.ca.gov/research/seminars/friedmann/friedmann.pdf>. ("High purity (>95%) CO<sub>2</sub> streams are required for storage.")

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.<sup>11</sup> 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

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<sup>11</sup> "The Closure Period is defined as that period of time (10 years unless otherwise designated by the State Regulatory Agency) after injection activities cease and the injection well is plugged. During this Closure period, the operator of the storage site would be responsible to maintain an operational bond and individual well bonds. The individual well bonds would be released as the wells are plugged. At the conclusion of the Closure Period, the operational bond would be released and the liability for ensuring that the site remains a secure storage site during the Post-Closure Period would transfer to the state." IOGCC report, p. 11.

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.

## Comments of Cogeneration Coalition of Washington on Proposed EPS Regulations

The Cogeneration Coalition of Washington<sup>1</sup> provides the following comments on the regulations revising WAC Chap. 173-407, attached to the CR-102 issued on February 22, 2008. CCW supports many parts of the regulation, including the method for allocation of cogeneration emissions, and the clarification of the definition of "change in ownership." The regulations properly implement the sections of SB 6001 deeming certain existing facilities to be in compliance. The remainder of these comments discusses only those sections requiring revision.

### I. 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 that the Washington Utilities and Transportation Commission will determine compliance once, either in a general rate case or upon application by a utility. This determination is made *once* when the utility is undertaking a new financial commitment. There is no provision for the WUTC to re-evaluate that determination at some later date. And there is no provision that Ecology can review and change the WUTC determination at a later date.

Such a one-time determination is prudent both from a financial and regulatory standpoint. The utility must have some assurance when it receives WUTC approval that it can continue to utilize the energy procured from the facility and receive ratepayer reimbursement of those expenses. The utility must have assurance when it constructs a new facility that it will be able to include the unit in rate base for the useful life of the facility. Such ratemaking treatment requires that the facility be "used and useful." That requires that the utility be able to utilize the generation from the facility for its useful life.

Similarly, the independent generator providing electricity under a long-term contract to a utility must have assurance when it enters into the contract and dedicates its capacity to the utility that it will be allowed to perform for the full term of the contract. It may be an improper *ex post facto* interference with the contract to approve the contract, allow the parties to perform, and then subsequently prohibit the generator from performing.

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

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<sup>1</sup> **Error! Main Document Only.** CCW represents the cogeneration and customer interests of March Point Cogeneration Company and Tenaska Ferndale Cogeneration.

71-W

The treatment of waste gas should be revised. Refinery gas, as a type of waste gas, is produced by petroleum refineries. It can be made available to generators to burn to replace natural gas and produce additional electricity. Otherwise, the refinery gas may be disposed of by flaring. Much like the treatment of biomass as a renewable, it is beneficial to have the refinery gas employed in a productive use to generate electricity rather than merely burned. But if the inclusion of refinery gas in the calculation of emissions results in a generating unit not meeting the EPS, the generating unit may refuse to use the refinery gas, and it may be flared. To encourage this productive use of refinery gas, Sec. 150(5)(a) should be revised to omit from the calculation of emissions both the emissions and energy attributable to waste gas.

This treatment of refinery gas is consistent with FERC regulations governing cogeneration facilities under PURPA. Sec. 5 of SB 6001 requires that Ecology's regulations be consistent with PURPA. FERC's regulations implementing PURPA specify how a cogenerator's energy inputs and electrical output are measured to determine the facility's efficiency. The regulations first define refinery gas as a waste. 18 CFR §292.202(b). Second, the regulations determine efficiency based only on the energy input from natural gas and oil; they intentionally omit waste inputs.<sup>2</sup> 18 CFR §292.205.

CCW appreciates all of the time and energy devoted to this project by Ecology staff. With these changes, the treatment of cogeneration will be proper and consistent with both federal law and SB 6001.

Respectfully submitted,



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<sup>2</sup>

In its order adopting the regulations, FERC determined that waste gas should not be included in the efficiency calculation. *Streamlining of Regulations*, 60 FR 4831 (Jan. 25, 1995); see also, *Red Top Cogeneration Project, L.P.*, 62 FERC ¶61,205 (1993).

W-18



Western States Petroleum Association

Credible Solutions • Responsive Service • Since 1907

Michaelaen Mason  
Director, Statewide Regulatory Issues

April 18, 2008

Ms. Nancy Pritchett  
Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

Dear Ms. Pritchett:

**WSPA COMMENTS – PROPOSED AMENDMENTS TO CHAPTER 173-218 WAC,  
CRITERIA FOR EVALUATING SEQUESTRATION PLANS**

The Western States Petroleum Association (“WSPA”) is a trade association comprised of companies engaged in the exploration, production, refining, marketing and transportation of petroleum and petroleum products in California, Washington, Oregon, Nevada, Arizona and Hawaii. WSPA member companies own and operate numerous facilities in the State of Washington that will be affected by the proposed amendments to Chapter 173-218 WAC.

WSPA appreciates this opportunity to comment on the proposed amendments to Chapter 173-218 WAC in response to Washington Department of Ecology (“WDOE”) solicitation for commentary.

Specific comments

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.

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 those of other caprocks 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."

2. 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.

3. "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.
4. "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.

5. 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.
6. 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.

7. 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."
8. 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.
9. 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.
10. 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.

11. 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.

12. 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.
13. 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.

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.

Ms. Nancy Pritchett  
April 18, 2008  
Page 7

WSPA appreciates WDOE's effort on this program and looks forward to working with you with regard to a final greenhouse gas sequestration rule. We appreciate both the opportunity to provide these comments, and your consideration of them. If you have any questions or have need for any further information related to our comments, please do not hesitate to contact me.

Sincerely,

Handwritten signature of Michael Deen Mason in cursive script, with a horizontal line underneath the name.

cc: Jay J. Manning, Director, WDOE  
John Stormon, Hydrogeologist, WDOE  
Catherine Reheis-Boyd, Chief Operating Officer, WSPA

W-19

Submitted by: Brad Riordan, Walla Walla, WA

Thursday, April 10, 2008

We, here in Eastern Washington support the Washington Legislative amendment 6001 as we understand it will be enforced. This is to promote renewable energy, limit CO2 & other greenhouse gas emissions.

I wish to comment on the following areas of 6001.

1. GHG Emission rates allowed
2. The definition of Permanent Sequestration
3. Unspecified Contracts
4. Using the life cycle of fossil fuel as a measurement of GHG
5. Penalizing new plants by not requiring retro fitting of existing plants

#### GHG Emissions

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*. The ability of IGCC plant facilities to meet and advance their operations to meet changing standards based on new technology is critical. The plants have long life cycles and it is unacceptable that they would be allowed to stall out at some point in their life cycle because of financial concerns. The requirement to meet this 1,100 lb./MWH needs to be met from day one. If there is a serious possibility that these plants cannot meet this requirement then they should not be allowed to be built

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.

#### Definition of Permanent Sequestration and Lifetime of Project vs. Closure Certificate

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

P1-W

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.

#### Unspecified Contracts

I am sure you have had comments on this matter. RCW 80.80.04 (9) authorizes the Dept. of Ecology (DOE) to deal with "unspecified sources". 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 legislatures 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. Their 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."

In line with these comments, 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 increased in power production.

#### Using the life cycle of fossil fuel as a measurement of GHG

WAC 173-407-230 -- Measuring the GHG requirements only at the smokestack is fatal to the intent of 6001. Again, it assumes that nothing happens prior to the fossil fuel being crushed, gasified and burned. Baseload compliance is only part of the life cycle. Enforcement need to include measuring, monitoring and enforcement of the entire life cycle of the fossil fuel to include emissions associated with extraction and transport of the fuel source. To not do this is for Washington state to fail in meeting our commitment to reduce GHG emissions.

#### 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.



W-20

STATE OF WASHINGTON  
DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT  
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April 18, 2008

Nancy Pritchett  
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Washington Department of Ecology  
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Allen Fiksdal, Manager  
Energy Facility Site Evaluation Council  
P.O. Box 43172  
Olympia, WA 98504-3172

Subject: Rulemaking Comments  
Ecology: Chapters 173-218, and 173-407 WAC  
EFSEC: Chapters 463-80 and 463-85 WAC

Dear Nancy and Allen:

The Department of Community, Trade, and Economic Development appreciates the opportunity to comment on the various CO2 emissions rules being developed by Ecology and EFSEC. Our comments are limited, so we have chosen to provide them in a single letter to both agencies.

#### ECOLOGY & EFSEC

First, we are pleased with the rules as filed. Nearly all the recommendations we made in December 2007 were incorporated into the final rules, and we had major concerns about the implementation of 80.70 and 80.80 RCW in unison, the calculation of emissions when using renewable fuels, and especially the calculation of emissions based on gross or net power production. The final rules as filed appropriately protect air quality in Washington.

We believe that all of our comments below represent suggestions to correct or clarify language and that none of them would affect the substantive nature of the rules.

05-11

General comment: All pertinent ECOLOGY and EFSEC rules

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

### WAC 173-407

1. 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.
2. 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.
3. In regard to proposed WAC 173-407-300, dealing with unspecified sources, CTED fully supports the comments submitted by the Washington Utilities and Transportation Commission. The changes recommended by the WUTC will make the proposed formula workable.

At the same time, 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.

#### Chapter 173-218 WAC (Sequestration)

1. As said in our December, 2007 comments, we approve of the approach taken by Ecology to locate CO2 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 CO2 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.

#### EFSEC

#### Chapter 463-80 WAC

1. On page 12, at 463-80-100(4) WAC, the numbering in the text is incorrect. What is recorded as (2) and (3) should actually be (1) and (2). Subsection (3) refers to EFSEC actions when an organization has violated subsections (1) or (2).

#### Chapter 463-85 WAC

1. On page 2, at WAC 463-85-110 Definitions, there is no definition provided for "baseload electric generation facility." The definition is included in the Ecology rule.
2. On page 8, at WAC 463-85-140(2)(b), the phrase "...or ecology as appropriate..." is included when talking about who to submit calculations to. This phrase is included elsewhere as well, but sometimes not. It is confusing. Why are some things submitted to EFSEC and others to Ecology? When is it "appropriate?" To maintain awareness EFSEC may want all materials submitted to it, then can transfer documents to Ecology if necessary.
3. On page 10, at WAC 463-85-200, is an example of where EFSEC's rules and Ecology's could be identical but are not. The title should read "Requirement for and timing of sequestration plan or sequestration program submittals." Truly this is a small item, but there are numerous places in the rules where the text could be identical but is not. In this one example there actually should be a difference. Ecology adds "under Part II." EFSEC need not do this because it is drafting two separate rules, but there is no excuse for different text where there is no difference. Readers have to read these rules carefully because there are some substantive differences in jurisdiction and requirements, but they should not be tripped up by style differences or dropped words when the substance is identical. We recommend a careful re-reading with Ecology to determine what text both agencies should use when the rules are identical.
4. Also on page 10, at WAC 463-85-210, is another example where title text could be identical except for "under Part II." In this case EFSEC's wording appears to be better, but the point is the same. Please work with Ecology to choose text that is identical when it can be.
5. On page 14, at WAC 463-85-230(c)(iv) Methane, the numbering is wrong and should be identical to the Ecology rule. The sentence after the word "Methane," should be a separate subsection (A) and following paragraphs should be renumbered.
6. On page 15, at WAC 463-85-230(d)(iv)(B)(2)(a) the text is dealing with facilities or units not subject to the reporting requirements of 40 CFR Part 75. Our limited understanding of 40 CFR Part 75 is that requirements may be waived for fossil fuel generators under 25MW. If so, this subsection would not apply for EFSEC and could be struck. We suggest EFSEC ascertain from Ecology whether this subsection does have applicability for EFSEC.
7. On page 17, at WAC 463-85-240(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. We found this same lack of definition in the Ecology rule too, and made the same recommendation.



**Washington Rural Electric**  
COOPERATIVE ASSOCIATION

April 17, 2008

Ms. Nancy Pritchett  
Washington State Department of Ecology  
Air Quality Program  
PO Box 47600  
Olympia, WA 98504-47600

RE: Comments on Proposed Rules Implementing RCW 80.80

Dear Ms. Pritchett:

Thank you for the opportunity to comment on the Department of Ecology's (DOE's) proposed rules for implementing RCW 80.80. We have two comments.

**Comments on WAC 173-407-300**

As we understand it, the purpose of this section is to provide a method to calculate the greenhouse gas emissions attributable to long-term contracts supported by multiple sources of power based on a weighted average of the emissions, regardless of whether that source is specified or unspecified. We appreciate this approach which seems to conform to the statute.

However, when we attempted to "test" the formula provided in the proposed rules for calculating the greenhouse gas emissions, we were not able to make the formula in proposed subsection (5) work. Therefore, to clarify how the weighted average is calculated, we propose the following changes to WAC 173-407-300:

**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.** (1) 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 the governing boards of consumer-owned utilities pursuant to RCW 80.80.070 when evaluating a potential long-term financial commitment when the long-term financial commitment includes electricity from unspecified sources, electricity from one or more specified sources, and/or provisions to meet load growth with electricity from unspecified and/or specified sources.

(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 energy-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

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Ms. Nancy Pritchett

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and divided by the number of years in the term of the commitment MWh delivered under the contract for that year.

(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~~ energy-weighted 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~~ energy-weighted 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

$$EPS = \frac{(E_1 MWh_1 T_1) + (E_2 MWh_2 T_2) + (E_3 MWh_3 T_3) + \dots (E_n MWh_n T_n)}{Total\ Hours}$$

$$WEF(t) = \frac{EF1 * MWh1 + EF2 * MWh2 + EF(n) * MWh(N)}{Total\ MWh(t)}$$

where:

EPS = Emissions performance standard  
E = EPS of each type of source expressed as MW

Ms. Nancy Pritchett  
April 17, 2008  
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T \_\_\_\_\_ = Percentage of time used for that source  
Total Hours \_\_\_\_\_ = Total hours that power was available to customers in the year (8,760 or less)

WEF(t) \_\_\_\_\_ = Weighted emissions factor in lbs/MWh  
EF(n) \_\_\_\_\_ = Emissions Factor for source "n" in lbs/MWh  
MWh(n) \_\_\_\_\_ = MWh generated by each source "n"  
Total MWh \_\_\_\_\_ = Total MWh delivered in year (t)

### Comments on WAC 173-407-320

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.

Thank you for the opportunity to submit these comments. Please let us know if you have any questions.

Sincerely,



Kent Lopez  
General Manager

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INDUSTRIAL  
CUSTOMERS OF  
NORTHWEST  
UTILITIES

MICHAEL B. EARLY

April 18, 2008

Nancy Pritchett, Air Quality Program  
Washington Department of Ecology  
PO Box 47600  
Olympia, WA 98504-7600

RE: Comments on draft rules implementing Emissions Performance Standard

Dear Ms. Pritchett,

The Industrial Customers of Northwest Industries (ICNU) appreciates the opportunity to submit the following comments:

ESSB 6001 directs the Department of Ecology (Department) to implement the greenhouse gases Emissions Performance Standard and, in particular, directs the Department "with the assistance of the [Washington Utilities and Transportation] commission..., to the extent practicable, address long-term purchases of electricity from unspecified sources in a manner consistent with this chapter."

Proposed WAC 173-407-300 addresses, inter alia, the application of the Emissions Performance Standard to long-term financial commitments which are purchases of "electricity from specified and unspecified sources." For a purchase that includes both specified and unspecified sources, emissions are calculated under the proposed rule as the "time-weighted average" of the emissions associated with the specified and unspecified resources based on the "expected annual delivery contracted or expected to be supplied by each specified and unspecified source's portion of the total

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portfolio of electricity to be provided under the contract for the year.” WAC 173-407-300(5) proposes a formula for this calculation with default emissions rates when the manufacturer’s specifications or measured rates are unknown for specified resources and for the portion of the purchase for which a resource is not specified or known on an expected basis.

ICNU agrees that the calculation should be forward-looking and based on the contractually-specified or expected portfolio of resources to serve the contract. However, ICNU recommends that the calculation should be based on the expected “energy-weighted average” rather than “time-weighted.” In this regard, ICNU supports the clarification to WAC 173-407-300 submitted by the WUTC in its April 8th comments (copy attached).

ICNU also supports the recommendation made by the Washington Public Utilities Districts Association that the default emissions for steam turbines using pulverized coal should be reduced from 2600 lbs/MWh to 2,250 lbs/MWh.

Thank you for the opportunity to comment, and we look forward to working with the Department in the future.

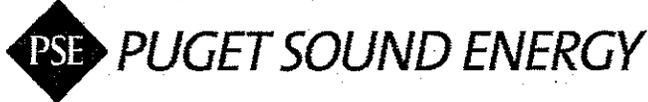
Sincerely,

Michael B. Early

Attachment

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www.pse.com



Puget Sound Energy, Inc.  
P.O. Box 97034  
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*Via electronic mail*

April 18, 2008

Ms. Nancy Pritchett  
Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

**Subject: Rulemaking on RCW 80.80  
Rulemaking to Implement Greenhouse Gases Emissions Performance  
Standard for Washington State  
Comments of Puget Sound Energy, Inc.**

Dear Ms. Pritchett:

Puget Sound Energy, Inc. ("PSE") appreciates the opportunity to participate in the Department of Ecology's ("Ecology") rulemaking to implement the requirements of RCW 80.80 regarding electrical company compliance with the greenhouse gases emissions performance standard contained in RCW 80.80. In response to Ecology's Notice of Opportunity to File Written Comments on the CR-102 draft rules, PSE offers the following comments and suggested rule language:

**WAC 173-407-110**

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

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define "new ownership interest" in a manner that complies with the scope and intent of the statute, as follows:

**Suggested Rule Language**

"New ownership interest" means the acquisition by an electric utility of more than 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 any direct or indirect change in ownership of an electric utility constitute a new ownership interest.

**WAC 173-407-110**

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.

**WAC 173-407-110**

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 interpretation of the phrase "designed and intended." PSE recommends that Ecology adopt the following language defining "designed and intended":

**Suggested Rule Language**

"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."

### **WAC 173-407-110**

Clarifying the meaning of "power plant" is important to understanding and implementing the definition of "baseload electric generation". 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 36.70C.020(2).

### **WAC 173-407-110**

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 that Ecology adopt the following language defining "permitted":

#### **Suggested Rule Language**

"Permitted" means the energy facility site evaluation council certification process that is the licensing process for the siting, construction, and operation of power plant.

### **WAC 173-407-300(1)**

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 ...."

PSE appreciates the opportunity to present its viewpoint on the Department of Ecology's Rulemaking to Implement Greenhouse Gases Emissions Performance Standard in Washington State. PSE looks forward to further discussions on this topic. Please direct any questions regarding these comments to Keith Faretra at (425) 456-2561 or Eric Englert at (425) 456-2312 or the undersigned at (425) 462-3495.

Sincerely,

Tom DeBoer  
Director – Rates & Regulatory Affairs

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April 18, 2008

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We have reviewed the proposal to amend the two rules to implement Chapter 80.80 RCW in which the 2007 Legislature directed the Department of Ecology (the Department) to adopt rules by June 30, 2008 to implement and enforce a greenhouse gases emissions performance standard and to establish criteria for evaluating sequestration plans:

- Chapter 173-407 WAC, Carbon Dioxide Mitigation Program for Fossil-fueled Thermal Electric Generating Facilities, and
- Chapter 173-218 WAC, Underground Injection Control (UIC) Program.

We commend the Department for the public stakeholder process through which the proposed rules were developed and for the general approach that has been taken to the UIC rules, with an emphasis on fitting within the existing regulatory framework and the use of performance based standards and requirements. Our comments are based on our participation in and observation of a number of activities, projects, and conferences outside of the State of Washington that relate to the development and deployment of the technologies and regulatory frameworks for the capture, transportation, and geologic sequestration of carbon dioxide and other greenhouse gases to isolate them from release into the atmosphere. These include Regional Carbon Sequestration Partnerships operating in conjunction with the US Department of Energy's National Energy Technology Laboratory, the technical and regulatory workshops conducted by the US Environmental Protection Agency in connection of its development of a proposed rule for geologic sequestration under the UIC program of the Safe Drinking Water Act, the Carbon Capture and Sequestration Project of the World Resources Institute, as well as meetings and activities conducted by the Interstate Oil and Gas Compact Commission (IOGCC), the Ground Water Protection Council (GWPC), the International Energy Agency (IEA), the Intergovernmental Panel on Climate Change (IPCC), and others. We offer suggestions to the Department drawn from these experiences in an effort to ensure the effectiveness of the proposed regulations, consistency with other regulatory schemes, and ultimately successful widespread deployment of carbon capture, transportation and sequestration technologies.

1. 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

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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 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.

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 those of other caprocks 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...."

2. 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.

3. "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.

4. "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.

5. 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.
6. 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.
7. 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."
8. 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.
9. 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.
10. 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.

11. 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.

12. 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.

13. 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

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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. 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 applicants or the Department discretion in implementing effective methods and technologies to meet those standards.

14. 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"

15. 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.

We commend the Department's work in developing these proposed rules and hope that these comments and suggestions prove beneficial. Please contact us if you have any questions about any of these comments or need additional information.

Respectfully submitted,

Sarah W. Wade

Robert F. Van Voorhees

***Sarah M. Wade***

Sarah Wade is a partner in AJW, Inc., a small energy and environmental consulting firm starting in 2004. She has almost 20 years experience in environmental regulation and policy. Her expertise is in air quality issues including acid rain, ground-level ozone, and climate change. For the past six years she has been focusing on issues related to the development and deployment of carbon capture and storage (CCS) technologies. Prior to joining AJW, Ms. Wade worked at the environmental non-profit organization Environmental Defense. In one of her key projects, she assisted a handful of large, multi-national companies with the development of their internal greenhouse gas management programs and facilitated discussion among those companies as part of the Partnership for Climate Action. She also worked at the management consulting firm Hagler Bailly, where she helped utilities to comply with the acid rain program and respond to opportunities created through deregulation. Ms. Wade started her career by working in state government in both the Massachusetts and Connecticut environmental protection agencies. She holds masters degrees in Environmental Studies and in Public and Private Management from Yale University.

***Robert F. Van Voorhees***

Bob Van Voorhees has practiced law in the environmental, safety, and health field since the early 1970's. His practice includes environmental litigation, counseling, and representation on regulatory and legislative matters in the air, water, hazardous waste, toxic substance, underground injection, and occupational safety and health areas. Bob has represented major clients, primarily in the chemical and petroleum industries, in achieving broad policy objectives in rulemaking proceedings and regulatory litigation. He has represented clients in the United States Supreme Court and in the United States Courts of Appeals and District Courts. He has also defended a broad range of clients in civil and criminal enforcement actions before administrative agencies and in courts at both federal and state levels. He has also represented and counseled industrial clients in achieving compliance or obtaining modification of chemical regulation and reporting requirements under the Toxics Release Inventory (TRI) program of the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Pollution Prevention Act (PPA) and under the Toxic Substances Control Act (TSCA).

For more than two decades he has represented clients in the chemical, petroleum, mining, commercial waste management and other industries in dealing with regulatory and legislative issues relating to underground injection control (UIC). He has represented operators of wells in each of the five current well classifications under the UIC program. He was instrumental in obtaining relief for Class I injection well operators through the promulgation of the Hazardous Waste Disposal Injection Regulation (HWDIR) petition program under RCRA and the enactment of the Land Disposal Program Flexibility Act of 1996. The Ground Water Protection Council (GWPC) presented its Award of Excellence in Ground Water Protection to him in 1996 for his outstanding contribution in the development of sound national regulations for underground injection control. Currently, he represents the Underground Injection Technology Group and is helping clients address issues relating to the development and implementation of regulatory frameworks and the deployment of technologies for geologic sequestration of carbon dioxide, permitting of experimental injection wells for this and other purposes, and the use of underground injection for aquifer storage and recovery, disposal of wastewater treatment residuals, uranium recovery operations, and injection of slurried solids for various purposes.

**Comments on Chapter 173-407 WAC - Carbon dioxide mitigation program for fossil-fueled thermal electric generating facilities CR-102**

**FINAL**

Submitted by:

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April 18, 2008

The above-signed parties respectfully submit these comments to WA Department of Ecology (department) on Chapter 173-407 WAC - Carbon dioxide mitigation program for fossil-fueled thermal electric generating facilities and WAC 173-218 – regarding geologic sequestration of carbon dioxide. Most of the parties have been involved closely in the rulemaking process and some have submitted comments on drafts throughout the entire process, which assisted the department in creating the current draft. Comments on WAC 173-407 language are below followed by comments on WAC-218. When new or altered language is proposed, the section is in italics and the new/changed language will be underlined. We hope that the department finds the comments useful when finalizing the language.

\*\*\*Please note that the comments on NEW SECTION WAC 173-407-300 have altered since alternative proposals for this section were circulated to agencies after the CR-102 was published.

**NEW SECTION- WAC 173-407-005 Work in unison.**

We strongly agree that the proper reading of this section is that the two requirements must work with each other in a serial manner. When a conductor instructs a choir to sing “in unison,” surely the conductor has not called for a solo performance. Likewise, the

<sup>1</sup> Environmental Defense Fund is participating only in the comments relating to geologic sequestration.

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legislature's command that the emissions performance standard work "in unison" with the mitigation requirements does not allow for either chapter to be rendered silent.

Chapter 80.80 RCW and chapter 80.70 RCW represent two different but complementary strategies for controlling GHG emissions from energy facilities. Chapter 80.80 RCW requires power plants to *reduce* emissions in order to comply with an emissions performance standard initially set by the legislature and subject to modification by CTED (RCW 80.80.040(1)-(2)). Chapter 80.70 RCW requires energy facilities to *mitigate* 20% of their "total carbon dioxide emissions" (RCW 80.70.020(4)). These two chapters of Title 80 RCW are easily harmonized and work "in unison" to provide a preliminary program for controlling GHG emissions from energy until further policies are implemented such as a cap and trade.

If the legislature had intended to repeal portions of chapter 80.70 RCW, it would have clearly expressed such intent. Cf. *State v. Conte*, 159 Wn.2d 797, 815, 154 P.3d 194 (2007) ("Implied repeal is disfavored and will be found only (1) where the later act covers the entire field of the earlier one, is complete in itself, and is intended to supersede prior legislation, or (2) where the two acts cannot be reconciled and both given effect by a fair and reasonable construction.") (citations omitted); *Amalgamated Transit Union Legislative Council v. State*, 145 Wn.2d 544, 559, 40 P.3d 656 (2002) ("Repeal by implication is strongly disfavored. The legislature is presumed to be aware of its own enactments . . .") (citations omitted). It is untenable to suggest that the legislature affected an implied repeal of the earlier-enacted chapter 80.70 RCW simply by directing, in the intent section of RCW 80.80.005, that these two laws be implemented "in unison."

This harmonious interpretation of the statutory scheme is buttressed by the fact that the two statutes are intended to address GHG emissions in two very different ways. RCW 80.70.020(4) requires a facility to "*provide mitigation* for twenty percent of the total carbon dioxide emissions produced by the facility." (emphasis added). Under chapter 80.70 RCW "mitigation" includes a broad sweep of measures such as "energy efficiency measures, clean and efficient transportation measures, qualified alternative energy resources, demand side management of electricity consumption, and carbon sequestration programs . . . verified carbon credits . . . enforceable and permanent reductions in carbon dioxide . . . through process change, equipment shutdown. . . ." RCW 80.70.010(12)(a)-(d).<sup>17</sup> The "total carbon dioxide emissions" are the calculated lump sum of emissions over a thirty-year period. RCW 80.70.010. Chapter 80.70 RCW allows the mitigation to be completed piecemeal or all once, with a "lump sum" purchase of approved mitigation credits. See RCW 80.70.020(4).

In contrast, chapter 80.80 RCW limits the amount of emissions allowable at the "commence[ment] of operation" and requires emissions reductions to be calculated based on "the total emissions associated with producing electricity." RCW 80.80.040(2), (5). In contrast to the mitigation required under chapter 80.70 RCW, the emissions performance standard in chapter 80.80 RCW is focused on reducing the amount of CO<sub>2</sub> that is emitted in the first place. Furthermore, the "emissions" for purposes of meeting the emissions performance standard do not include those that are sequestered or mitigated pursuant to

RCW 80.80.040(13).

Additionally, other interpretations of RCW 80.80.005(1)(e) would also produce inequitable results that effectively punish cleaner energy facilities. If dirtier facilities were not required to purchase mitigation under chapter 80.70 RCW so long as they take action to reduce emissions to the performance standard in chapter 80.80 RCW, cleaner plants that already comply with chapter 80.80 RCW without the need for sequestration would still be required to mitigate 20% of their emissions under chapter 80.70 RCW.

**NEW SECTION WAC 173-407-110 Definitions to Part II**

The following comments reflect our concerns and comments on the following definitions.

**Include a definition for Local jurisdiction**

The term "*local jurisdiction*" is referenced in RCW 80.80.010(17) in the definition of "*power plant*", i.e., "*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.*" That term is not defined separately, however, nor is it used elsewhere in RCW 80.80. 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."*<sup>2</sup>

Interpretation of the term "*local jurisdiction*" is critical to the application and effect of the emissions performance standard. The emissions performance standard established in RCW 80.80.040(1) applies to long-term financial commitments for baseload electric generation. RCW 80.80.010(4) defines "*baseload electric generation*" as "*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.*" (emph. added) RCW 80.80.010(17) then defines a "*power plant*" as "*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.*" (emph. added) 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

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<sup>2</sup> Neither Black's Law Dictionary nor the Merriam-Webster Dictionary precisely define "*local jurisdiction*." The term "*jurisdiction*" is commonly defined as the territory within which power or authority can be exercised (see for example Merriam Webster Dictionary; Wordnet.princeton.edu). "*Local*" is commonly defined as being characteristic of a particular place or a limited district (see for example Merriam Webster Dictionary).

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. Further, the Legislature finds that “It is vital to ensure all electric utilities internalize the significant and under recognized cost of emissions and to reduce Washington consumers' exposure to costs associated with future regulation of these emissions, which is consistent with the objectives of integrated resource planning by electric utilities under chapter 19.280 RCW” (RCW 80.80.005(4)(b)). Application of the emissions performance standard solely to in-state power plants would not be in line with this goal. Creating a perverse incentive for Washington utilities to purchase power from out-of-state would not only be contrary to the goal of reducing greenhouse gas emissions, but also would be contrary to the goal of protecting Washington electricity consumers from higher costs, including those associated with future carbon emissions.

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”). Allowing utilities to get around the overall technology-forcing intent of the statute, and the emissions performance standard specifically, simply by purchasing polluting power from plants outside the state violates this critical aspect of the law.

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. The Courts have long presumed that where the legislature has explicitly limited the reach of a statute in one provision of a statute, the exclusion of that limitation in another provision is meaningful. Indeed, the non-parallel structure of these sections makes perfect sense. The law contains two primary mechanisms for reducing greenhouse gas emissions from power use in Washington. The first governs pollution caused by energy supply at the source – requiring new power plants to meet the emissions performance standard. The second mechanism targets pollution on the demand side – eliminating the ability of utilities to purchase power from facilities that do not meet this standard. The “supply-side” independent duty for new power facilities to comply with the emissions performance standard can apply only to those facilities permitted by (i.e., subject to the jurisdiction of) Washington governments. Washington has no direct jurisdiction to prohibit construction of a new power plant in Oregon that would violate the emissions performance standard. On the other hand, Washington *does* have the authority to direct how and from what sources utilities that operate in the state fill their demand for power. Thus, RCW 80.80.040(2) correctly recognizes that the requirement that new generation facilities meet the emissions performance standard applies only to in-state power plants, but RCW 80.80.060 and .070 properly do not recognize the same limitation on power purchases.

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.<sup>3</sup> 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

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<sup>3</sup> “Remarks of the chairman of the committee in charge of the bill or reports of the committee itself may be resorted to in the search for ‘legislative intent. . . .’” State v. Leek, 26 Wash.App. 651, 657-658, 614 P.2d 209,213 (Wash.App. 1980).

pulverized coal plants are built in Washington and also that our utilities stop buying pulverized coal from out of state.<sup>4</sup> (emph. added)

In testimony to the House Technology, Energy and Communications committee during the March 27, 2007 public hearing on ESSB 6001, Rep. Morris, committee Chair, acknowledged that Sen. Pridemore's intent is important here given his role as prime sponsor of ESSB 6001 when asking him specifically about the reach of the bill. ("You are the prime sponsor of the bill, Your desire is probably what's most important to me right now and since it's your intent here"). Senator Pridemore responded, "The goal has to be consumed [energy]; it is not our intent to simply drive all energy production out of the state and then import dirty energy from other states."<sup>5</sup> Rep. Morris led the efforts to develop the strike to ESSB 6001, ultimately passed by the House on April 12, 2007.

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

- On February 8, 2007, the Seattle Times printed, "State leaders launch attack on warming" by Warren Cornwall and Ralph Thomas<sup>6</sup>. Included in that article is the following paragraph: "Poulsen said he will introduce legislation effectively barring Washington utilities from building new coal-fired power plants or from signing new long-term contracts for coal power, thereby preventing them from buying dirtier power from out-of-state power plants. That could mean higher rates for some power customers, as utilities are steered away from the cheap coal." (emph. added) This article appeared the day after a press conference held in Olympia to announce Gov. Gregoire's executive order 07-02 and the legislation to be introduced in the Senate that became ESSB 6001.
- On April 18, 2007, the Olympian printed, "Legislature passes bill targeting climate change" by Rachel La Corte, The Associated Press<sup>7</sup>. The article states, "Under the measure, any new coal-fired plant would have to be able to inject into the ground any emissions of greenhouse gases – primarily carbon dioxide -- in excess of 1,100 pounds of gas per megawatt hour. And utilities would be prevented from entering into contracts with plants in other states that don't meet the same cap."

### Permanent Sequestration

<sup>4</sup> <http://www.tvw.org/media/mediaplayer.cfm?EvId=2007040115B>, commencing at appx. 1:03:27 of the recording,

<sup>5</sup> <http://198.239.32.186/200703/2007031183.mp3>, commencing at about minute 18:00 of this recording.

<sup>6</sup> <http://archives.seattletimes.nwsourc.com/cgi-bin/taxis.cgi/web/vortex/display?slug=warming08m0&date=20070208&query=poulsen>

<sup>7</sup> <http://www.theolympian.com/239/story/83866.html>

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.

### **Regulated greenhouse gas emissions**

The current definition for regulated greenhouse gas emissions reads,

*"Regulated Greenhouse gas emissions" is the mass of carbon dioxide emitted plus the mass of nitrous oxide emitted plus the mass of methane emitted. Regulated greenhouse gas emissions include CO2 produced by a sulfur dioxide control system such as a wet limestone scrubber system."*

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 CO2 – treating this gas as if it has the exact same impact on climate change as CO2 is not scientifically accurate and will not help to meet the intent of the law.

### **NEW SECTION WAC 173-407-220 Requirements for nongeologic permanent sequestration plans under Part II.**

\* 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.*

\* 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.*

**NEW SECTION WAC 173-407-230 Emissions and electrical production monitoring, recordkeeping and reporting requirements under Part II.**

We feel strongly that the appropriate way to account for emissions in determining whether or not a baseload electric generating facility is in compliance with the emissions performance standard is by analyzing the entire life cycle of the fossil fuel, including emissions associated with extraction and transport of the fuel source. Chapter 80.80 RCW requires that “in determining the rate of emissions of greenhouse gases for baseload electric generation, the total emissions associated with producing electricity shall be included.” RCW 80.80.040(5) (emph. added).

The importance of this distinction is illustrated in the following examples. It is possible that a utility burning coal gas or liquids produced in an out-of-Washington coal gasification or liquefaction plant would ship the gas or liquid to WA for power generation in a combustion turbine from another state. We suggest the utility must report total emissions of the production of the gas or liquid plus the emissions from the combustion. Also, emissions from using gas in a combustion turbine when the gas came from LNG should include the emissions produced in producing and transporting (e.g., liquefaction, pressurization, transportation) the gas. Overlooking these lifecycle emissions would be especially egregious.

While the legislature did not define the precise boundaries of this term, a comparison of this language to the emissions addressed in chapter 80.70 RCW provides some guidance and supports a broad life-cycle analysis. Chapter 80.70 RCW defines and addresses emissions in the context of "total carbon dioxide emissions" emitted "by the facility." RCW 80.70.010(17), .020(4). In contrast, the plain terms of RCW 80.80.040(5) indicate that the legislature was concerned with a far broader profile of emissions. The expansive sweep of the phrase "total emissions associated with producing electricity" must encompass those emissions associated with obtaining and preparing the fuels used to run a power plant, including mining, refining, and transportation of this fuel. All of the emissions from these various stages of energy production must be included in the "total emissions associated with producing electricity." Not including a life cycle assessment of the fossil fuel fails to provide a comprehensive understanding of greenhouse gas emissions and thus the global warming impact of Washington's energy use.

**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 be 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.

\* SUBSECTION (3)(c) This section states that failure to meet a benchmark should be reported by January 31 of 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.

**NEW SECTION WAC 173-407-300 Procedures for determining the emissions performance standard of a long-term financial commitment and addressing electricity sources under Part II**

The law specifies that greenhouse gas emissions produced by baseload electric generation owned or contracted through a long-term financial commitment shall meet the EPS (no more than 1,100 lbs of greenhouse gases per megawatt-hour) unless emissions are sequestered. RCW 80.80.040(9) provides the department with authority to address "unspecified sources," i.e., *"In developing and implementing the greenhouse gases emissions performance standard, the department shall, with assistance of the commission, the department of community, trade, and economic development energy policy division, and electric utilities, and to the extent practicable, address long-term purchases of electricity from unspecified sources in a manner consistent with this chapter."*

**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. See Advanced Silicon Materials, LLC v. Grant County, 156 Wn.2d 84, 89-90, 124 P.3d 294 (“The plain meaning of a statute ‘is discerned from all that the Legislature has said in the statute and related statutes which disclose legislative intent about the provision in question.’”) (citation omitted); 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 takē 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 Legislature’s intent to reduce greenhouse gas emissions and address the global problem of climate change. The Legislature found that “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). See also RCW 80.80.005(1)(a) (finding that Washington State is especially vulnerable to climate change). The Legislature emphasized in RCW 80.80.005(4)(a) “to the extent energy efficiency and renewable resources are unable to satisfy increasing energy and capacity needs, the state will rely on *clean and efficient* fossil fuel-fired generation” (*italics added for emphasis*), noting in (4)(c) that California’s emissions performance standard is based on the emissions of a natural gas combined cycle combustion turbine. Further, the Legislature found that it “is vital to ensure all electric utilities internalize the significant and under recognized cost of emissions and to reduce Washington consumers’ exposure to costs associated with future regulation of these emissions, which is consistent with the objectives of integrated resource planning by electric utilities under chapter 19.280 RCW” (RCW 80.80.005(4)(b).

It would be nonsensical to assume that the Legislature intended utilities to comply with these goals by contracting for up to 43% of coal and inefficient gas and still meeting the EPS through creative contracting. It is difficult to understand how such an action furthers the intent of the law. The Legislature enacted Chapter RCW 80.80 to *reduce* greenhouse gas emissions, not simply to maintain – or even increase – current levels by gaming contracts.

The proposed rule creates a significant loophole that undermines the intent of the law. The law never suggests blending of resources as an acceptable way to meet the EPS. Implementation of this rule as currently written will not reduce climate pollution as the law intended.

### 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.

### **NEW SECTION WAC 173-407-310 Relationship of ecology and the boards of consumer-owned utilities under Part II**

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.

**WAC 173-218**

**AMENDATORY SECTION (Amending Order 01-10, filed 1/3/06, effective 2/3/06)**

**General Questions/Comments**

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 CO<sub>2</sub> 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 managed 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.

#### **WAC 173-218-030 Definitions**

##### Caprock

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.*

##### 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.

##### Monitoring zone(s)

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 CO2.*

**NEW SECTION WAC 173-218-040 UIC well classification including allowed and prohibited wells.**

SUBSECTION (xv) It is unclear in the rules how monitoring wells or wells used to produce CO2 for re-injection will be permitted. We suggest grouping them under the same class as CO2 injection wells. This subsection could read,

*Injection, monitoring or other wells used to inject carbon dioxide for, or in the context of, geologic sequestration.*

**NEW SECTION WAC 173-218-115 Specific requirements for Class V wells used to inject carbon dioxide for permanent geologic sequestration**

\* 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;

\* SUBSECTION (1)(b)(iii) We believe that a prohibition or strict limit to the concentrations of contaminants (e.g. SOx, NOx, H2S), which is allowed in the injected CO2, 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 CO2 to ensure that the injected material does not meaningfully increase the risks of the injection compared to pure CO2. Geologic sequestration of carbon dioxide shall not be used for the preferential disposal of non-CO2 contaminants that can be removed with known treatment technologies; and*

\* SUBSECTION (2)(b)(i) This section provides that the mapped boundary of the project can cover less territory than the CO2 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.*

\* 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;*

\* 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;*

\* 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;*

\* 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;*

\* 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.

\* SUBSECTION (2)(e) We believe that a prohibition or strict limit to the concentrations of contaminants (e.g. SOx, NOx, H2S), which is allowed in the injected CO2, 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).

\* 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 CO2 and other fluids.*

\* 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;*

\* 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,*

\* 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:*

\* 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.*

\* SUBSECTION (4)(b)(i) should be amended to read,

*(i) The pilot study is for a defined limited time duration;*

\* 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.*

\* 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 CO2 in the subsurface.*

\* SUBSECTION (4)(g)(iv) this section should read,

*Observed deviations from predicted behavior shall be identified and explained;*

\* 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."*

\* 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.*

\* 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.*

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April 18, 2008

Nancy Pritchett, Air Quality Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

Dear Ms. Pritchett,

We write to comment on the draft rules implementing RCW 80.80, and specifically Chapter 173-407 WAC (Carbon dioxide mitigation program for fossil-fueled thermal electric generating facilities) and Chapter 173-218 WAC (Underground injection control program).

Current science indicates that large-scale CO<sub>2</sub> emission reductions are needed to stabilize greenhouse gas concentrations in the atmosphere and avoid dangerous anthropogenic climate change. We therefore commend the WA agencies for seeking to address regulatory issues related to CO<sub>2</sub> sequestration and the early and pioneering developments in this important area.

The proposed rule addresses a number of important areas, and holds the potential to establish important precedents among states and at the Federal level. Having served as the coordinating lead authors for the Underground Geological Storage chapter of the 2005 IPCC Special Report on Carbon Dioxide Capture and Storage, we would like to comment on one specific area that seems to have been influenced by the Report's findings, viz. the issue of permanence. We do not formally represent the IPCC, but we write as individuals based on our professional judgment and research, which we believe to be consistent with the Report's findings and the scientific consensus that it represents.

Specifically, the proposed rule addresses the issue of permanence using the following definition:

*"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 creates a high degree of confidence that substantially ninety-nine percent of the greenhouse gases will remain contained for at least one thousand years."*

The primary objective of geological CO<sub>2</sub> sequestration is to prevent the emission of CO<sub>2</sub> from industrial sources to the atmosphere, allowing for current concentrations to be stabilized and eventually reduced to acceptable levels, in order to avoid dangerous anthropogenic climate change. The target level is a policy decision that has to be made by world governments, informed by sound science. It also has implications for the design of sequestration projects.

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

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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:

*"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 ["very likely" is a probability between 90 and 99%] to exceed 99% over 100 years and is likely ["likely" is a probability between 66 and 90%] to exceed 99% over 1,000 years."*

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"

We are pleased to see that WA is engaged in drafting a well-based regulatory framework for geological sequestration, and wish you success in the process.

Respectfully,

Sally Benson & Peter Cook

**Dr. Sally Benson** is a Professor (Research) in the Energy Resources Engineering Department in the School of Earth Sciences at Stanford University and the Executive Director of the Global Climate and Energy Project. She was a Coordinating Lead Author of the Underground Geological Storage chapter in the IPCC Special Report on Carbon Dioxide Capture and Storage. Since 1998, Dr. Benson has focused her research on

geological storage of CO<sub>2</sub>, leading a number of research programs at Lawrence Berkeley National Laboratory, including the GEO-SEQ program, LBNL's Zero Emissions Research and Technology Program (ZERT) and WestCarb's Geological Pilot Tests. At Stanford she conducts research on multiphase flow of CO<sub>2</sub> in saline formations, monitoring technology and risk assessment.

**Dr. Peter Cook CBE** is the Chief Executive of the Co-operative Research Centre for Greenhouse Gas Technologies (CO<sub>2</sub>CRC) in Australia. A geologist by training, he has previously served as Executive Director of the Petroleum CRC, Director of the British Geological Survey and Associate Director of the Bureau of Mineral Resources. He established the GEODISC program and subsequently CO<sub>2</sub>CRC, which is conducting one of the world's largest research and demonstration programs on carbon dioxide capture and geological storage. He was a Coordinating Lead Author of the IPCC Special Report on Carbon Dioxide Capture and Storage, and is a member of various national and international committees concerned with energy and greenhouse issues.

April 17, 2008

Ms Nancy Pritchett  
Washington State Department of Ecology

**RE: Comments on implementing ESSB 6001 through Proposed WAC 173-407-110,  
WAC 173-407-300, and WAC 173-407-320**

Dear Ms Pritchett,

Please accept these comments from the Washington Public Utility Districts Association regarding the CR102 draft rules pursuant to the implementation of ESSB 6001. We appreciate the opportunity to comment. We would also like to express our appreciation to the Department of Ecology (Department) staff for undertaking and conducting the successful process to gather stakeholder input in this multidisciplinary rulemaking involving, in some cases, breaking ground in new complex and highly technical subject areas.

Our comments cover supporting a definitional correction **WAC 173-407-110** proposed by the WUTC, and comments on proposed amendments **WAC 173-407-300** of the proposed WAC:

**WAC 173-407-300 Procedures:** The method for calculating emissions pursuant to a new long-term financial commitment; the default emissions factor for pulverized coal and "unspecified sources"; and

**WAC 173-407-320: Relationship of ecology and the governing boards of consumer-owned utilities**

**1) Comment on proposed WAC 173-407-110**

The proposed rule reads:

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

We recommend the following change:

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**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. We assume this was merely an oversight in drafting.

## 2) Comment on proposed WAC 173-407-300

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 proportionate to the expected energy from that source to be delivered in any given year – whether specified or unspecified. We agree with and support this approach. However, we found the formula in the proposed subsection (5) to be mathematically inconsistent according to a “unit analysis”, where the units for the terms on the right side of the equation, when analyzed, must give the units of the expected answer on the left side of the equation: lbs/MW - hour. This equation does not appear to accomplish that. To clarify how the weighted average is calculated, we propose the following clarifications to WAC 173-407-300 (strikeouts for deletions, underline for additions).

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.

**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.** (1) 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 the governing boards of consumer-owned utilities pursuant to RCW 80.80.070 when evaluating a potential long-term financial commitment when the long-term financial commitment includes electricity from unspecified sources, electricity from one or more specified sources, and/or provisions to meet load growth with electricity from unspecified and/or specified sources.

(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 energy-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 energy-weighted** 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 energy-weighted** 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~~ 2,250 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~~ 2,250 lbs/MWh.

(c) Renewable resources = 0 lbs/MWh.

#### Example Calculation

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

where:

EPS = Emissions performance standard  
F = EPS of each type of source expressed as MW  
T = Percentage of time used for that source  
Total Hours = Total hours that power was available to customers in the year (8,760 or less)

$$WEF(t) = \frac{EF1 * MWh(1) + EF2 * MWh(2) + EF(n) * MWh(n)}{\text{Total MWh}(t)}$$

Where:

WEF(t) = Weighted emissions factor in lbs/MWh for year t  
EF(n) = Emissions Factor for source (n) in lbs/MWh  
MWh(n) = MWh expected to be generated by each source "n" on average during year (t)  
Total MWh = Total MWh expected to be delivered in year t

#### Reason for recommended change to default emissions rate for pulverized coal and unspecified sources

From WAC 173-407-300 - 4(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."*

In the original statute, ESSB 6001, now codified as RCW 80.80, an emissions performance standard was established at 1,100 lbs of CO<sub>2</sub> emitted/MWh of electricity generated. This number was developed from the average emissions rate from natural gas fired combined cycle combustion turbines currently operating, apparently in the US, and in fact in RCW 80.80.050, the Department of Community, Trade and Economic Development is tasked with updating the emissions performance standard through a survey of commercially available CCTs in the US and adopting by rule a new emissions performance standard based upon that survey.

*80.80.050 The energy policy division of the department of community, trade, and economic development shall provide an opportunity for interested parties to comment on the development of a survey of new combined-cycle natural gas thermal electric generation turbines commercially available and offered for sale by manufacturers and purchased in the United States to determine the average rate of emissions of greenhouse gases for these turbines. The department of community, trade, and economic development shall report the results of its survey to the legislature every five years, beginning June 30, 2013. The department of community, trade, and economic development shall adopt by rule the average available greenhouse gases emissions output every five years beginning five years after July 22, 2007.*

For consistency with this statutory provision and the establishment of the original emissions performance standard, we believe that the emissions rate for pulverized coal and unspecified sources should be determined using reported data from the commercially operating coal fleet except in cases where the actual measured emissions from a specific plant under consideration for a long term financial commitment are available pursuant to WAC 173-407-300 - 4(c) .

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.**

In an email communication with Department staff, we understand that the 2,600 lb/MWh default emission rate in this draft rule was calculated using a theoretical thermodynamic calculation of the CO<sub>2</sub> emissions from the combustion of coal for generation of electricity under certain assumed conditions. We do not contest this calculation, rather we believe that the underlying premise in the emissions rates contained in RCW 80.80 and these rules points to utilizing the emissions rates averaged across commercially available, operating technologies using measured emissions rates when available. We believe that our recommendation of 2,250 lbs/MWh more closely meets these criteria.

### 3) Comment on proposed WAC 173-407-320

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.

We appreciate the opportunity to comment on these proposed rules. Please don't hesitate to call 360.741.2683 if we can answer any questions.

Sincerely,

/s/

Dave Warren  
Energy Services Director  
Washington PUD Association

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**Table of Contents**  
for

**eGRID2006V2\_1\_year04\_plant.xls, Version 2.1**  
**Year 2004 eGRID Plant, Boiler, and Generator Data Files**

- 1 EGRDBLR04 eGRID boiler year 2004 data
- 2 EGRDGEN04 eGRID generator year 2004 data
- 3 EGRDPLNT04 eGRID plant year 2004 data, Modified for Purposes of Washington State SB 6001 Rulemaking

\* Data analysis for ESSB 6001 Rulemaking includes only generation and emissions data from pulverized coal generating plants (not cogenerating) operating at over 80% capacity factor with a nameplate capacity of over 100 MW.

6GRD2006 2004 file sequence number	State	Plant name	Plant operator name	Parent company name associated with the operator	Plant primary fuel	Plant category	Plant capacity factor	Plant nameplate capacity (MW)	Plant annual heat input (MMBtu)	Plant annual net generation (MWh)	Plant annual CO2 emissions (tons)	Plant annual CO2 emissions rate (lb/MWh)	Plant annual CO2 input emission rate (lb/MWh)	Plant annual unadjusted annual CO2 emissions (tons)	Plant annual unadjusted annual heat input rate (MMBtu)	Plant annual nominal generation (MWh)	Plant annual net generation (MWh)
6GRD2006	2004 file	SEOP1T04 PSTAYV/PHAME	Cholla	Arizona Public Service Co Salt River Proj Aq 18 P Dist	COAL	COAL	88%	1,129	78760670.0	6793115.0	60758954.5	2298.039	2386.039	6075895.5	78760670	11633.821	6794016.0
232 AZ	Concord	OPPRAME	OPPRAME	Princeton West Capital Corp	SUB	COAL	81%	822	61654300.0	5737281.0	6325734.99	2182.273	2292.273	6325735.0	20237544.9	61864300	5791623.0
294 AZ	Navigo	USBR/Upper Colorado Region	USBR/Upper Colorado Region	US Bureau Of Reclamation	BIT	COAL	84%	2,409	187247286.0	17734190.0	20237544.94	2292.320	2292.320	20237544.9	197247286	11122.430	17720683.0
265 AZ	Springville	Tucson Electric Power Co	Tucson Electric Power Co	UnSource Energy Corp	SUB	COAL	76%	885	61933230.0	5705735.0	63843949.59	2227.355	2227.355	63843949.6	61933230	10834.574	5593112.0
989 CO	Comanche	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	70%	807	62909240.0	4966098.0	4966098.0	2167.417	2167.417	4966098.0	62909240	10381.484	4922086.0
883 CO	Craig	Tri-State G & T Assn Inc	Tri-State G & T Assn Inc	Xcel Energy Inc	SUB	COAL	63%	779	52074272.0	43032722.0	5332098.46	2176.165	2176.165	5332098.5	52074272	12101.124	4292488.0
989 CO	Harnden	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	85%	1,339	118191070.0	9939919.0	9939919.0	1462118.46	1462118.46	9939919.0	204,197	11452115.5	4292488.0
987 CO	Macla	Colorado Springs City of	Colorado Springs City of	Xcel Energy Inc	BIT	COAL	86%	465	403482330.0	39650783.0	39650783.0	2297.502	2298.288	39650783.0	111619107	11161910.6	40984233.0
989 CO	Paluma	Tri-State G & T Assn Inc	Tri-State G & T Assn Inc	Xcel Energy Inc	BIT	COAL	72%	287	191507700.0	16270610.0	16270610.0	2487.371	2487.371	16270610.0	19150770	2024229.9	11867164.6
989 CO	Ray D Nixon	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	73%	532	403448935.0	351926330.0	4491295.83	2282.374	2282.374	4491295.8	40344893	1491188.5	3492358.0
1020 CO	Vernant	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	79%	279	191303230.0	14903383.0	14903383.0	2282.374	2282.374	14903383.0	204,470	11691259.9	1612638.0
2792 MT	Calstrip	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	80%	153	147569371.0	11633293.5	11633293.5	2282.438	2285.488	11633293.5	19130323	14756937	745000.0
3147 NM	Escalante	Colorado Springs City of	Colorado Springs City of	Xcel Energy Inc	BIT	COAL	80%	257	185443030.0	14861221.0	14861221.0	2111.881	2111.881	14861221.0	17193895	10882.088	1557123.0
3148 NM	Four Corners	Public Service Co of Colorado	Public Service Co of Colorado	Xcel Energy Inc	BIT	COAL	65%	237	147444133.0	135469330.0	135469330.0	2282.374	2282.374	135469330.0	14744413	11012.470	1182163.0
3148 NM	San Juan	TH-Stein G & T Assn Inc	TH-Stein G & T Assn Inc	PPL Generation LLC	SUB	COAL	69%	279	191303230.0	14903383.0	14903383.0	2282.374	2282.374	14903383.0	14744413	11012.470	1182163.0
3168 NV	Malheur	Sierra Pacific Power Co	Sierra Pacific Power Co	Pinnacle West Capital Corp	BIT	COAL	77%	1,348	128107281.0	128240180.0	13147180.95	2016.885	2016.885	13147180.9	14793971	10291.786	14944811.0
3168 NV	North Valley	Sierra Pacific Power Co	Sierra Pacific Power Co	Edison International	BIT	COAL	89%	521	424817980.0	40218930.0	40218930.0	2093.645	2093.645	40218930.0	1874181.0	9829.392	12495254.0
3168 NV	Red Gate	Sierra Pacific Power Co	Sierra Pacific Power Co	Edison International	BIT	COAL	76%	601	621002680.0	45846826.48	45846826.48	2167.452	2167.452	45846826.5	10871709.3	10406567.5	12495254.0
3168 NV	Boardman	Sierra Pacific Power Co	Sierra Pacific Power Co	Sierra Pacific Resources	BIT	COAL	67%	601	39234560.0	35423611.0	35423611.0	2597.702	2597.702	35423611.0	42481798	10582.648	10174242.0
4316 UT	Benham	Portland General Electric Co	Portland General Electric Co	Sierra Pacific Resources	BIT	COAL	85%	500	42108705.0	3737946.0	3737946.0	2272.759	2272.759	3737946.0	42108705	10582.648	10174242.0
4320 UT	Carbon	Utah Generation & Tran Coop	Utah Generation & Tran Coop	MMAmerican Energy Holdings Co	BIT	COAL	79%	189	12388690.0	1153092.9	1153092.9	2291.867	2291.867	1153092.9	42108705	11075.622	3839764.0
4320 UT	Hunter	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	78%	968	69639138.0	9967970.0	9967970.0	2133.378	2133.378	9967970.0	12717818	12388690	3734911.0
4323 UT	Hurlington	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	73%	1,940	158908230.0	68883010.0	68883010.0	2295.447	2295.447	68883010.0	12717818	10308.678	9967970.0
4323 UT	Hunter	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	78%	968	69639138.0	9967970.0	9967970.0	2133.378	2133.378	9967970.0	12717818	10308.678	9967970.0
4323 UT	Hurlington	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	73%	1,940	158908230.0	68883010.0	68883010.0	2295.447	2295.447	68883010.0	12717818	10308.678	9967970.0
4323 UT	Hunter	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	78%	968	69639138.0	9967970.0	9967970.0	2133.378	2133.378	9967970.0	12717818	10308.678	9967970.0
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4323 UT	Hunter	PacificCorp-Rocky Mtn	PacificCorp-Rocky Mtn	MMAmerican Energy Holdings Co	BIT	COAL	78%	9									

W-28

**From:** Julian Powers [mailto:julianandjane@gmail.com]  
**Sent:** Friday, April 18, 2008 3:53 PM  
**To:** Zehm, Polly (ECY); Manning, Jay (ECY)  
**Subject:** Re: Draft Rules, CR-102, for SB 6001

WA Department of Ecology  
Olympia, WA

Re: Draft Rules, CR-102, for SB 6001

Gentlepeople:

My written comments herein are relative to the emissions performance standard (EPS) for greenhouse gases.

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!!!!

My detailed comments:

(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!!**

(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.

I request, and expect, a response to this letter, preferably written so that I can accurately forward your comments.

35-W

I've never before written a more critical letter to any government entity. I'm a retired engineer who worked for over 30 years in the area of infrared. I've followed global warming for at least a decade and believe that, although WA cannot significantly impact world-wide global warming, we are absolutely derelict if we do not give it our serious effort.

I obviously very adamantly resent what DOE is attempting to do on this issue.

Sincerely,

Julian Powers  
509-838-5803