

Attach Address Label

U.S. ENVIRONMENTAL PROTECTION AGENCY  
DRAFT QUESTIONNAIRE FOR THE COALBED METHANE  
EXTRACTION SECTOR



Form Approved  
OMB Control No. XXX  
Approval Expires XXX

The public reporting and recordkeeping burden for this collection of information is estimated to average XXX hours per response. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions, develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques, EPA has established a public docket for this ICR under Docket ID No. EPA-HQ-OW-2006-0771, which is available for public viewing at the Water Docket in the EPA Docket Center (EPA/DC), EPA West, Room B102, 1301 Constitution Ave., NW, Washington, DC 20004. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Reading Room is (202) 566-1744, and the telephone number for the Water Docket is (202) 566-2426. An electronic version of the public docket is available through the federal data management system (FDMS) at <http://www.regulations.gov>. Use FDMS to submit or view public comments, access the index listing of the contents of the public docket, and to access those documents in the public docket that are available electronically. Also, you can send comments to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17<sup>th</sup> Street, NW, Washington, DC 20503, Attention: Desk Officer for EPA. Please include the EPA Docket ID No. EPA-HQ-OW-2006-0771 and OMB control number (2040-XXXX) in any correspondence.

## INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is conducting a survey of coalbed methane (CBM) extraction operations. EPA will use the questionnaire responses to inform its decision on whether to initiate a rulemaking to potentially revise the effluent guidelines for the Oil and Gas Extraction Point Source Category (40 CFR Part 435) to include limits for pollutants discharged in CBM produced water. This questionnaire is not focused on conventional oil and gas extraction. The technical data collected with this questionnaire will be used to determine the characteristics of CBM produced water, potential environmental impacts, existing management, beneficial use, and disposal practices for CBM produced water, and the related costs for this industry sector. The financial and economic data collected in this questionnaire will be used to characterize the economic status of the industry sector and to estimate the possible economic impacts of potential technology and beneficial use options for CBM produced water. EPA is conducting this survey as part of its annual review of existing effluent guidelines, which is required by the Clean Water Act (CWA) sections 301(d) and 304(b). You must respond to this questionnaire if you operated a CBM well in 2007.

EPA is conducting this survey under the authority of Section 308 of the Clean Water Act (Federal Water Pollution Control Act, 33 U.S.C. Section 1318). **You must respond to this questionnaire within 60 days** of receiving it. Failure to respond, late filing, or failure to comply with the instructions may result in criminal fines, civil penalties, and other sanctions, as provided by law.

## OVERVIEW OF THE QUESTIONNAIRE

The questionnaire is divided into three parts: Part A lists the wells operated by your company that have been selected for this questionnaire, Part B contains financial and economic information, and Part C contains produced water management information. The parts are divided into the following sections:

### PART A: CBM WELLS SELECTED FOR QUESTIONNAIRE AND CERTIFICATION

Part A of the questionnaire will determine whether you need to complete the questionnaire.

### PART B: FINANCIAL AND ECONOMIC INFORMATION

- SECTION 1: CONTACT INFORMATION
- SECTION 2: FIRM-LEVEL FINANCIAL QUESTIONS
- SECTION 3: PROJECT-LEVEL QUESTIONS

The financial and economic data collected in Part B of this questionnaire will be used to characterize the economic status of the industry and to estimate the possible economic impacts of wastewater regulations. The questions in Part B pertain to calendar years 2005 through 2007.

### PART C: PRODUCED WATER MANAGEMENT INFORMATION

#### INSTRUCTIONS FOR PART C

- SECTION 1: GENERAL OPERATOR INFORMATION
- SECTION 2: PRODUCED WATER MANAGEMENT SYSTEM GENERAL QUESTIONS
- SECTION 3: DETAILED PRODUCED WATER MANAGEMENT AND TREATMENT QUESTIONS
- SECTION 4: PRODUCED WATER QUALITY DATA

The information requested in Part C of this questionnaire will be used to analyze produced water production rates, produced water characteristics, and produced water management, treatment, and disposal practices. Part C requests information for calendar year 2007.

### PART D: SUPPORTING INFORMATION

- LIST OF ACRONYMS AND ABBREVIATIONS
- DEFINITION OF KEY TERMS

**COMPLETION OF THE QUESTIONNAIRE**

Each section of the questionnaire should be completed by the person(s) most knowledgeable about the information requested. The corporate official or designee responsible for directing or supervising the response to the questionnaire must sign one of the Certification Statements on pages A-2 or A-3 to either (1) verify and validate the information provided, or (2) certify that this facility did not engage in CBM operations during the 2007 calendar year. Different people may complete Part B (Financial and Economic) and Part C (Produced Water Management).

**Keep a Copy of the Completed Questionnaire**

**Please keep a copy of the completed questionnaire, including attachments.** EPA will review the information submitted and may request your cooperation in answering follow-up questions, if necessary, to complete analyses.

**QUESTIONNAIRE ASSISTANCE**

**EPA Coalbed Methane Help Lines**

**Information About Part B: Financial and Economic Information**

Eastern Research Group, Inc. .... XXX-XXX-XXXX  
Internet Electronic Mailing Address ..... XXX@erg.com

**Information About Part C: Technical Information**

PG Environmental/Eastern Research Group, Inc. .... XXX-XXX-XXXX  
Internet Electronic Mailing Address ..... XXX@XXX.com

**WHEN TO RETURN QUESTIONNAIRE**

You must respond to this questionnaire within 60 days of receiving it.

If you wish to request an extension, you must do so **in writing** within 30 days of receipt of this questionnaire. Written requests may be e-mailed to Mr. Carey Johnston at johnston.carey@epa.gov with "CBM Questionnaire Extension Request" in the e-mail subject line or may be mailed to:

United States Postal Service

Mr. Carey Johnston  
U.S. EPA, Office of Water  
Mail Code: 4303T  
1200 Pennsylvania Avenue, N.W.  
Washington, DC 20460

One- or Two-Day Delivery (e.g., FedEx)

Mr. Carey Johnston  
U.S. EPA, Office of Water  
Room 6231G, EPA West  
1301 Constitution Avenue, NW  
Washington, DC 20004

Extension requests will be evaluated on a case-by-case basis. Submittal of an extension request to EPA does **not** alter the due date of your questionnaire unless and until EPA agrees to the extension and establishes a new date.

**WHERE TO RETURN QUESTIONNAIRE**

After completing the questionnaire and certifying the information that it contains, please use the enclosed mailing label to mail the completed questionnaire to:

U.S. Environmental Protection Agency  
CBM Industry Questionnaire  
c/o PG Environmental, LLC  
447B Carlisle Drive  
Herndon, VA 20170

**REQUESTING AN ELECTRONIC VERSION OF THE QUESTIONNAIRE**

**[Note: Instructions will be added once questionnaire distribution method is determined.]**

If you would like an electronic version of the questionnaire, it is available on the EPA Web site at <http://www.epa.gov/guide/cbm/>.

**CONFIDENTIAL BUSINESS INFORMATION**

**If no business confidentiality claim accompanies the information when it is received by EPA, EPA may make the information available to the public without further notice.**

Regulations governing the confidentiality of business information are contained in the Code of Federal Regulations (CFR) at Title 40 Part 2, Subpart B. You may assert a business confidentiality claim covering part or all of the information you submit, other than effluent data and information or data that is otherwise publicly available, as described in 40 CFR 2.203(b):

*“(b) Method and time of asserting business confidentiality claim. A business which is submitting information to EPA may assert a business confidentiality claim covering the information by placing on (or attaching to) the information, at the time it is submitted to EPA, a cover sheet, stamped or typed legend, or other suitable form of notice complying language such as ‘trade secret,’ ‘proprietary,’ or ‘company confidential.’ Allegedly confidential portions of otherwise non-confidential documents should be clearly identified by the business, and may be submitted separately to facilitate identification and handling by EPA. If the business desires confidential treatment only until a certain date or until the occurrence of a certain event, the notice should so state.”*

You may claim as confidential all information included in the response to a question by checking the Confidential Business Information (CBI) box next to the question number. Note that you may be required to justify any claim of confidentiality at a later time. Note also that facility effluent data are not eligible for confidential treatment, pursuant to Section 308(b) of the Clean Water Act, and thus will be treated as non-confidential even if the CBI box is checked. In addition, information that is publicly-available should not be claimed confidential. Note also that information claimed confidential cannot be accessed, verified, or used by the industry to evaluate data and analyses supporting the results of the CBM study.

Information covered by a claim of confidentiality will be disclosed by EPA only to the extent of, and by means of, the procedures set forth in 40 CFR Part 2, Subpart B. In general, submitted information protected by a business confidentiality claim may be disclosed to other employees, officers, or authorized representatives of the United States concerned with implementing the Clean Water Act. Exemption 4 of the Freedom of Information Act (FOIA) protects from disclosure "trade secrets and commercial or financial information obtained from a person and privileged or confidential." See 5 U.S.C. 552(b)(4).

Information covered by a claim of confidentiality will be made available to EPA contractors under EPA Contract Numbers No. 68-C02-095, EP-C-07-029, and EP-C-05-030 to enable the contractors to perform the work required by their contracts with EPA. All EPA contracts provide that contractor employees use the information only for the purpose of performing the work required by their contracts and will not disclose any CBI to anyone other than EPA without prior written approval from each affected business or from EPA's legal office. EPA has approved written procedures for each contractor on how they will gather, safeguard, and secure CBI. Any comments you may wish to make on this issue must be submitted in writing along with your completed questionnaire.

**PART A. CBM WELLS SELECTED FOR QUESTIONNAIRE AND CERTIFICATION**

**CBI?**  
 Yes

A1-1. Did you own or operate any CBM wells in 2007?

- Yes. Proceed to Table A-1 and Question A1-2.
- No. You did not own or operate any CBM wells in the U.S. in 2007. You do not need to complete this questionnaire. Please sign Certification Statement A on Page A-2 and return the blank questionnaire to EPA at the address listed on page *ii*.

**Table A-1. Wells To Be Surveyed (Check (☒) Each Applicable Table Cell)**

API Or State ID Number [EPA to insert numbers]	(Column 1) Neither this firm nor any affiliate <sup>a</sup> owned or operated this well in 2007	(Column 2) This well is not a CBM well	(Column 3) CHECK THIS COLUMN ONLY IF NEITHER COLUMN 1 NOR 2 IS CHECKED FOR THIS WELL.	(Column 4) In 2007, CBM production from this well was commingled prior to water separation with conventional oil/gas
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<sup>a</sup>Affiliate: Subsidiary, parent, partner firm; owns: has any working interest in the well or wells, whether producing or shut in; operated: responsible for the day-to-day management of the wells, whether producing or shut in.

**CBI?**  
 Yes

A1-2. Did you check any boxes in Column 3, Table A-1 for the listed wells?

- Yes.** Proceed to Part B and complete all sections of this questionnaire pertaining to all of the wells listed in Table A-1 that are check marked in Column 3. When you have completed the entire questionnaire, please sign the Certification Statement B on Page A-3 and return the questionnaire to EPA at the address listed on page *ii*.
- No.** Proceed to Part B and complete ONLY Section 2. When you have completed Part B, Section 2, please sign the Certification Statement C on Page A-3 and return the questionnaire to EPA at the address listed on page *ii*.

Operator ID: \_\_\_\_\_

**CERTIFICATION STATEMENT**

The corporate official responsible for directing or supervising the preparation of the questionnaire must read and sign the applicable Certification Statement listed below. The certifying official must be a responsible corporate official or his/her authorized representative.

**Certification Statement A**

*I certify under penalty of law that this company did not own or operate any CBM wells. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment as explained in Section 308 of the Clean Water Act.*

\_\_\_\_\_  
Signature of Certifying Official\_\_\_\_\_  
Date\_\_\_\_\_  
Printed Name of Certifying Official

( )

\_\_\_\_\_  
Telephone Number of Certifying Official\_\_\_\_\_  
Title of Certifying Official\_\_\_\_\_  
Facility Name

*(Return the questionnaire along with the signed Certification Statement to the address provided on page ii.)*

**Certification Statement B**

*I certify under penalty of law that the attached questionnaire was prepared under my direction or supervision and that qualified personnel properly gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, accurate and complete. In those cases where we did not possess the requested information for questions applicable to our operations, we provided best estimates. We have to the best of our ability indicated what we believe to be company confidential business information as defined under 40 CFR Part 2, Subpart B. We understand that we may be required at a later time to justify our claim in detail with respect to each item claimed confidential. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment as explained in Section 308 of the Clean Water Act.*

\_\_\_\_\_  
Signature of Certifying Official\_\_\_\_\_  
Date\_\_\_\_\_  
Printed Name of Certifying Official

( )

\_\_\_\_\_  
Telephone Number of Certifying Official\_\_\_\_\_  
Title of Certifying Official\_\_\_\_\_  
Facility Name

*(Continue to Part B, Section 1 of the questionnaire, complete all sections, and return the questionnaire along with the signed Certification Statement to the address provided on page ii.)*

Operator ID: \_\_\_\_\_

**Certification Statement C**

*I certify under penalty of law that all CBM wells listed on Table A-1 are either not owned or operated by this company or are not CBM wells. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment as explained in Section 308 of the Clean Water Act.*

\_\_\_\_\_  
Signature of Certifying Official

\_\_\_\_\_  
Date

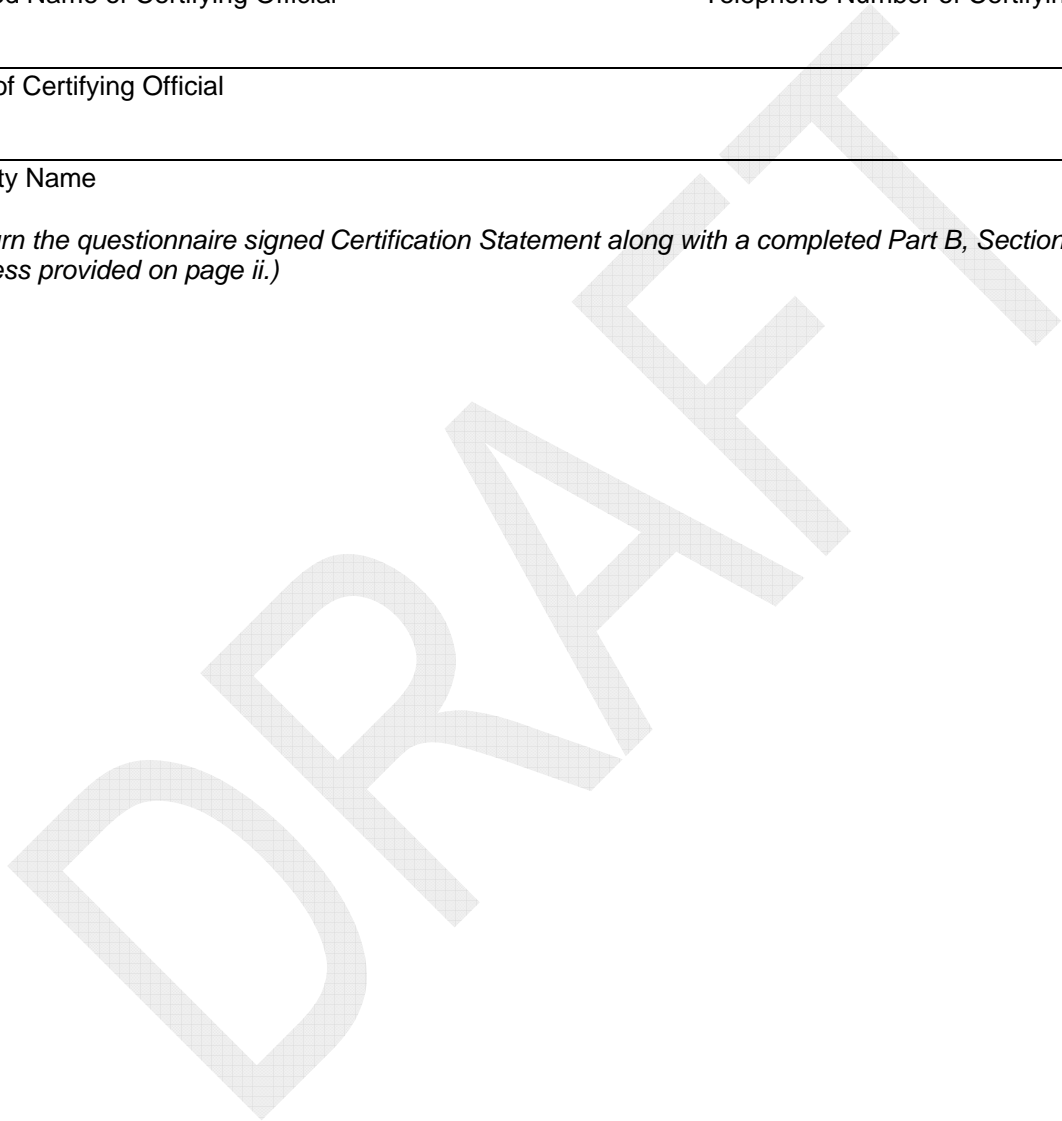
\_\_\_\_\_  
Printed Name of Certifying Official

(\_\_\_\_) \_\_\_\_\_  
Telephone Number of Certifying Official

\_\_\_\_\_  
Title of Certifying Official

\_\_\_\_\_  
Facility Name

*(Return the questionnaire signed Certification Statement along with a completed Part B, Section 2 to the address provided on page ii.)*



Operator ID: \_\_\_\_\_

## PART B. FINANCIAL AND ECONOMIC INFORMATION

### SECTION 1: CONTACT INFORMATION

#### GENERAL INSTRUCTIONS FOR SECTION 1

This section of the questionnaire is designed to collect general operator information pertinent to Part B, including contact information.

Indicate information that should be treated as confidential by checking the Confidential Business Information (CBI) box next to each question number with responses containing CBI. Any response where "CBI" is not checked will be considered non-confidential. Refer to the instructions given in the CONFIDENTIAL BUSINESS INFORMATION section on page iii for additional information regarding EPA's confidentiality procedures set forth in 40 CFR Part 2, Subpart B.

**CBI?**  
 Yes

B1-1. Provide the name, title, telephone and facsimile numbers, and e-mail address of the primary contact at your operation for information supplied in the firm-level financial section of the questionnaire (**Part B, Section 2**).

_____	( ) _____
Primary Contact Name	Telephone Number
_____	( ) _____
Primary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	
City	State Zip Code

**CBI?**  
 Yes

B1-2. Provide the name, title, telephone and facsimile numbers, and e-mail address of the secondary contact at your operation for information supplied in the firm-level financial section of the questionnaire (**Part B, Section 2**).

_____	( ) _____
Secondary Contact Name	Telephone Number
_____	( ) _____
Secondary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	
City	State Zip Code



Operator ID: \_\_\_\_\_

**CBI?**  
 Yes

B1-3. Provide the name, title, telephone and facsimile numbers, and e-mail address of the primary contact at your operation for financial information supplied in the project-level section of this questionnaire (**Part B, Section 3**), **if different from the primary contact for Part B, Section 2.**

_____	( )
Primary Contact Name	Telephone Number
_____	( )
Primary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	
City	State Zip Code

**CBI?**  
 Yes

B1-4. Provide the name, title, telephone and facsimile numbers, and e-mail address of the secondary contact at your operation for financial information supplied in **Part B, Section 3**, of this questionnaire, **if different from the secondary contact for Part B, Section 2.**

_____	( )
Secondary Contact Name	Telephone Number
_____	( )
Secondary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	
City	State Zip Code

**CBI?**  
 Yes

B1-5. If you know that other facilities in your firm have received this questionnaire and would like to reference the firm-level information provided by another respondent, please provide the operator ID of the respondent who is submitting Part B Section 2 for your firm:

\_\_\_\_\_

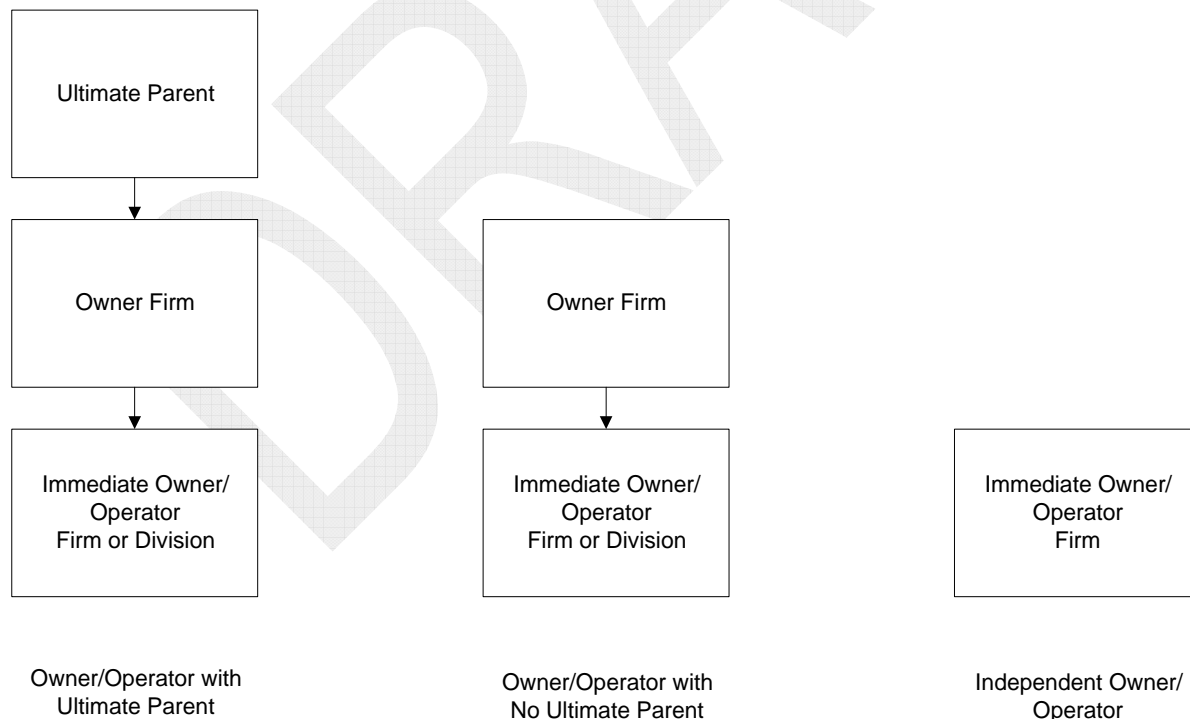
**SECTION 2: FIRM-LEVEL FINANCIAL QUESTIONS**

**General Instructions for Section 2**

The following questions apply to the immediate owner/operator level (if a firm or profit center) of one or more of the wells listed in Table A-1 that were checked in Column 3 of that table. The definition of immediate owner/operator is generally the same as the definition the U.S. Department of Energy (DOE) Energy Information Administration (EIA) uses for collecting information on Form EIA-23. The immediate owner/operator is the firm or division (if a profit center) that is responsible for management and the day-to-day operation of this well or wells. This immediate owner/operator is generally a working interest owner or a company under contract to the working interest owner(s). Management decisions might include:

- Whether well(s) should be shut-in, worked over or abandoned;
- Whether additional or replacement wells should be drilled into a reservoir;
- Whether additional or different production equipment should be installed; and
- Any other decision factor used by DOE in the General Instructions to Form EIA-23 (see also definition of management decisions in Part D: Supporting Information, Definition of Key Terms section at the end of the questionnaire).

There are potentially three levels of corporate hierarchy for which EPA would like at least some minimum information. Most questions are relevant to the immediate owner/operator, but the type of information requested, if not accounted for at that level, may need to be obtained from a higher corporate level. Just above the immediate owner/operator is the owner firm. The owner firm, in turn, may be owned (directly or through other intermediate firms) by an ultimate parent. Different companies have different criteria for deciding which entity (owner/operator, owner firm, ultimate parent) makes a particular investment decision. The ultimate parent is the highest level of the corporate hierarchy. The diagram below indicates some simpler arrangements of this type. Some owner/operators are owned by more than one owner firm (joint ventures or other partnership arrangements). EPA will be requesting only limited information on these joint owners.



**CBI?**  
 Yes

B2-1. Is the name of the immediate owner/operator the same as that that shown on the questionnaire label on the cover sheet of this questionnaire? (Choose only one)

- Yes.
- No. The correct name is \_\_\_\_\_

**CBI?**  
 Yes

B2-2. Describe the position in the corporate hierarchy of the immediate owner/operator (as defined above). (Choose only one)

- Independent owner/operator. This firm is not owned or affiliated with any other firm. Skip to Question B2-4.
- Joint venture or other partnership arrangement. This firm is owned by at least two other firms. Skip to Question B2-4.
- Division or profit center. This entity is owned by one owner firm. Answer Question B2-3.
- Subsidiary firm. This firm is owned by no more than one owner firm (portions may be publicly held). Answer Question B2-3.

**CBI?**  
 Yes

B2-3. What is the name of the ultimate parent company for the immediate owner/operator?

\_\_\_\_\_

**CBI?**  
 Yes

B2-4. Does the immediate owner/operator qualify as a small business under the Small Business Administration (SBA) definition of small business, given the industrial classification (North American Industry Classification System—NAICS), size of employment, or other SBA factor AND lack any corporate affiliations to large and/or foreign-owned firms (as these terms are defined by SBA)? (See SBA definitions at <http://www.sba.gov/services/contractingopportunities/sizestandardstopics/index.html>)

- Yes
- No

**CBI?**  
 Yes

B2-5. If the owner/operator has an owner firm or firms (is not an independent owner/operator), what is the corporate name (or names, if a joint venture) of the owner(s)?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CBI?**  
 Yes

B2-6. What is the 6-digit NAICS code for the immediate owner/operator?

\_\_\_\_\_

**CBI?**  
 Yes

B2-7. Is the immediate owner/operator a contract operator only?

- Yes
- No

**CBI?**  
 Yes

B2-8. What is the organization type of the immediate owner/operator (or owner firm if immediate owner/operator is not a firm)?

- C Corporation
- S Corporation, Limited Liability Corporation, or Limited Liability Partnership
- Division or Profit Center
- Other: \_\_\_\_\_

Operator ID: \_\_\_\_\_

**CBI?**  
 Yes

B2-9. What is the 2007 employment at the immediate owner/operator?

- a. Total 2007 employment was \_\_\_\_\_
- b. 2007 employment attributable to CBM operations is \_\_\_\_\_ (estimate if necessary).

Instructions: The following questions should be answered at the **lowest level** of firm organization at which **substantial financial** decisions are made on CBM operations (e.g., decisions on major capital investments or major production decisions for an individual project, such as converting from discharge of produced water to subsurface injection and whether to develop a new or abandon an existing CBM project). This may be the operator or the operator's owner firm, for example, or even higher in the corporate hierarchy, such as at a parent firm.

**CBI?**  
 Yes

B2-10. Questions B2-10 through B2-16 ask for information critical to evaluating CBM project decisions and/or understanding the financial situation reflected in the information provided in this section. To the extent possible (or relevant), provide this information at the immediate owner/operator level, whether a profit center or a firm. Otherwise, please provide this information at the lowest level of corporate hierarchy where such decision-making is made. Please indicate the corporate level at which these data are being provided:

- Immediate Owner/Operator
- Owner Firm
- Other. Name of entity and corporate relationship (e.g., ultimate parent company).  
\_\_\_\_\_

**CBI?**  
 Yes

B2-11. How do you evaluate major capital investment decisions (e.g., expansion of project, major upgrade or replacement of produced water treatment system)? This question is not related to the day-to-day decisions involved maintaining existing operations.

- Payback period (length of time required to recover the cost of an investment)
- Net present value analysis
- Other. Describe: \_\_\_\_\_

**CBI?**  
 Yes

B2-12. If you use payback period, what is your typical payback period for CBM capital investments?

\_\_\_\_\_ years.

**CBI?**  
 Yes

B2-13. If you use payback period, do you include a cost of capital in your calculations?

- Yes
- No

**CBI?**  
 Yes

B2-14. If your organization needed to borrow money or use equity to pay for a capital investment today, what rate, given your typical mix of debt and equity, would you pay for that capital? (This is not the hurdle rate or minimum investment return required for prospective projects.)

\_\_\_\_\_ %

**CBI?**  
 Yes

B2-15. What hurdle rate (minimum desired investment return) do you typically use in evaluating potential coalbed methane projects?

\_\_\_\_\_ %

**CBI?**  
 Yes

B2-16. Are you required to use the cost-depletion method (unit of production) method in computing your depletion allowance for tax purposes?

- Yes
- No

Operator ID: \_\_\_\_\_

**Instructions:** The following questions ask for income statement (through net income) and balance sheet information. Information is requested at the **lowest level** in the corporate hierarchy at which such information is kept.

CBI?  
 Yes

**B2-17. Income Statement Information:** Questions B2-18 through B2-20 ask for revenues, costs and expenses, and earnings, interest, taxes and net income (loss). To the extent possible, provide this information at the immediate owner/operator level, whether a profit center or firm. EPA acknowledges that taxes and interest might be kept only at a higher corporate level in some cases. Please indicate the corporate level at which these income statement data other than taxes and interest, if necessary, are being provided.

- Immediate Owner/Operator  
 Owner Firm

CBI?  
 Yes

**B2-18.** What were your organization's revenues for 2005 through 2007? Report in nearest thousands of dollars (i.e., if net sales were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

	Revenues	2005 (\$)	2006 (\$)	2007 (\$)
a.	Net sales and other operating revenues (all operations, including non-oil and gas related revenues)	_____,_____,000	_____,_____,000	_____,_____,000
b.	Revenues attributable to all oil and gas operations (including CBM)	_____,_____,000	_____,_____,000	_____,_____,000
c.	Revenues attributable to CBM operations only	_____,_____,000	_____,_____,000	_____,_____,000
d.	Other income (specify): _____	_____,_____,000	_____,_____,000	_____,_____,000
e.	Total revenues (a plus d)	_____,_____,000	_____,_____,000	_____,_____,000

Operator ID: \_\_\_\_\_

**CBI?**  
 Yes

B2-19. What were your organization's operating expenses for 2005 through 2007? Report in nearest thousands of dollars (i.e., if operating costs were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

	<b>Costs and Expenses</b>	<b>2005 (\$)</b>	<b>2006 (\$)</b>	<b>2007 (\$)</b>
a.	Operating costs (all operations)	_____,_____,000	_____,_____,000	_____,_____,000
b.	Operating costs attributable to all oil and gas operations (including CBM)	_____,_____,000	_____,_____,000	_____,_____,000
c.	Operating costs attributable to CBM operations only	_____,_____,000	_____,_____,000	_____,_____,000
d.	Selling, general, and administrative costs	_____,_____,000	_____,_____,000	_____,_____,000
e.	Depreciation, depletion, and amortization	_____,_____,000	_____,_____,000	_____,_____,000
f.	Royalty payments	_____,_____,000	_____,_____,000	_____,_____,000
g.	Severance tax payments	_____,_____,000	_____,_____,000	_____,_____,000
h.	Other costs (specify): _____	_____,_____,000	_____,_____,000	_____,_____,000
i.	Total costs and expenses (a plus d through h)	_____,_____,000	_____,_____,000	_____,_____,000

**CBI?**  
 Yes

B2-20. What were your organization's earnings and net income for 2005 through 2007? Report in nearest thousands of dollars (i.e., if earnings were \$1,253,779, please report as \$1,254,000; zeroes have been provided already). If tax and/or interest information is not kept at the corporate level represented in the income statement information provided above, please insert NA.

	<b>Earnings and Net Income</b>	<b>2005 (\$)</b>	<b>2006 (\$)</b>	<b>2007 (\$)</b>
a.	Earnings before interest and taxes (Question B2-18e minus Question B2-19i)	_____,_____,000	_____,_____,000	_____,_____,000
b.	Interest expense	_____,_____,000	_____,_____,000	_____,_____,000
c.	Federal and state income tax	_____,_____,000	_____,_____,000	_____,_____,000
d.	Net income or net loss (a minus b minus c)	_____,_____,000	_____,_____,000	_____,_____,000

**CBI?**  
 Yes

B2-21. **Balance Sheet Questions:** Questions B2-22 through B2-24 ask for assets, liabilities and equity information, as well as information on payments to principal. Please indicate the level at which these balance sheet and other data are being provided:

- Immediate Owner/Operator
- Owner Firm

Operator ID: \_\_\_\_\_

**CBI?**  
 Yes

B2-22. What were your company's assets in 2007? Report in nearest thousands of dollars (i.e., if assets were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

	Assets	2007 (\$)
a.	Current assets	_____, _____,000
b.	Property, plant, and equipment (net of depreciation)	_____, _____,000
c.	Other assets (net of depreciation)	_____, _____,000
d.	Cumulative depreciation	_____, _____,000
e.	Total assets (sum of a through c minus d)	_____, _____,000

**CBI?**  
 Yes

B2-23. What were your company's liabilities and equity in 2007? Report in nearest thousands of dollars (i.e., if total liabilities were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

	Liabilities and Equity	2007 (\$)
a.	Current liabilities (including accounts payable, accrued expenses and taxes, and the current portion of long-term debt)	_____, _____,000
b.	Long-term debt (including bonds, debentures, long-term leases, bank debt, and all other noncurrent liabilities such as deferred income taxes)	_____, _____,000
c.	Retained earnings	_____, _____,000
d.	Other owner equity (not including retained earnings)	_____, _____,000
e.	Sum of liabilities and owner equity (sum of a, b, c, and d)	_____, _____,000

**CBI?**  
 Yes

B2-24. What were your payments to principal (for both current and long-term debt) in:

- a. 2005? \$ \_\_\_\_\_, \_\_\_\_\_,000
- b. 2006? \$ \_\_\_\_\_, \_\_\_\_\_,000
- c. 2007? \$ \_\_\_\_\_, \_\_\_\_\_,000

**CBI?**  
 Yes

B2-25. The income statement and balance sheet information reflect a fiscal year starting in (month):

\_\_\_\_\_

**CBI?**  
 Yes

B2-26. Please provide financial statements.

**Instructions:** Include copies of all 2005 through 2007 financial statements used to compile the answers to Questions B2-18 through B2-25 above with your completed questionnaire. These may be accountant reports, annual reports, and/or 10-K reports and MUST include income statements, balance sheets, and associated notes for your organization. These financial statements should include those for the owner firm if the immediate owner/operator is a division or profit center and does not account for assets and liabilities.

Attached

### SECTION 3: PROJECT-LEVEL QUESTIONS

#### General Instructions for Section 3

This section asks for information from the operator of the well or wells identified in Table A-1, where operator is defined as the person responsible for the management and day-to-day operation of this well or wells as defined in Section 2 and in the definitions section of this questionnaire. The following questions ask for information pertaining to projects associated with the well or wells in Table A-1 that were check marked in Column 3. *A CBM project comprises a well, group of wells, lease, group of leases, or recognized unit for which you operate as an economic unit when making production decisions.* For each of the wells identified in Table A-1 that (1) you own/operate and (2) produces CBM, identify each well's project and answer the questions in Section 3 on a project basis.

If you own but do not operate the project in question, and you are not able to complete some or all of the information, please contact your contract operator to obtain answers to questions or remove Section 2 of the questionnaire and provide the remaining portions of the questionnaire to your contract operator. You are responsible for obtaining the questionnaire from your contract operator, recompiling the questionnaire, signing the certification pages, and returning the entire questionnaire to EPA.

In some cases, some of the wells identified in Table A-1 might belong to the same project. Provide the same project identifier in Question B3-1 for a well or wells that belong to the same project. You do not need to answer the remaining questions in Section 3 for a subsequent surveyed well in the same project. The project identifier you choose should ideally be one you use internally to refer to the project, but can be just a number such as 1, 2, 3, etc., if you use no formal identifier. A project identifier is needed primarily for linking information in this section to Part C and to expedite communications with you if necessary to follow up on questions EPA may have regarding this questionnaire.

**If a project operates as a unit in which you are not the sole operator, please include information only for that portion of a unit for which you actively operate and/or own working interests.**

[Note: Additional copies will be provided if Table A-1 contains more than 3 wells].



Operator ID: \_\_\_\_\_

**Table B-1. General Project Information—All Projects at Year End 2007**

	Question	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX
<b>Project Identifier Information</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-1. Name or Identifier of Project.			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-2. State permit number or lease number or numbers associated with project (list all that apply; if only a portion of the lease is considered a project, please provide API numbers of applicable wells in the comments section on Page _____. If additional space is needed to list leases, please attach a separate sheet.)			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-3. Unit Number, or other group identifier (if relevant). <b>Skip to Question B3-5 if not part of a formal unit.</b>			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-4. If you are the sole operator on this unit, <b>Skip to Question B3-5</b> , otherwise: Indicate the percentage of annual production on the unit in 2007 associated with your portion of the unit.			
<b>Numbers of Wells in Project at Year End 2007</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-5. Actively producing.			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-6. Planned, with active permits.			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-7. Spudded, drilling, or completed (production pending).			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-8. Inactive (shut in, temporarily abandoned, or other non-productive status during all of 2007).			
<b>Basic Historic Information</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-9. Year project development began (including planning phases) or year you acquired project.	Project Began _____ Acquired Project _____	Project Began _____ Acquired Project _____	Project Began _____ Acquired Project _____

**Table B-2 requests additional historic information on your projects.**

**Instructions:** If project began development prior to 2003, or if you acquired the project since development began, **skip to Question B3-27.** Otherwise, provide information for Questions B3-10 through B3-26 on capital costs and timing for **any project you initiated as of January 2003 or later that you have owned/operated continuously since that time** (i.e., you did not acquire the project after development began). Report large dollar amounts in nearest thousands of dollars where indicated (i.e., if lease development costs were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

**Table B-2. Project History**

	Question	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX
<b>Lease Acquisition Costs</b>				
CBI? <input type="checkbox"/> Yes	B3-10. Original lease bid amount (or sum of lease bids, if multi-lease).	\$ _____ 000	\$ _____ 000	\$ _____ 000
CBI? <input type="checkbox"/> Yes	B3-11. Year(s) of lease(s) acquisition.			
CBI? <input type="checkbox"/> Yes	B3-12. Total lump sum payments to surface owner(s) (all leases).	\$ _____ 000	\$ _____ 000	\$ _____ 000
<b>Lease Development Costs</b>				
CBI? <input type="checkbox"/> Yes	B3-13. Total capital costs of project development, including planning, geological and geophysical costs, and all site development costs (roads, pads, etc.) but excluding major maintenance (e.g., workovers), well drilling costs through tophole equipment (e.g., Christmas tree), and water management systems after gas/water separation units (including piping); through year end 2007.	\$ _____ 000	\$ _____ 000	\$ _____ 000
CBI? <input type="checkbox"/> Yes	B3-14. Total capital costs of produced water management system (see definition): <input type="checkbox"/> Treatment <input type="checkbox"/> Reuse or disposal	\$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000
CBI? <input type="checkbox"/> Yes	B3-15. Total costs of well drilling to date through tophole equipment, (e.g., Christmas tree).	\$ _____ 000	\$ _____ 000	\$ _____ 000
<b>Project Development Schedule</b>				
CBI? <input type="checkbox"/> Yes	B3-16. Year project construction began.			

	Question	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX	Project Containing API or State ID Number XX-XXX-XXXXX
<b>CBI?</b> <input type="checkbox"/> Yes	B3-17. Number of year(s) between when project construction began and initial water production.			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-18. Number of year(s) between initial water production and initial gas production.			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-19. Year of peak gas production (NA if gas production has not yet peaked).			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-20. Gas produced in peak year (MMBtu) (NA if gas production has not yet peaked).			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-21. Year of peak water production (NA if water production has not yet peaked).			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-22. Water produced in peak year (bbls) (NA if water production has not yet peaked).			
<b>Other Major Expenditures Associated with Project</b>				
<b>CBI?</b> <input type="checkbox"/> Yes	B3-23. Total cost of workovers, stimulations, recompletions, and other major activities performed to date on this project?	\$ _____ 000	\$ _____ 000	\$ _____ 000
<b>CBI?</b> <input type="checkbox"/> Yes	B3-24. Are there any major intermittent outlays that have been undertaken on this project not included in capital costs? <input type="checkbox"/> No. Skip to Question B3-28. If so: What were they? If more space is needed, please use the comments page at the end of this section.	_____ _____ _____	_____ _____ _____	_____ _____ _____
<b>CBI?</b> <input type="checkbox"/> Yes	B3-25. When did they occur (Year, e.g., 2004)? If more space is needed, please use the comments page at the end of this section.	_____ _____ _____	_____ _____ _____	_____ _____ _____
<b>CBI?</b> <input type="checkbox"/> Yes	B3-26. How much did they cost? If more space is needed, please use the comments page at the end of this section.	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000

Table B-3 requests information about your project in 2007.

**Instructions:** Respond to Table B-3 questions for **all projects**, regardless of when the project began development or when you acquired the project. Report large dollar amounts in nearest thousands of dollars where indicated (i.e., if fixed operating costs were \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

**Table B-3. Current (2007) Operations at Your Projects**

	Question	Project Containing API Number xx-xxx-xxxxx	Project Containing API Number xx-xxx-xxxxx	Project Containing API Number xx-xxx-xxxxx
<b>General Information</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-27. If single lease project, type of lease (fee, federal, state, tribal, other).			
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-28. If this is a unit or multi-lease project, list the number of each type of lease.	_____ Fee _____ Federal _____ State _____ Tribal _____ Other	_____ Fee _____ Federal _____ State _____ Tribal _____ Other	_____ Fee _____ Federal _____ State _____ Tribal _____ Other
<b>2007 Operating and Maintenance Costs of Project (do not include extraordinary expenses such as major, intermittent maintenance)</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-29. 2007 total fixed operating cost of gas production (does not vary by production). Exclude all costs of water management after separation, but include any lease rental costs, annual payments to surface owners, or other such payments.	\$ _____ 000	\$ _____ 000	\$ _____ 000
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-30. 2007 average variable costs associated with gas production (\$./MMBtu). Exclude all costs of water management after separation.	\$ _____	\$ _____	\$ _____
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-31. 2007 total fixed operating costs of water management after separation.	\$ _____ 000	\$ _____ 000	\$ _____ 000
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-32. 2007 variable costs of water management after separation (\$./MMBtu).	\$ _____	\$ _____	\$ _____
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-33. Any other O&M costs associated with this project in 2007 (\$./MMBtu)? Please specify.	\$ _____	\$ _____	\$ _____
<b>2007 Extraordinary and Other Expenses (e.g., well drilling expenditures, workovers, recompletions, other unusual expenses)</b>				
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-34. What was the total cost of all well drilling on this project in 2007?	\$ _____ 000	\$ _____ 000	\$ _____ 000

	Question	Project Containing API Number XX-XXX-XXXXX	Project Containing API Number XX-XXX-XXXXX	Project Containing API Number XX-XXX-XXXXX
<input type="checkbox"/> CBI? Yes	B3-35. What was the cost of any infrastructure additions in 2007? Specify addition. _____ _____	\$ _____ 000	\$ _____ 000	\$ _____ 000
<input type="checkbox"/> CBI? Yes	B3-36. What was the total cost of any workovers, stimulations, recompletions or other major, intermittent maintenance activity on this project in 2007?	\$ _____ 000	\$ _____ 000	\$ _____ 000
<input type="checkbox"/> CBI? Yes	B3-37. Were any other major expenditures (including capital expenditures) incurred at this project in 2007? If so, what were they?	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000
<input type="checkbox"/> CBI? Yes	B3-38. What was the total cost of all other major expenditures reported in B3-37 for this project in 2007 (include any capital expenditures as well)?	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000	\$ _____ 000 \$ _____ 000 \$ _____ 000
<b>2007 Production, Royalties, and Taxes</b>				
<input type="checkbox"/> CBI? Yes	B3-39. What was the total gas production from this project in 2007? (MMBtu)			
<input type="checkbox"/> CBI? Yes	B3-40. What was the total gas sold from this project in 2007? (MMBtu)			
<input type="checkbox"/> CBI? Yes	B3-41. What was the total gas used by this project in 2007? (MMBtu)			
<input type="checkbox"/> CBI? Yes	B3-42. What was the minimum, average, and maximum wellhead price received for sold gas for this project in 2007? (\$. \$\$/MMBtu)	\$ _____ min \$ _____ average \$ _____ max	\$ _____ min \$ _____ average \$ _____ max	\$ _____ min \$ _____ average \$ _____ max
<input type="checkbox"/> CBI? Yes	B3-43. What was this project's water production in 2007? (bbbls)			

	Question	Project Containing API Number XX-XXX-XXXXX	Project Containing API Number XX-XXX-XXXXX	Project Containing API Number XX-XXX-XXXXX
<input type="checkbox"/> CBI? Yes	B3-44. What was your average working interest share for this project in 2007 (%)			
<input type="checkbox"/> CBI? Yes	B3-45. What was the average royalty rate for this project in 2007 (among all parties, including surface owner if relevant)? (%)			
<input type="checkbox"/> CBI? Yes	B3-46. What were the total severance taxes from this project in 2007? (% or \$)	_____ % \$ _____ 000	_____ % \$ _____ 000	_____ % \$ _____ 000
<input type="checkbox"/> CBI? Yes	B3-47. Are there any other taxes such as ad valorem or production shares associated with this project? Provide dollar amount and/or percent and describe: _____	_____ % \$ _____ 000	_____ % \$ _____ 000	_____ % \$ _____ 000
<b>Reserves Information</b>				
<input type="checkbox"/> CBI? Yes	B3-48. If available, what is the estimated remaining proved reserves associated with this project? (Prorate field estimates to project, where necessary, and specify units used (e.g., MMcf) and estimation method.)  Units: _____  Estimation Method:  <input type="checkbox"/> SEC Definition of Proved Reserves  <input type="checkbox"/> Other: _____			
<input type="checkbox"/> CBI? Yes	B3-49. What wellhead price was used for proved reserve estimate? (\$./MMBtu)			
<input type="checkbox"/> CBI? Yes	B3-50. What discount rate was used for proved reserve estimate? (%)			
<input type="checkbox"/> CBI? Yes	B3-51. If available, what is the estimated remaining technically recoverable reserves? (Prorate field estimates to project, where necessary, and specify units used, e.g., MMcf.)			

	<b>Question</b>	<b>Project Containing API Number xx-xxx-xxxxx</b>	<b>Project Containing API Number xx-xxx-xxxxx</b>	<b>Project Containing API Number xx-xxx-xxxxx</b>
<b>CBI?</b> <input type="checkbox"/> Yes	B3-52. If available, what is the projected remaining productive life of this project? (years)			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-53. What is the cumulative gas production at 2007 year end for this project? Specify units (e.g., MMBtu) _____			
<b>CBI?</b> <input type="checkbox"/> Yes	B3-54. What is the cumulative water production at 2007 year end for this project? Specify units (e.g., thousand bbls): _____			

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## Questions for Project Associated with API or State ID Number xx-xxx-XXXXX

[One copy will be provided for each well in Table A-1

### FUTURE COSTS AND REVENUES

**Instructions:** EPA will need to project costs and revenues of this project over the next 10 years. EPA acknowledges that projections beyond 5 years are very uncertain. You have two options for providing projection information. Please check which option you have chosen and follow the instructions associated with the options you have selected.

**CBI?**  
 Yes

B3-55. Please indicate how you would like to handle projections of project data requested in the remainder of this section of the questionnaire.

- We request EPA make these projections based on the information provided below in Questions B3-56 through B3-63. **Instructions:** Please complete Questions B3-56 through B3-63 for this project. You do not have to complete Table B-4 on Page B-19, which asks for 5 years of year-by-year projections.
- We will provide up to 5 years' year-by-year projection information. **Instructions:** Please complete Questions B3-56 through B3-63 for this project. Please fill out Table B-4 for as many years as you have in your planning horizon. EPA is requesting your best judgment on these projections; the Agency is aware that projections are not certain. If the number of years requested exceeds your planning horizon, please indicate with NA in any remaining years.

**Instructions:** EPA will assume further projections from 2007 or from beyond your planning horizon represented in your responses to Table B-4 based on your answers to the following questions, your reported 2007 data, and any information provided in Table B-4. Please provide information to the extent possible without considering the effects of inflation. If this is not possible, please note the inflation rate inherent in your answers in the comments section in Question B3-76. If you have provided some projections in Table B-4, EPA will assume further projections based on your answers to the following questions and/or either your last year's reported values in Table B-4 or the patterns seen in the projections provided (assuming at least 3 years' projections have been provided).

**CBI?**  
 Yes

B3-56. Drilling and other major expenses (e.g., workovers and recompletions) can be roughly projected further out to 2017 by assuming:

- A flat-line projection (assuming no inflation)
- A decline in these expenses of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in these expenses of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on patterns of expenditures or declines or increases in expenditures as shown in the years of projections provided
- Other approach (provide information in comments section)

**CBI?**  
 Yes

B3-57. Gas production can be roughly projected further out to 2017 by assuming:

- A flat line projection
- A decline in production of \_\_\_\_\_ % per year
- An increase in production of \_\_\_\_\_ % per year
- A further projection based on patterns of production or declines or increases in production as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76 or attach production curves)



Operator ID: \_\_\_\_\_

**CBI?**  
 Yes

B3-58. Water production can be roughly projected further out to 2017 by assuming:

- A flat line projection
- A decline in production of \_\_\_\_\_ % per year
- An increase in production of \_\_\_\_\_ % per year
- A further projection based on patterns of production or declines or increases in production as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76 or attach production curves)

**CBI?**  
 Yes

B3-59. Wellhead price of gas can be roughly projected further out to 2017 by assuming:

- A flat line projection (assuming no inflation)
- A decline in price of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in price of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on DOE projections in EIA's Annual Energy Outlook 2008
- Other approach (provide information in comments section in Question B3-76)

**CBI?**  
 Yes

B3-60. Fixed operating costs for gas production (excluding water management) can be roughly projected further out to 2017 by assuming:

- A flat line projection (assuming no inflation)
- A decline in fixed costs of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in fixed costs of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on patterns of expenditures or declines or increases in expenditures as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76)

**CBI?**  
 Yes

B3-61. Variable operating costs for gas production (excluding water management) can be roughly projected further out to 2017 by assuming:

- A flat line projection (assuming no inflation)
- A decline in variable operating costs of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in variable operating costs of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on patterns of expenditures or declines or increases in expenditures as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76)

**CBI?**  
 Yes

B3-62. Fixed operating costs for water management can be roughly projected further out to 2017 by assuming:

- A flat line projection (assuming no inflation)
- A decline in fixed costs of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in fixed costs of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on patterns of expenditures or declines or increases in expenditures as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76)

**CBI?**  
 Yes

B3-63. Variable operating costs for water management can be roughly projected further out to 2017 by assuming:

- A flat line projection (assuming no inflation)
- A decline in variable operating costs of \_\_\_\_\_ % per year (assuming no inflation)
- An increase in variable operating costs of \_\_\_\_\_ % per year (assuming no inflation)
- A further projection based on patterns of expenditures or declines or increases in expenditures as shown in the years of projections provided
- Other approach (provide information in comments section in Question B3-76)

If you will not be continuing with Table B-4, please proceed to Part C of this questionnaire.

Report large dollar amounts in nearest thousands of dollars where indicated (i.e., if additional capital expenditures are expected to be \$1,253,779, please report as \$1,254,000; zeroes have been provided already).

**Table B-4. Projections of Costs and Production over 10 Years**

	Question	2008	2009	2010	2011	2012
<b>Drilling and Major Expenditure Schedule</b>						
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-64. Estimated number of wells drilled annually					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-65. Estimated drilling costs incurred (see definition), by year (\$)					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-66. Estimated number of workovers, stimulations, and recompletions, or other major maintenance tasks performed each year					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-67. Estimated workover stimulation, and recompletion or other major maintenance tasks costs incurred, by year	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-68. Estimated additional capital expenditures incurred, by year	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000
<b>Production Schedule</b>						
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-69. What is your projection of gas production at this project?(MMBtu/yr)					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-70. What is your projection of water production at this project? (bbls/yr)					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-71. What do you expect the average wellhead price of gas to be for this project each year? (\$.\$/MMBtu)					
<input type="checkbox"/> CBI? <input type="checkbox"/> Yes	B3-72. What is your projection of severance and other production taxes?	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000	\$ , , .000

	Question	2008	2009	2010	2011	2012
CBI? <input type="checkbox"/> Yes	B3-73. What inflation rate are you using in these projections (including expenditure projections)? (%)					
<b>Operating Cost Schedule</b>						
CBI? <input type="checkbox"/> Yes	B3-74. Total fixed operating costs per year? a. Gas only (\$./MMBtu) b. Water (\$./bbl)					
CBI? <input type="checkbox"/> Yes	B3-75. Variable operating costs per year? a. Gas only (\$./MMBtu) b. Water (\$./bbl)					

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## PART C. PRODUCED WATER MANAGEMENT INFORMATION

### INSTRUCTIONS FOR PART C (Technical Portion of Questionnaire)

**Read all question-specific instructions and definitions of key terms (Part D).**

**Data may be submitted as clearly marked electronic attachments to this questionnaire.**

**Complete this part of the questionnaire for only the wells listed in Part A.** EPA is requesting information from a statistical sample of operators in each basin. Additional instructions will be provided throughout this part.

**You may need to make copies of some PAGES before responding.** Some pages in Part C of the questionnaire will need to be photocopied before you respond. Indicate how many copies of the PAGE you are submitting by completing the entry "Copy \_\_\_\_ of \_\_\_\_" in the top right corner.

**Not all questions will be applicable to every operator.** EPA prepared Part C of the questionnaire to be applicable to a variety of operators; therefore, not all of the questions will apply to every operator. Complete each relevant item in the questionnaire.

**Mark responses for each question.** Fill in the appropriate response(s) to each question. Please use **black ink** or **type** in the spaces provided. Answer the questions in sequence unless you are directed to SKIP. Do not leave any entry blank. If the answer is zero, write "0" or "zero". If a question is not applicable to your operations, write "NA." EPA intends that responses to all questions be based upon available data and information. Please provide best estimates when exact data are not available. If you provide an estimate, note the methods that were used to make the estimate, along with the section and question number that the estimate refers, on the Comments page at the end of Part C.

**You are not required to perform new or non-routine tests or measurements solely for the purpose of responding to this questionnaire.** EPA intends that responses to all questions be based upon available data and information. In the event that exact data are not available, please provide best engineering estimates and note the methods that were used to make the estimates on the Comments page located at the end of Part C.

**Include any clarifying attachments.** If additional attachments are required to clarify a response, please place the associated question number and your operator identification (ID) number in the top right corner of each page of the attachments. The following list contains examples of items that may be included as attachments to this questionnaire:

- Operations brochure, pamphlet, general description;
- Produced water treatment flow diagrams;
- Hard copy or electronic water quality data collected from water monitoring locations;
- Produced water treatment operation and maintenance logs; and
- Pollution prevention or management practices policies or data.

**Pay close attention to the measurement units requested (e.g., barrels per day, milligrams per liter).** Report answers in the units that are specified, unless the question requires you to specify the units.

**Indicate information that should be treated as confidential.** You may claim as confidential all information included in the response to a question by checking the Confidential Business Information (CBI) box next to the question number. Note that you may be required to justify any claim of confidentiality at a later time. See the CONFIDENTIAL BUSINESS INFORMATION section on page iii.

**Questions?** If you have any questions regarding the completion of this questionnaire, see the QUESTIONNAIRE ASSISTANCE section on page ii.

Operator ID: \_\_\_\_\_

**SECTION 1: GENERAL OPERATOR INFORMATION**

**GENERAL INSTRUCTIONS FOR SECTION 1**

This section of the questionnaire collects operator and company address and contact information.

Indicate information that should be treated as confidential by checking the Confidential Business Information (CBI) box next to each question number with responses containing CBI. Any response where "CBI" is not checked will be considered non-confidential. Refer to the instructions given in the CONFIDENTIAL BUSINESS INFORMATION section on page iii for additional information regarding EPA's confidentiality procedures set forth in 40 CFR Part 2, Subpart B.

**CBI?**  
 Yes

C1-1. Provide the name, title, telephone and facsimile numbers, and e-mail address of the primary contact at your operation for information supplied in Part C of this questionnaire.

_____	( ) _____
Primary Contact Name	Telephone Number
_____	( ) _____
Primary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	_____
City	State Zip Code

**CBI?**  
 Yes

C1-2. Provide the name, title, telephone and facsimile numbers, and e-mail address of the secondary contact at your operation for information supplied in Part C of this questionnaire.

_____	( ) _____
Secondary Contact Name	Telephone Number
_____	( ) _____
Secondary Contact Title	Facsimile Number
_____	Convenient time to call between:
E-mail Address	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm and
_____	_____ <input type="checkbox"/> am / <input type="checkbox"/> pm (Eastern Time)
Street Address	
_____	_____
City	State Zip Code

**SECTION 2: PRODUCED WATER MANAGEMENT SYSTEM GENERAL QUESTIONS**

**GENERAL INSTRUCTIONS FOR SECTION 2**

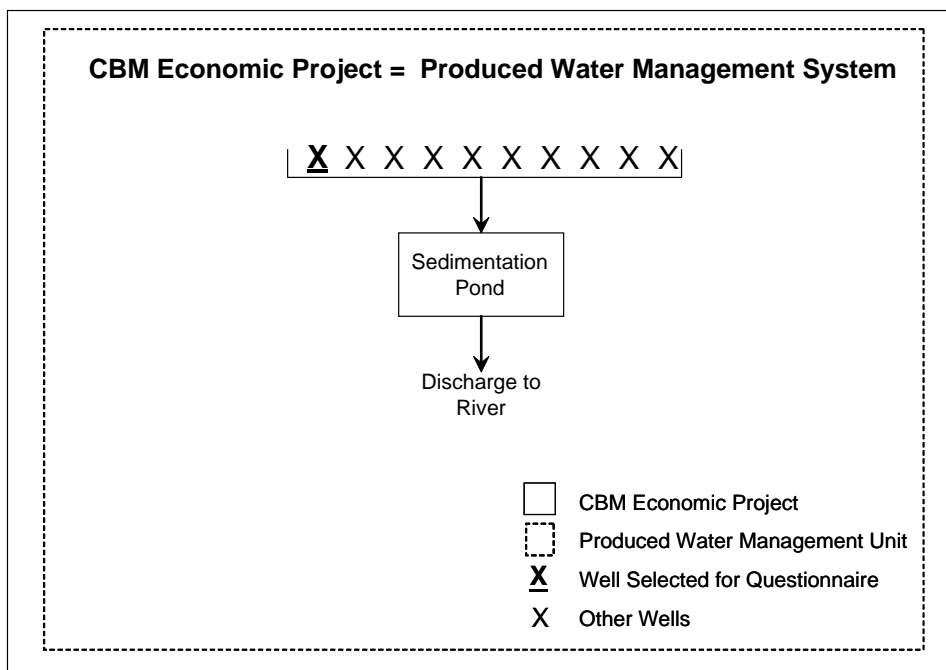
The following questions request general information on the components and costs of the Produced Water Management System used for the wells listed in Table A-1. These data will be used to evaluate the costs and benefits of various CBM water management arrangements. EPA is collecting information in this section of the questionnaire for each Produced Water Management System that you operated in conjunction with the wells listed in Part A and the CBM economic projects listed in Part B, Section 3.

**Produced Water Management System (PWMS)** - For the purposes of this questionnaire, Produced Water Management System is defined as the production area or grouping of wells that is managed by the operator as a single unit for produced water management. Produced water management may include treatment, transfer to disposal locations, and/or reuse. The Produced Water Management System may treat water from a lease, field, project, or plan of development (POD). Water discharge permits, land application permits, and applications for permits to drill (APD) typically use one of these terms to define the well grouping. Operators may also report production information to state agencies by lease, field, project, or POD. Note that the Produced Water Management System can have multiple disposal options but it is managed as a single unit. For example, an operator may use a combination of stock tanks, irrigation, and storage ponds on a single Produced Water Management System. Also note that the Produced Water Management System may serve the same or different wells from the CBM project defined in the economic portion of the questionnaire, Part B Section 3.

The following diagrams are designed to help you determine the Produced Water Management Systems that should be included in this section of the questionnaire.

In **Example 1**, the operator is using the same produced water management system for all wells in the CBM economic project (Part B of this questionnaire). Therefore, the CBM economic project and Produced Water Management System are the same. The operator should have completed Part B Section 3 of the questionnaire for the CBM economic project corresponding to the selected well(s). The operator should complete one copy of Part C, Sections 2 and 3, for the Produced Water Management System for the selected well(s).

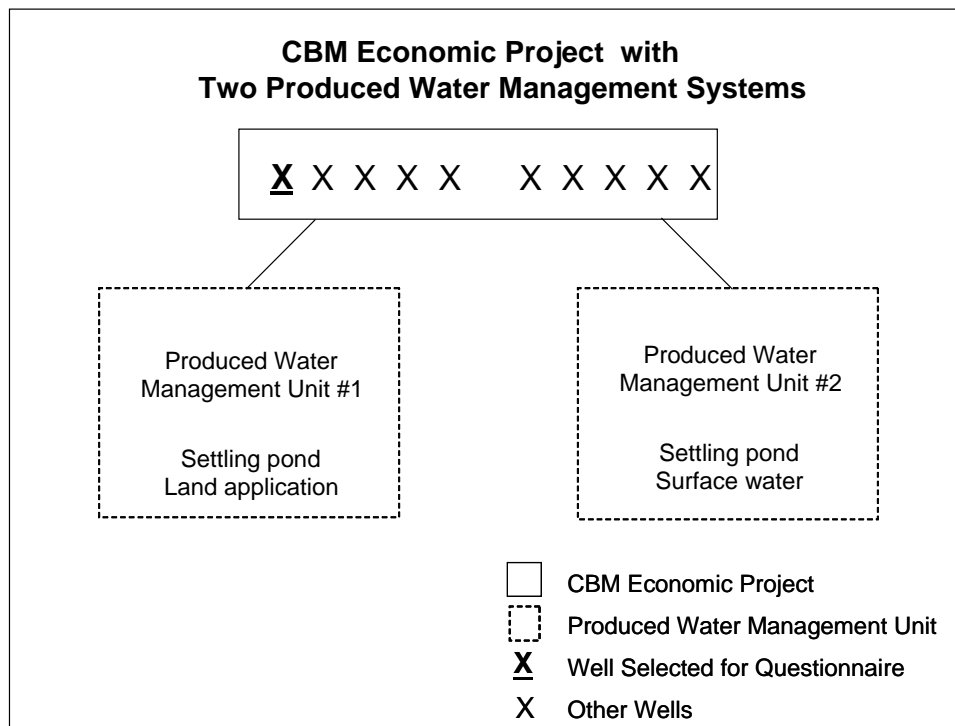
**Example 1.**



Operator ID: \_\_\_\_\_

In **Example 2**, the operator is using the two Produced Water Management Systems for the wells included in the CBM economic project from Part B. The operator should have completed Part B Section 3 of the questionnaire for the CBM economic project corresponding to the selected well(s). The operator should complete two copies of Part C Section 2 and Part C Section 3, one for each produced water management scenario used as part of this economic project.

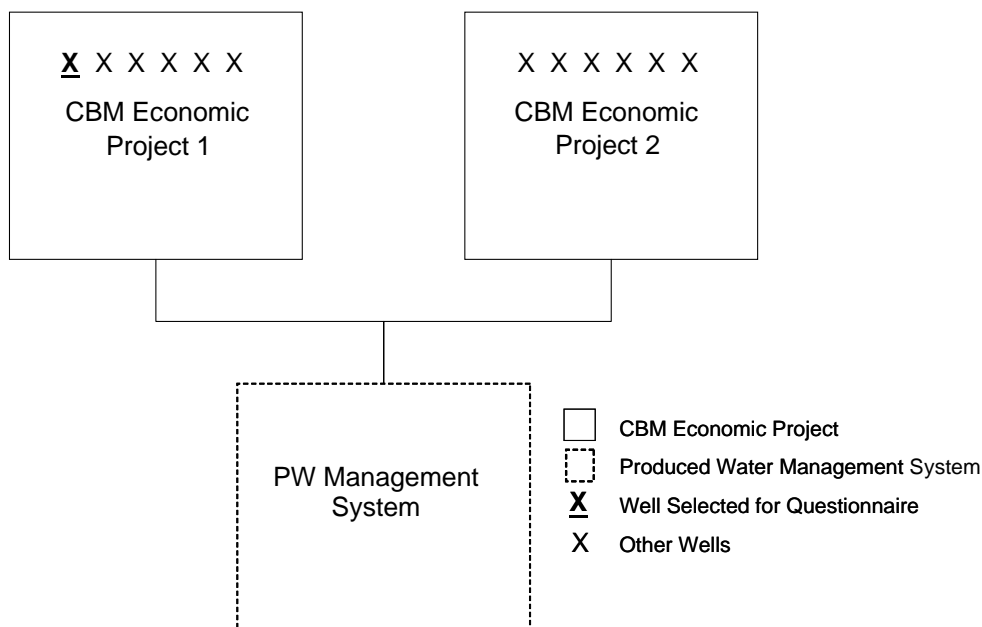
**Example 2.**



In **Example 3**, the operator has two economic projects that share the same produced water management system. One of the economic projects (CBM Economic Project 1) has a selected well(s). The operator should have completed Part B, Section 3 for Economic Project 1. The operator did not need to provide information for Economic Project 2 because it did not have any selected wells. The operator should complete one copy of Part C for the combined produced water management system. Note that the operator should include all wells and the total produced water volumes for the Produced Water Management System when answering the questions in Part C regardless of whether the economic information for those wells was included in Part B of the questionnaire.



**Example 3.**  
**Multiple CBM Economic Projects Sharing  
the Same Produced Water Management System**



For EACH Produced Water Management System you operated in 2007 to treat produced water from the wells listed in Section X, complete a copy of the entire Part C Section 2 and Section 3. You may need to make multiple copies of this section. Please enter a Produced Water Management System number and name. The number you choose could be one you use internally to refer to the project, but can be just a number such as 1, 2, 3, etc., if you use no formal identifier. This information will be used to check that the detailed information provided in this section is linked to the correct Produced Water Management System.

Question C2-1 requests a block flow diagram for each Produced Water Management System. EPA has provided examples to guide you in completing this question. This block flow diagram will be used to answer the remaining questions in this section.

Questions C2-2 through C2-9 request general information on the Produced Water Management System such as discharge location, transportation costs, and capital and operating costs.

Questions C3-1 through C3-9 request detailed design information for the individual components in the Produced Water Management System.

A comment page is included at the end of Part C to clarify responses.

If you are unsure of how to complete any parts of this section, please refer to the QUESTIONNAIRE ASSISTANCE information on page ii.

Operator ID: \_\_\_\_\_  
Produced Water Management System ID: \_\_\_\_\_  
Operator's Name for this Produced Water Management System: \_\_\_\_\_

**CBI?**  
 Yes

C2-1. For each Produced Water Management System, please provide a block diagram (as in the following examples) that shows how the produced water was managed in 2007. The block diagram should have a similar level of detail as EPA's examples. Refer to this diagram as you answer questions throughout this section. Hand drawings are sufficient for this question. Please provide a Produced Water Management System identification number and name for each diagram. This diagram will help EPA and the respondent determine which Part C questions should be answered and will allow EPA to track the path of produced water.

Attached.

The following items should be included on your diagram for each Produced Water Management System:

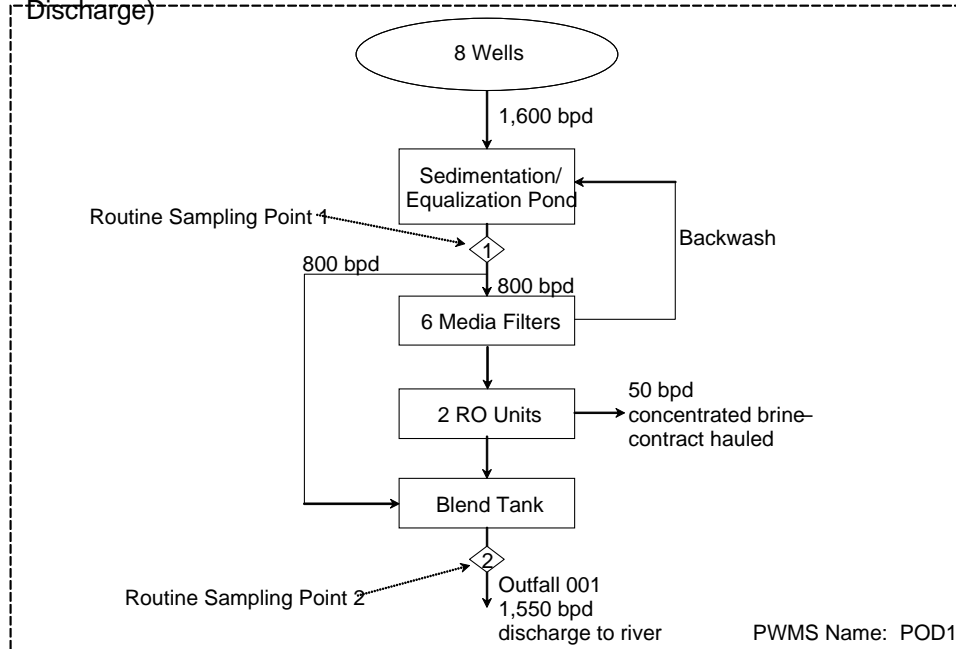
- The total number of wells contributing to each water management practice. (Note that individual wells do not need to be shown on the diagram.)
- Discharge, disposal, and reuse practices for this Produced Water Management System, including the final destination of the produced water.
- Individual treatment units prior to discharge, disposal, or reuse. Please show each individual unit on the diagram. For example, if you have two sedimentation ponds, please show each one on the diagram.
- Points of chemical addition, along with the chemical name.
- Average flow rates (for calendar year 2007) for each segment of the Produced Water Management System.
- Descriptions and flow rates for any waste streams resulting from CBM produced water treatment (e.g., concentrated brine, ion exchange regeneration wastewater, settled solids).
- Destinations for all produced water. Please remember to include any evaporation or infiltration estimates on the diagram.
- The locations where routine water quality data are collected (you will be asked to provide some of this data in Part C Section 4).
- Please note on the diagram whether any produced water from conventional oil and gas extraction is commingled with produced water from this CBM project. Please indicate on the diagram the volumes or flow rates of the conventional oil and gas extraction produced water as well as the point at which these waters are commingled.
- Please note on the diagram whether any produced water from another CBM project (either yours or another operators) is commingled with produced water from this CBM project. Please indicate on the diagram the volumes or flow rates of the CBM produced waters not from this CBM project as well as the point at which these waters are commingled.

Example 4 and Example 5 illustrate a Produced Water Management System with only one management practice. Average flowrates to and from each segment are shown on the diagram and the labeled data points indicate locations where water quality is routinely monitored. In both examples, you would complete one copy of this section for this Produced Water Management System.

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_

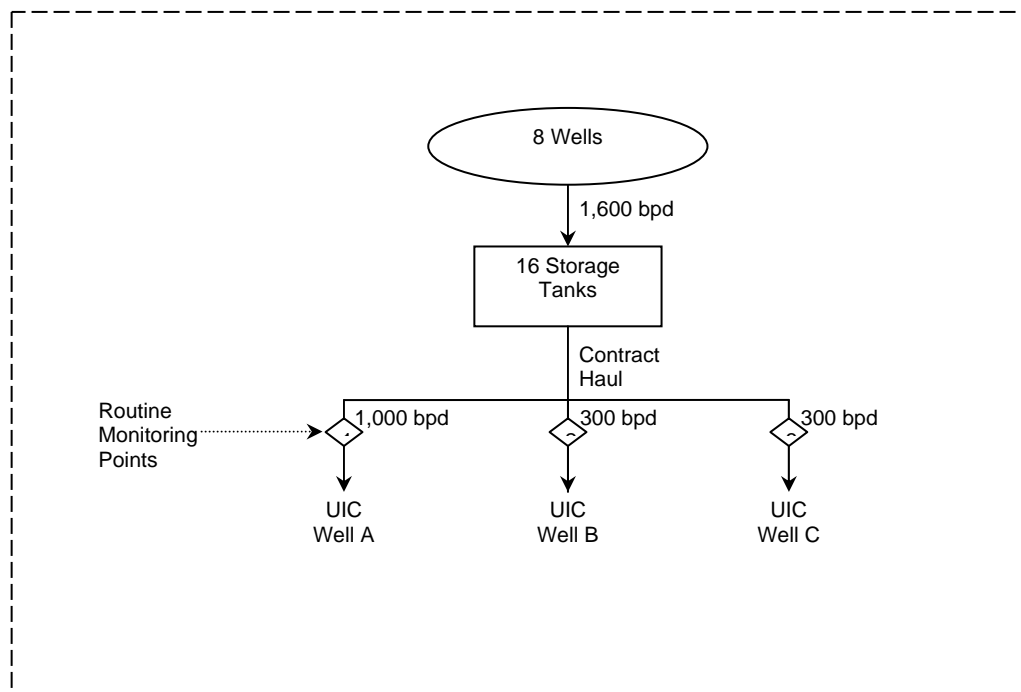
**Example 4.**

One Produced Water Management System for the CBM Project (Treatment and Discharge)



**Example 5.**

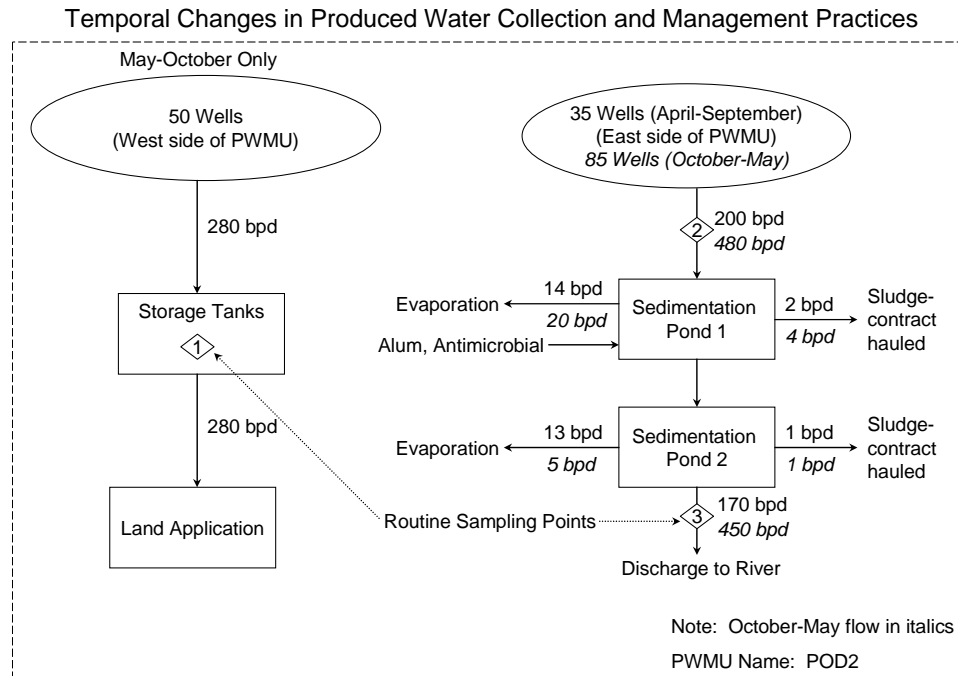
One Produced Water Management System for the CBM Project (Underground Injection)



Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_

Example 6 illustrates a Produced Water Management System with multiple produced water management practices that vary throughout the year. The dates during which each water management practice is in use are shown above that branch of the flow diagram. For this example two copies of Part C, Sections 2 and 3, would be completed for this scenario, one for the west side and one for the east side.

**Example 6.**



Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_

**CBI?**  
 Yes

C2-2. In what year did this Produced Water Management System begin operating? \_\_\_\_\_

Number of days in operation in 2007:

365 days; or  
 \_\_\_\_\_ days

**CBI?**  
 Yes

C2-3. **List of Wells in this Produced Water Management System** - Complete the following table for each well in this Produced Water Management System. Note that if water is not metered at the wellhead, you may provide the total water produced by this Produced Water Management System at the bottom of this table rather than individual well flows. However, you should complete well latitude and longitude and production date for each well. The number of wells in the table should match the total number of wells shown on the diagram you provided in response to Question C2-1. Also, the flow rates should match the flow rates in the diagram. You may need to make additional copies of this table to include all of the wells. You may submit these data electronically as an attachment to this completed questionnaire.

API or State ID Number	Well Latitude and Longitude <sup>a</sup>	Date Well Began Water Production	Volume of Water Produced in 2007 (barrels)
Total	NA	NA	

<sup>a</sup>Latitude and Longitude - Provide coordinates for each outfall in decimal form with 4 to 6 significant digits after the decimal place, if possible (e.g., 37.783056°N, 81.5075°W).

Please specify the datum associated with these coordinates:

- North American Datum of 1927
- North American Datum of 1983
- Not Known

Operator ID: \_\_\_\_\_  
Produced Water Management System ID: \_\_\_\_\_  
Operator's Name for this Produced Water Management System: \_\_\_\_\_

**CBI?**  
 Yes

**C2-4. Selection of Management Option**

a. How was the Produced Water Management System designed? (Check all that apply)

- Input from the surface owner during development of the surface use plan
- Work with outside contractor
- Other: Please describe \_\_\_\_\_

b. Who manages the day-to-day operations for the produced water management?

- Operator (Skip to Question C2-5)
- Landowner (Skip to Question C2-5)
- Contractor/third party; please provide company name \_\_\_\_\_

c. Cost of hiring the contractor/third party for produced water management in 2007

Capital cost and year incurred \$ \_\_\_\_\_ Year: \_\_\_\_\_

2007 annual operating and maintenance cost \$ \_\_\_\_\_

Minimum quantity of CBM produced water required for contract: \_\_\_\_\_ bbl

**CBI?**  
 Yes

**C2-5. Produced Water Transportation Questions** - Please provide cost and design information for transporting the produced water from the well head to the final produced water destination (e.g., discharge to river, underground disposal well). Note the name of the starting location and final location which should be shown on the diagram required in Question C2-1. Please note that this question does not refer to the disposal of any brine, solids, or any other residuals resulting from produced water treatment.

a. What is the approximate percentage of this project (as measured by the volume of produced water transported) that uses piping to transport produced water from the wellhead to a centralized location for storage, treatment, or disposal?

\_\_\_\_\_ %

Estimated pump and pipe replacement and repair costs in 2007: \$ \_\_\_\_\_

b. Please answer the following questions if you transport produced water via trucking. Otherwise, skip to Question C2-6.

i. Volume of water requiring trucking/hauling in 2007: \_\_\_\_\_

ii. Average trucking/hauling distance in 2007: \_\_\_\_\_

iii. Number of days trucking/hauling required in 2007: \_\_\_\_\_

iv. Trucking Costs in 2007 (including tipping fees, etc.): \$ \_\_\_\_\_

Operator ID: \_\_\_\_\_  
Produced Water Management System ID: \_\_\_\_\_  
Operator's Name for this Produced Water Management System: \_\_\_\_\_

CBI?  
 Yes

C2-6. **Produced Water Management System Capital Costs** – Please provide the following capital cost information for this Produced Water Management System. Do not include transportation costs of produced water since these should have been reported in Question C2-5.

a. Capital cost in dollars: \$ \_\_\_\_\_

Check this box if your company purchased an existing treatment system from another company and does not have capital cost information.

b. Year cost incurred: \_\_\_\_\_

c. Please check () the components from the list below that are included in the capital cost you reported in (a).

- |   |   |
|---|---|
| <input type="checkbox"/> Storage tanks                          | <input type="checkbox"/> Ion exchange unit        |
| <input type="checkbox"/> Pumps                                  | <input type="checkbox"/> Membrane filtration unit |
| <input type="checkbox"/> Piping/hoses                           | <input type="checkbox"/> Liner                    |
| <input type="checkbox"/> Outfall structure                      | <input type="checkbox"/> Stock tanks              |
| <input type="checkbox"/> Land application equipment             | <input type="checkbox"/> Land acquisition         |
| <input type="checkbox"/> Underground injection well             | <input type="checkbox"/> Monitoring equipment     |
| <input type="checkbox"/> Surface impoundment/sedimentation pond | <input type="checkbox"/> Other: _____             |

CBI?  
 Yes

C2-7. **Produced Water Management System Operating and Maintenance Costs** – Please provide the operating and maintenance costs for this Produced Water Management System for 2007 and check the components included in this cost. Do not include transportation costs of produced water since these should have been reported in Question C2-5.

a. \$

b. Please check () the components from the list below that are included in the operating and maintenance cost you reported in (a).

- |   |  |
|---|--|
| <input type="checkbox"/> Chemicals        | <input type="checkbox"/> Maintenance materials   |
| <input type="checkbox"/> Energy: electric | <input type="checkbox"/> Maintenance labor   |
| <input type="checkbox"/> Energy: gas      | <input type="checkbox"/> Operating labor   |
| <input type="checkbox"/> Energy: oil      | <input type="checkbox"/> Disposal costs of any brine, solids, or any other residuals resulting from produced water treatment |
| <input type="checkbox"/> Other: _____     | <input type="checkbox"/> Other: _____  |

Operator ID: \_\_\_\_\_  
Produced Water Management System ID: \_\_\_\_\_  
Operator's Name for this Produced Water Management System: \_\_\_\_\_

**CBI?**  
 Yes

C2-8. Have any monitoring or other studies been conducted to assess the potential impacts of produced water for this Produced Water Management System, such as impacts related to irrigation, impoundment, or surface water discharges? Produced water related impacts may include but are not limited to: changes in soil characteristics, changes in stream flows, changes in aquatic toxicity, and changes in aquatic and riparian species composition.

- Yes  
 No (Skip to Question Part C Section 3)

**CBI?**  
 Yes

C2-9. Indicate the following information about the studies, if known. If there are additional studies, please provide the information in the comments section at the end of Part C.

Title: \_\_\_\_\_

Publication Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_



Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_

**SECTION 3: DETAILED PRODUCED WATER MANAGEMENT AND TREATMENT QUESTIONS**

**GENERAL INSTRUCTIONS FOR SECTION 3**

Questions C3-1 through C3-9 request more detailed information and design parameters for each component of the Produced Water Management System shown on the diagram(s) you provided in response to Question C2-1. Please see the following tables to identify the questions you should complete.

**Table C3-1: Final Destination of CBM Produced Water**

Once complete, this table directs you to the questions in this section that must be answered related to the final destination of the produced water for this Produced Water Management System. Check (☒) all that apply. Note any final destination options that you check on this table should be displayed on the block flow diagram provided in response to Question C2-1, even if they are only used during part of the year.

	Check (☒) all that apply	Destination	Do you have water quality data for the produced water entering and/or leaving this treatment unit? If so, please provide in Section 4 (water quality section). <sup>a</sup>	Additional Information
a.	<input type="checkbox"/>	Discharge to Surface Water (requiring NPDES permit)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-1 for each NPDES permit.
b.	<input type="checkbox"/>	Land Application (no crop production)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-2 for each land application system.
c.	<input type="checkbox"/>	Irrigation (for crop production)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-2 for each irrigation system.
d.	<input type="checkbox"/>	Underground Injection	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-3 for each UIC well.
e.	<input type="checkbox"/>	Evaporation or Infiltration Pond (with no intended discharge to surface water)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-4 for each pond.
f.	<input type="checkbox"/>	Livestock or Wildlife Watering	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-5
g.	<input type="checkbox"/>	Hauled Off Site	<input type="checkbox"/> Yes <input type="checkbox"/> No	

<sup>a</sup>Note that locations for routine monitoring should be noted on the diagrams required in Question C2-1.

Copy pages as needed to include information on all destinations checked (☒) in the table above. For example, if the produced water for this management system is directly discharged to surface water during one part of the year and used in irrigation for crop production during the other part of the year, you should complete Questions C3-1 and C3-2. Please be sure to enter the Produced Water Management System number identification number and name so that EPA can link the information in this section to the correct Produced Water Management System.

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_

**Table C3-2. Final Destination of CBM Produced Water**

Once complete, this directs you to the questions that must be answered related to the treatment of the produced water for this Produced Water Management System. Check (☒) all that apply. Note any treatment units that you check on this table should be displayed on the block flow diagram requested in Question C2-1, even if treatment is performed during only part of the year or a unit only treats a portion of the produced water. EPA will request more detailed information about treatment of the produced water in later questions.

	Check (☒) all that apply	Type of Treatment Unit	Do you have water quality data for the produced water entering and/or leaving this treatment unit? If so, please provide in Section 4 (water quality section). <sup>a</sup>	Additional Information
a.	<input type="checkbox"/>	Surface Impoundment/Sedimentation Pond (for equalization or suspended solids removal)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-4 for each pond.
b.	<input type="checkbox"/>	Ion Exchange	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-6 for each ion exchange unit.
c.	<input type="checkbox"/>	Low-Pressure Filtration (e.g., hydro-cyclone, multi-media filtration)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-7 for each low-pressure filtration unit.
d.	<input type="checkbox"/>	High-Pressure Filtration (e.g., reverse osmosis, nanofiltration)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-8 for each high-pressure filtration unit.
e.	<input type="checkbox"/>	Other: please specify:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Complete Question C3-9 for any additional treatment units not listed elsewhere.

<sup>a</sup>Note that locations for routine monitoring should be noted on the diagrams required in Question C2-1.

Copy pages as needed to include information on all treatment units checked (☒) in the table above. For example, if the produced water for this management system is treated via a low-pressure filtration unit (as a pretreatment unit) prior to high-pressure filtration (e.g., reverse osmosis), you should complete both Questions C3-7 and C3-8. Likewise, if you have one or more surface impoundments in your Produced Water Management System, please complete Question C3-4 for each surface impoundment. Please be sure to enter the Produced Water Management System number identification number and name so that EPA can link the information in this section to the correct Produced Water Management System.

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Surface Water Discharge** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-1. Surface Water Discharge.** Complete Question C3-1 if you checked that this Produced Water Management System discharges to surface water in Table C3-1. If this Produced Water Management System does not discharge to surface water, skip to Question C3-2. Remember to complete one copy of this question for each permitted surface water discharge associated with this Produced Water Management System.

a. **General Information on Surface Water Discharge Permit** – Please complete the following table of general information about the surface water discharge permit.

NPDES Permit Number	
Permit Type	<input type="checkbox"/> General <input type="checkbox"/> Individual
Expiration Date (MM-DD-YYYY)	
Receiving Water Monitoring Required?	<input type="checkbox"/> Yes (specify frequency: _____) (specify location: _____) <input type="checkbox"/> No
Effluent Monitoring Required?	<input type="checkbox"/> Yes (specify frequency: _____) <input type="checkbox"/> No
Permit Currently Being Reviewed or Modified?	<input type="checkbox"/> Yes <input type="checkbox"/> No

b. **General Information on Outfalls Included in Permit** – Please complete the following table of general information about the outfalls included in the permit listed in part (a) of this question.

- **Outfall Number** – Provide the numerical designation for each outfall included in the NPDES permit.
- **Latitude and Longitude** - Provide coordinates for each outfall in decimal form with four to six significant digits after the decimal place, if possible (e.g., 37.783056°N, 81.5075°W).
- **Receiving Water Name** – Provide the name of the receiving water (e.g., Black Warrior River).
- **Receiving Water Type** – Provide the type of receiving water (e.g., lake, pond, ephemeral stream, river).
- **Treatment at Outfall**– Check (☒) any aeration equipment or other treatment equipment used at the outfall.
- **Total Volume Discharged Through Outfall** – Please provide the total volume discharged through each outfall in 2007. Note that this volume should match the volume provided on your Produced Water Management System diagrams. Alternatively, you can specify the average flowrate (e.g., average daily flow for 2007).
- **Frequency of Discharge** – Indicate the frequency of discharge including number of days discharged in 2007.

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Surface Water Discharge** Question Copy \_\_\_\_\_ of \_\_\_\_\_

Outfall Number	Latitude	Longitude	Receiving Water Name	Receiving Water Type	Treatment at Outfall(s)	Total Volume Discharged Through Outfall (specify units)	Frequency of Discharge
					<input type="checkbox"/> None <input type="checkbox"/> Rip Rap <input type="checkbox"/> Atomizer <input type="checkbox"/> Sprinkler head <input type="checkbox"/> Diffuser <input type="checkbox"/> Other Please specify: _____ _____	_____ Units: _____	<input type="checkbox"/> Continuous  <input type="checkbox"/> Intermittent: Number of days of intermittent discharge in 2007 ____  <input type="checkbox"/> Emergency discharge only : Number of days of emergency discharge in 2007 _____
					<input type="checkbox"/> None <input type="checkbox"/> Rip Rap <input type="checkbox"/> Atomizer <input type="checkbox"/> Sprinkler head <input type="checkbox"/> Diffuser <input type="checkbox"/> Other Please specify: _____ _____	_____ Units: _____	<input type="checkbox"/> Continuous  <input type="checkbox"/> Intermittent: Number of days of intermittent discharge in 2007 ____  <input type="checkbox"/> Emergency discharge only: Number of days of emergency discharge in 2007 _____
					<input type="checkbox"/> None <input type="checkbox"/> Rip Rap <input type="checkbox"/> Atomizer <input type="checkbox"/> Sprinkler head <input type="checkbox"/> Diffuser <input type="checkbox"/> Other Please specify: _____ _____	_____ Units: _____	<input type="checkbox"/> Continuous  <input type="checkbox"/> Intermittent: Number of days of intermittent discharge in 2007 ____  <input type="checkbox"/> Emergency discharge only: Number of days of emergency discharge in 2007 _____

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Surface Water Discharge** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- c. **Surface Water Discharge Design Components** – Please complete the table below with details about each component of the surface water discharge system. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Specification or Type
Outfall Structure (e.g., bed of rip rap for aeration, discharge pipe, diffuser)		
Pumps Required for Direct Discharge		Total HP=
Land (acres) (only for land required to operate the surface discharge system)		
Monitoring Equipment (e.g., river monitors, telemetry station, groundwater monitoring)		
Other (please specify): _____		
Other (please specify): _____		

- d. **Discharge Permit and Discharge Monitoring Reports** – Please attach a copy of the current surface water discharge NPDES permit. Please report any discharge monitoring reports (DMR) for 2005 through 2007 in Table C4-1. If available, EPA prefers this DMR data be submitted in an electronic format. Note also that effluent data are not eligible for confidential treatment, pursuant to Section 308(b) of the Clean Water Act,

Attached.

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Land Application/Irrigation** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-2. Land Application/Irrigation** - Complete Question C3-2 if you checked that this Produced Water Management System uses land application or irrigation in Table C3-1. If this Produced Water Management System does not use land application or irrigation, skip to Question C3-3. Remember to complete one copy of this question for each land application/irrigation system used in this Produced Water Management System.

a. **General Information on Land Application/Irrigation** – Please complete the following table of general information about the land application/irrigation system.

Permit Number (if applicable)	
Issuing Agency (if applicable)	
Permit Type (if applicable)	<input type="checkbox"/> General <input type="checkbox"/> Individual
Permit Expiration Date (if applicable)	
Currently Reviewing/Modifying Permit? (if applicable)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Crops Grown on Irrigated Area (list all)	
Area of Land Used for Land Application/Irrigation (acres)	
Type of Land Application/Irrigation	<input type="checkbox"/> Center-pivot irrigation <input type="checkbox"/> Sub-surface drip irrigation (SDI) <input type="checkbox"/> Distributed, above-ground pipe network <input type="checkbox"/> Single point distribution <input type="checkbox"/> Other (please specify): _____
Routine Monitoring of the Land Application Area (check all that apply)	<input type="checkbox"/> Soil <input type="checkbox"/> Water quality <input type="checkbox"/> Vegetation
Party Responsible for Management of Land Application	<input type="checkbox"/> Operator <input type="checkbox"/> Landowner <input type="checkbox"/> Third-party company. Provide name: _____ _____
Total Volume of Water Land Applied or Used for Irrigation in 2007(bbls)	
Frequency of Application	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent: Number of days applied in 2007 _____ Months applied in 2007 _____
Soil Amendments (include material and quantity applied in 2007)	

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Land Application/Irrigation** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **Land Application/Irrigation Design Components** – Please complete the table below with details about each component in the land application/irrigation system. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Specification or Type
Storage Tank(s)		Size (specify units): _____
Hose(s)	Length=	Type
		Diameter=
Pump(s)		Total HP=
Chemicals (e.g., biocides, soil amendments)		
Land (acres) (only for land required to operate the land application system)		
Land Application Equipment (e.g., center pivot system)		
Monitoring Equipment (e.g., river monitors, telemetry station, groundwater monitoring)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Underground Injection** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-3. Underground Injection** – Complete Question C3-3 if you checked that this Produced Water Management System uses underground injection in Table C3-1. If this Produced Water Management System does not use underground injection, skip to Question C3-4. Remember to complete one copy of this question for each underground injection permit associated with this Produced Water Management System.

a. **General Information on Underground Injection** – Please complete the following table of general information about the re-injection facility.

Underground Injection Control (UIC) Permit Number	
Expiration Date	
UIC Well Class	<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> V
Currently Reviewing/Modifying Permit?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Injection Formation	
Volume of Produced Water Injected in 2007	_____ bbl
Depth of Well	_____ ft
Injection Pressure	_____ psi  <input type="checkbox"/> Well not operating under pressure
Estimated Operating Life / Cumulative Injection Capacity of Well	<input type="checkbox"/> bbl _____ OR <input type="checkbox"/> years _____
Party Responsible for Injection of Produced Water	<input type="checkbox"/> Operator <input type="checkbox"/> Other (please specify): _____



Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Underground Injection** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **Underground Injection Design Components** – Please complete the table below with details about each component of the re-injection facility. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number of Amount	Type or Specification
Injection Well		
Injection Pump		Total HP=
Storage Tank(s)		bbl
Chemicals		
Land (acres) (only for land required to operate the underground injection system)		
Monitoring Equipment (e.g., river monitors, telemetry station, groundwater monitoring)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Surface Impoundments/Sedimentation Ponds** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-4. Surface Impoundments/Sedimentation Ponds** – Complete Question C3-4 if you checked that this Produced Water Management System uses surface impoundments or sedimentation ponds in Table C3-1 or Table C3-2. If this Produced Water Management System does not use surface impoundments or sedimentation ponds, skip to Question C3-5. Remember to complete one copy of this question for each surface impoundment or sedimentation pond used in this Produced Water Management System.

a. **General Information on Surface Impoundments/Sedimentation Ponds** – Please complete the following table of general information about the surface impoundment or sedimentation pond. If this pond is intended to treat produced water, please indicate the water quality parameters that are removed by this treatment unit and the estimated removal efficiency.

Intended Use (check all that apply)	<input type="checkbox"/> Infiltration as disposal (specify type) <input type="checkbox"/> On-Channel <input type="checkbox"/> Off-Channel  <input type="checkbox"/> Evaporation as disposal  <input type="checkbox"/> Surface Impoundment (specify type) <input type="checkbox"/> Equalization prior to treatment or disposal <input type="checkbox"/> Treatment (removal of suspended solids)
Design Capacity (acre-feet)	_____ acre-feet
Volume of Produced Water into Surface Impoundment/Sedimentation Basin in 2007	_____ bbl
Average Frequency of Sludge Removal	_____ Years  <input type="checkbox"/> No sludge removal to date
Amount of Sludge Removed in 2007	_____ Tons  _____ Percent Solids (% wt./wt.)
Destination of Removed Sludge	<input type="checkbox"/> Landfill <input type="checkbox"/> On-site land application <input type="checkbox"/> Other

Targeted Water Quality Parameters – Answer This Section if you Checked (☒) Surface Impoundments/Treatment as Intended Use Above		
Parameter Name	Estimated Design Influent and Effluent Concentrations & Parameter Removal Efficiency	Basis/Comments

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Surface Impoundments/Sedimentation Ponds** Question Copy \_\_\_\_\_ of \_\_\_\_\_

<b>Water Management for Disposal Units – Answer this Section if you Checked (☒)                      Infiltration as Disposal or Evaporation as Disposal as Intended Use Above</b>	
Approximate Volume of Total Emergency Discharges in 2007	_____ bbl
Approximate Volume of Water Leaving this Impoundment by Evaporation/Infiltration in 2007	_____ bbl
Approximate Volume of Water Leaving this Impoundment by Evaporation in 2007	_____ bbl

b. **Surface Impoundment/Sedimentation Pond Design Components** – Please complete the table below with detailed information for each component group of the surface impoundment/sedimentation pond. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Type or Specification
Surface Impoundment(s) / Sedimentation Pond(s)		Barrels=
Type of Liner and Thickness (if applicable) <input type="checkbox"/> High Density Polyethylene Resins (HPDE) <input type="checkbox"/> Other: _____		Thickness= (mil)
Aerator(s)		
Pump(s)		Total HP =
Chemicals (e.g., coagulants, biocides)		
Initial Bonding Costs		
Land (acres) (only for land required to operate the surface discharge system)		
Monitoring Equipment (e.g., river monitors, telemetry station, groundwater monitoring)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Livestock or Wildlife Watering** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-5. Livestock or Wildlife Watering** – Complete Question C3-5 if you checked that this Produced Water Management System uses livestock or wildlife watering in Table C3-1. If this Produced Water Management System does not use livestock or wildlife watering, skip to Question C3-6. Remember to complete one copy of this question for each livestock or wildlife watering operation used in this Produced Water Management System.

a. **General Information on Livestock/Wildlife Watering** - Please complete the following table of general information.

Volume of produced water used for livestock or wildlife water in 2007	_____ bbl
Maximum disposal/reuse capacity of this destination	_____ bbl/d
Primary livestock/wildlife	

b. **Livestock/Wildlife Watering Design Components** – Please complete the table below with detailed information for each component of your livestock/wildlife watering operation. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number of Amount	Type or Specification
Stock Tanks		Size= (bbl)
Monitoring Equipment (e.g., level monitors)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Ion Exchange** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-6. Ion Exchange** - Complete Question C3-6 if you checked that this Produced Water Management System uses ion exchange in Table C3-2. If this Produced Water Management System does not use ion exchange, skip to Question C3-7. Remember to complete one copy of this question for each ion exchange unit used in this Produced Water Management System.

a. **General Information on Ion Exchange** - Please complete the following table of general information. Also, please indicate the water quality parameters that are removed by this treatment unit and the estimated removal efficiency.

Design Capacity of Ion Exchange System (bbl/d)		
Vendor/Unit Name		
Resin Name/Type		
Average Regeneration Frequency (specify units)		
Average Resin Life (years)		
Approximate Volume of Rinse/Regeneration Waste Generated in 2007	_____ bbl/day	
Destination of Rinse/Regeneration Waste Stream (check all that apply)	<input type="checkbox"/> Injection <input type="checkbox"/> Use as Drilling Fluid <input type="checkbox"/> Direct Discharge <input type="checkbox"/> POTW <input type="checkbox"/> Sale	
Pilot Project	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Targeted Water Quality Parameters		
Parameter Name	Estimated Design Influent and Effluent Concentrations & Parameter Removal Efficiency	Basis/Comments

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Ion Exchange** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **Ion Exchange Design Components** – Please complete the table below with details for each component in the ion exchange system. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Type or Specification
Storage Tanks		Size= (bbl)
Pump(s)		Total HP=
Ion Exchange Unit(s)		Size= (bbl)
Chemicals		
Monitoring Equipment (e.g., discharge monitors)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Low-Pressure Filtration** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-7. Low-Pressure Filtration** – Complete Question C3-7 if you checked that this Produced Water Management System uses low-pressure filtration in Table C3-2. If this Produced Water Management System does not use low-pressure filtration, skip to Question C3-8. Remember to complete one copy of this question for each low-pressure filtration unit used in this Produced Water Management System.

a. **General Information on Low-Pressure Filtration** - Please complete the following table of general information. Also, please indicate the water quality parameters that are removed by this treatment unit and the estimated removal efficiency.

Volume of Produced Water Entering Low-Pressure Filtration Unit in 2007	_____ bbl
Type	<input type="checkbox"/> Multimedia <input type="checkbox"/> Sand <input type="checkbox"/> Microfiltration <input type="checkbox"/> Ultrafiltration <input type="checkbox"/> Other: _____
Vendor/Unit Name	_____
Maximum Capacity of Filtration System	_____ bbl/d
Approximate Volume of Waste Stream Generated in 2007	_____ bbl
Destination of Waste Stream (check all that apply)	<input type="checkbox"/> Injection <input type="checkbox"/> Direct Discharge <input type="checkbox"/> Use as Drilling Fluid <input type="checkbox"/> POTW <input type="checkbox"/> Sale
Average Cleaning Frequency (specify units)	_____
Pilot Project	<input type="checkbox"/> Yes <input type="checkbox"/> No

Targeted Water Quality Parameters		
Parameter Name	Estimated Design Influent and Effluent Concentrations & Parameter Removal Efficiency	Basis/Comments

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Low-Pressure Filtration** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **Low-Pressure Filtration Design Components** – Please complete the table below with details for each component of the filtration facility. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Type or Specification
Storage Tanks		Size= (bbl)
Storage Pond(s)		Size= (bbl)
Pump(s)		HP=
Filtration Unit(s)		Total Area= (ft <sup>2</sup> )
Chemicals		
Monitoring Equipment (e.g., discharge monitors)		
Other (please specify): _____		
Other (please specify): _____		



Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**High-Pressure Filtration** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-8. High-Pressure Filtration** – Complete Question C3-8 if you checked that this Produced Water Management System uses high-pressure filtration in Table C3-2. If this Produced Water Management System does not use high-pressure filtration, skip to Question C3-9. Remember to complete one copy of this question for each high-pressure filtration unit used in this Produced Water Management System.

a. **General Information on High-Pressure Filtration** - Please complete the following table of general information. Also, please indicate the water quality parameters that are removed by this treatment unit and the estimated removal efficiency.

Volume of Produced Water Entering Low-Pressure Filtration Unit in 2007 (bbl)	_____ bbl
Type	<input type="checkbox"/> Reverse Osmosis <input type="checkbox"/> Nanofiltration <input type="checkbox"/> Other (specify type): _____
Vendor/Unit Name	_____
Maximum Capacity of Filtration System	_____ bbl/d
Approximate Volume of Waste Stream Generated in 2007	_____
Destination of Waste Stream (check all that apply)	<input type="checkbox"/> Injection <input type="checkbox"/> Direct Discharge <input type="checkbox"/> Use as Drilling Fluid <input type="checkbox"/> POTW <input type="checkbox"/> Sale
Average Regeneration/Cleaning Frequency (specify units)	_____
Membrane Life	_____ years
Pilot Project	<input type="checkbox"/> Yes <input type="checkbox"/> No

Targeted Water Quality Parameters		
Parameter Name	Estimated Design Influent and Effluent Concentrations & Parameter Removal Efficiency	Basis/Comments

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**High-Pressure Filtration** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **High-Pressure Filtration Design Components** – Please complete the table below with details for each component at the filtration facility. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number	Type or Specification
Storage Tanks		Size= (bbl)
Pump(s)		HP=
Filtration Unit(s)		Total Area= (ft <sup>2</sup> )
Chemicals		
Monitoring Equipment (e.g., discharge monitors)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Treatment Not Specified Elsewhere** Question Copy \_\_\_\_\_ of \_\_\_\_\_

**CBI?**  
 Yes

**C3-9. Treatment Not Specified Elsewhere** – Complete Question C3-9 if you checked that this Produced Water Management System uses treatment not specified elsewhere in Table C3-2. Remember to complete one copy of this question for each treatment unit not specified elsewhere used at this Produced Water Management System.

a. **General Information** - Please complete the following table of general information. Also, please indicate the water quality parameters that are removed by this treatment unit and the estimated removal efficiency.

Volume of Produce Water Entering Treatment Unit in 2007	_____ bbl	
Vendor/Unit Name and Description of Treatment System	_____	
Maximum Capacity of This Treatment System	_____ bbl/d	
Average Cleaning Frequency	_____ <input type="checkbox"/> Days _____ <input type="checkbox"/> Hours	
Approximate Volume of Waste Stream Generated in 2007	_____ bbl	
Destination of Waste Stream (check all that apply)	<input type="checkbox"/> Injection <input type="checkbox"/> Direct Discharge <input type="checkbox"/> Use as Drilling Fluid <input type="checkbox"/> POTW <input type="checkbox"/> Sale <input type="checkbox"/> On-Site Land Application <input type="checkbox"/> Landfill	
Pilot Project	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Targeted Water Quality Parameters		
Name	Estimated Design Influent and Effluent Concentrations & Parameter Removal Efficiency	Basis/Comments

Operator ID: \_\_\_\_\_  
 Produced Water Management System ID: \_\_\_\_\_  
 Operator's Name for this Produced Water Management System: \_\_\_\_\_  
**Treatment Not Specified Elsewhere** Question Copy \_\_\_\_\_ of \_\_\_\_\_

- b. **Treatment System Design Components** – Please complete the table below with the approximate capital costs for each component in this treatment system. Do not include information associated with transporting the produced water since this information is requested above.

Design Component	Number or Amount	Type or Specification
Storage Tank(s)		Size= (bbl)
Pump(s)		HP=
Treatment Unit(s)		Total Area= (ft <sup>2</sup> )
Chemicals		
Monitoring Equipment (e.g., river monitors, telemetry station, groundwater monitoring)		
Other (please specify): _____		
Other (please specify): _____		

Operator ID: \_\_\_\_\_  
Produced Water Management System ID: \_\_\_\_\_  
Operator's Name for this Produced Water Management System: \_\_\_\_\_

#### SECTION 4: PRODUCED WATER QUALITY DATA

C4-1. Please provide produced water quality information on Table C4-1 for **all** locations in this Produced Water Management System for which you have water quality data. If you need more space, make a copy of Table C4-1. These locations should be labeled with a unique identifier on your block flow diagram in required in Question C2-1 and noted on Tables C3-1 and C3-2. Locations may include: influent to treatment; effluent from treatment; and discharge outfalls. Please provide the number listed on your diagram in the column marked "location" in Table C4-1 below. Provide all relevant data for 2007. If 2007 data is unavailable, please provide the most recent data.

- The **pollutant** analyzed;
- The measured value including units (if not detected, list the detection limit value preceded by a less than (<) symbol);
- The analytical method used;
- The detection limit for the specific method used;
- The date samples were collected;
- Location where the samples were collected (this should be a number from a label on your block flow diagram);
- Whether the samples were collected as grabs or as composites; and
- Provide flow rate only if flow rate data were recorded at the sampling point during the sampling period.

**If you already have these data in electronic or hardcopy format, you may submit these data using your own reporting method.**

Submitted own data as attachment to this questionnaire.

#### C4-2. Whole Effluent Toxicity Information

a. Have you performed any whole effluent toxicity (WET) testing for this Produced Water Management System?

- Yes  
 No, Skip to C4-3.

b. Please provide the information on the WET testing conducted, including the including the test organism, test type (e.g., acute or chronic), and the results.

Attached

c. Has toxicity ever exceeded permit limits?

- Yes  
 No, Skip to C4-3.

d. Was a toxicity identification evaluation (TIE), toxicity reduction evaluation (TRE), or other study performed to determine the cause, treatability, or effective management of toxicity?

- Yes  
 No, Skip to C4-3.

e. Please describe the cause of the toxicity and the final resolution of the toxicity issue.





## PART D. SUPPORTING INFORMATION

### LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
bbl	Barrel (42 gallons)
bbl/d	Barrels per day
bbl/yr	Barrels per year
bcf	Billion cubic feet
BPJ	Best Professional Judgment
BTU	British thermal unit
CBM	Coal bed methane
CFR	Code of Federal Regulations
CFS	Cubic feet per second
Cl-	Chloride
CWA	Clean Water Act
dpy	Days per year
EA	Environmental Assessment
EC	Electrical Conductivity
ELG	Effluent limitations guideline
EPA	U.S. Environmental Protection Agency
ft	Foot
ft <sup>2</sup>	Square foot
ft <sup>3</sup>	Cubic foot
gal	Gallon
gpd	Gallons per day
gpm	Gallons per minute
hrs/day	Hours per day
in	Inch
kWh	Kilowatt-hour
lb	Pound
lb/hr	Pounds per hour
mcf	Thousand cubic feet
MCL	Maximum contaminant level
mg/L	Milligrams per liter
MGD	Million gallons per day
MMBTU/hr	Million BTUs per hour
MMBTU/yr	Million BTUs per year
mmcf	Million cubic feet
MW	Megawatt
NA	Not applicable
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
ppm	Parts per million
PrOTW	Privately Owned Treatment Works
psi	pounds per square inch
RO	Reverse osmosis
s	Second
SAR	Sodium Adsorption Ratio
SIC	Standard Industrial Classification
tcf	Trillion cubic feet
TDS	Total dissolved solids
ton	English ton, wet weight
TMDL	Total maximum daily load
tpy	Ton per year
TSS	Total suspended solids
UIC	Underground Injection Control
yr	Year



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## DEFINITION OF KEY TERMS

**Ad Valorem Taxes**—A type of property taxes, usually levied as a percentage of production or value of production by local authorities, such as a county, a school district, city, or township.

**Aeration**—Process that mixes air and water, normally by injecting air into water, spraying water into the air, or allowing water to pass over an irregular surface, to release compounds from the water through oxidation, precipitation, or evaporation.

**Arroyo**—An intermittently dry creek.

**Balance Sheet**—A quantitative summary of a company's financial condition at a specific point in time, including assets, liabilities and net worth. The first part of a balance sheet shows all the productive assets a company owns, and the second part shows all the financing methods (such as liabilities and shareholders' equity); also called statement of condition ([www.investorwords.com](http://www.investorwords.com)).

**Batch (Intermittent) Discharge or Application**—A discreet volume or mass of liquid or solid that is collected and discharged periodically.

**Beneficial Use**—The produced water is of good enough quality to be used for wildlife propagation or livestock watering or other agricultural uses and the produced water is actually put to such use during periods of discharge.

**Best Management Practices (BMP)**—Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources. Activities, maintenance procedures, and other management practices to prevent or reduce the pollution. BMPs may include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**C Corporation**—A business that is a completely separate entity from its owners, unlike a partnership ([www.investorwords.com](http://www.investorwords.com)).

**Capital Cost**—The costs associated with the purchase, development or construction of fixed assets such as land, stations, buildings, and water treatment equipment.

**Capital Cost of Project Development**—As defined for Question B3-13. this includes all capital and one-time costs of project development beyond the immediate tophole equipment (e.g., Christmas tree), including any exploratory costs, planning costs, geological and geophysical costs, site development costs, such as pads and roads or other land preparation activities, production pumps, gas/water separation equipment, other onsite gas gathering or treatment equipment, and gas pipelines to offsite location and/or point of sale. It does not include any capital costs of water management (see definition).

**Clarification**—Separation and concentration of solids from liquid/solid mixtures that are mostly liquid.

**Clean Water Act**—Federal legislation enacted by Congress to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters” (Federal Water Pollution Control Act of 1972, as amended, 33 U.S.C. 1251 et seq.).

**Coalbed Methane (CBM)**—Natural gas found in coal seam reservoirs.

**Coalbed Methane (CBM) Project**—A CBM project comprises a well, group of wells, lease, group of leases, or recognized or unofficial unit for which you operate as an economic unit when making production decisions. Typically, the well or wells within this project share some or all production costs. A new well drilled in such a project would be considered to incur the marginal (the incremental cost to add the well), not the average, cost of production.

**Coalbed Methane (CBM) Unit**—A unit is a group of leases that are managed together with the intention of maximizing production (and/or minimizing costs), where operating these leases independently might result in more wells drilled, less production realized, or both. Units can be formal, legal entities that are written into lease agreements, pooling agreements, and/or state permits; or informal, particularly where minerals rights on several leases are owned by the same entity.

**Continuous Flow**—A flow regime characterized by persistent flow, as opposed to intermittent flow or *batch* processes.

**Contract Haul**—The removal of any waste stream (including produced water) from a facility by a company authorized to transport and dispose of the waste, excluding discharges to sewers or surface waters.

**Cost-Depletion Method**—Recovery of the tax basis in a mineral deposit by deducting it proportionately over the productive life of the deposit. This is in contrast to the percentage depletion method, which permits a taxpayer with an economic interest in a mineral deposit to deduct a specified percentage of the gross income from the deposit instead of using the cost depletion method. Percentage depletion is generally restricted to independent producers, royalty owners, and some other narrow categories of oil and gas owners ([www.answers.com](http://www.answers.com)).

**Cost of Capital**—The opportunity cost of an investment; that is, the rate of return that a company would otherwise be able to earn at the same risk level as the investment that has been selected. For example, when an investor purchases stock in a company, he/she expects to see a return on that investment. Since the individual expects to get back more than his/her initial investment, the cost of capital is equal to this return that the investor receives, or the money that the company misses out on by selling its stock ([www.investorwords.com](http://www.investorwords.com)).

**Creek**—A small, natural stream that is often a shallow or intermittent tributary to a river.

**Cumulative Depreciation**—The total charges against the fixed assets of a company for wear and tear, obsolescence, or the depletion of a natural resource—oil in the ground, for instance—as it is used up (<http://moneycentral.msn.com/investor/glossary/glossary.asp?TermID=18>).

**Current Assets**—Any asset that can reasonably be expected to be used up or converted to cash or sold within a year or less, e.g., cash, accounts receivable, prepaid expenses.

**Current Liabilities**—Debts that are payable within 1 year, including accounts payable, notes payable within one year, accrued expenses and taxes, and the portion of long-term debt that are paid this year.

**Depreciation, Depletion, and Amortization**—The allocation of the cost of an asset over a period of time for accounting and tax purposes ([www.investorwords.com](http://www.investorwords.com)). Depletion, which reflects the declining value of a natural resource asset as it is produced, may be calculated either using the cost-depletion or percentage depletion method, depending on type of firm (see cost-depletion method).

**Design Capacity Flow Rate**—Maximum flow rate a treatment unit is designed to handle.

**Direct Discharge**—The discernible, confined, and discrete conveyance of pollutants to United States surface waters such as rivers, lakes, and oceans. See 40 CFR 122.2.

**Discharge**—The discernible, confined, and discrete conveyance of pollutants to: (1) United States surface waters such as rivers, lakes, and oceans (“direct discharge”), or (2) a publicly owned, privately owned, federally owned, combined, or other treatment works (“indirect discharge”). See 40 CFR 122.2.

**Disposal**—Intentional placement of waste (including produced water) into or on any land where the material will remain after closure. Waste placed into water is defined as discharge, not disposal.

**Division**—A business unit of a firm, often treated as a profit center (see profit center).

**Earnings Before Interest and Taxes (EBIT)**—A measure of a company's earning power from ongoing operations, equal to earnings before deduction of interest payments and income taxes; also called operating profit or operating income ([www.investorwords.com](http://www.investorwords.com)).

**Emergency Discharge**—A volume or mass of liquid or solid residuals are discharged only during extenuating circumstances (i.e., a treatment process malfunction).

**Equalization**—The process of storing produced water for later treatment or discharge. This process can also provide some removal of some suspended solids.

**Evaporation**—The process by which water or other liquid becomes a gas. Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapor.

**Fiscal Year**—A 12-month period over which a company budgets its spending. A fiscal year does not always begin in January and end in December; it may run over any period of 12 months ([www.investorwords.com](http://www.investorwords.com)).

**Filtration**—This treatment technology relies on the difference in size between the pore and the particle to be removed. Low-Pressure Filtration typically involves using can include direct media filtration using one or more layers of granular media such as sand and/or anthracite with coagulation. Low-pressure membrane filtration (e.g., microfiltration, ultrafiltration) generally operates at less than 40 psig and use porous membranes for the removal of particles from feedwater. High-Pressure Filtration (e.g., nanofiltration, reverse osmosis) typically uses a driving force to transport wastewater through a membrane, which separates the wastewater into two flows: permeate and retentate

**Fixed Operating Costs**—Any operating and maintenance costs that do not vary by the amount of production. An example might be equipment leases or a portion of labor that might be needed regardless of production.

**Groundwater**—Water in a saturated zone or stratum beneath the surface of land or water.

**Hurdle Rate**—The required rate of return in a discounted cash flow analysis, above which an investment makes sense and below which it does not. Often, this is based on the firm's cost of capital or weighted average cost of capital, plus or minus a risk premium to reflect the project's specific risk characteristics; also called required rate of return ([www.investorwords.com](http://www.investorwords.com)).

**Income Statement**—An accounting report showing various categories of revenues, expenses, interest payments, taxes, and net income.

**Indirect Discharge**—The discernible, confined, and discrete conveyance of pollutants to a publicly owned, privately owned, federally owned, combined, or other treatment works.

**Infiltration**—The process by which water penetrates into soil from the ground surface

**Injection Well (Deep or Shallow Well Injection)** —Any bored, drilled, or driven shaft or a dug hole, improved sinkhole, or a subsurface fluid distribution system where the depth is greater than the largest surface dimension that is used to dispose of fluids underground. See underground injection.

**Interest Expense**—An expense for interest on a loan ([www.investorwords.com](http://www.investorwords.com)).

**Intermittent Flow**—A flow regime characterized by flows that occur sporadically, seasonally, or for only a portion of time during normal operations.

**Ion Exchange (IX)** —Treatment process using a resin formulated to adsorb cationic or anionic species to remove pollutants from an influent stream.

**Lake**—A body of freshwater or saltwater surrounded by land.

**Landfill**—A natural or man-made formation in the earth into which solid waste, sludges, or other process residuals are placed for permanent disposal.

**Lease Bid**—Amount (generally a lump sum at time of lease acquisition) paid to the mineral rights owner to hold the property for a period of time, whether or not the lease is developed. This does not include rental payments, which may be charged over time, nor does it include royalties, which are paid only once production begins.

**Limited Liability Corporation or Company**—A type of company, authorized only in certain states, whose owners and managers receive the limited liability and (usually) tax benefits of an S Corporation without having to conform to the S corporation restrictions ([www.investorwords.com](http://www.investorwords.com)).

**Limited Liability Partnership**—See limited liability corporation.

**Long-term Debt**—Liabilities that are paid off over periods greater than 1 year, including mortgages, notes, bonds, debentures, long-term leases, bank debt, and deferred income taxes.

**Maximum Daily Flow**—The maximum flow in a 24-hour period.

**Membrane Filtration**—Separation processes that use a membrane as the filter mechanism.

**Microfiltration**—A method of water treatment that utilizes a membrane to separate micrometer or submicrometer particles from a solution. The method clarifies water by trapping particles and microorganisms in the membrane, while passing dissolved substances with the permeate.

**Mineral Rights Owner**—Party owning the rights to minerals beneath land that has been or will be used for the purposes of producing minerals or hydrocarbons. Party may or may not own the rights to the land surface. See surface owner.

**NAICS**—NAICS is an economic classification system. Economic units that use like processes to produce goods or services are grouped together. These units are assigned a code for identification purposes. US Census Bureau (<http://www.census.gov/epcd/www/naics.html>). Common 6-digit NAICS in the CBM extraction industry include 211111, Crude Petroleum & Natural Gas Extraction; 213111, Drilling Oil and Gas Wells; 213112, Support Activities for Oil and Gas; 212111, Bituminous Coal & Lignite Surface Mining; 212112, Bituminous Coal Underground Mining; 221210, Natural Gas Distribution; 221112, Fossil Fuel Electric Power Generation; and 324110 Petroleum Refineries.

**Nanofiltration**—A method of water treatment that utilizes membranes to remove hardness, bacteria, viruses, and organic-related color.

**Net Income**—Gross sales minus taxes, interest, depreciation, and other expenses ([www.investorwords.com](http://www.investorwords.com)).

**Net Sales**—Gross sales minus returns, discounts, and allowances ([investorwords.com](http://investorwords.com)).

**NPDES Permit Program**—The National Pollutant Discharge Elimination System (NPDES) program authorized by Sections 307, 318, 402, and 405 of the **Clean Water Act** that applies to **facilities** that **discharge wastewater** directly to United States **surface waters**.

**Operating Costs (income statement)**—These are the recurring expenses which are related to the operation of a business ([www.answers.com](http://www.answers.com)).

**Operator**—The person responsible for the management and day-to-day operation of one or more CBM wells. The operator is generally a working interest owner or a company under contract to the working interest owner(s).

**Operating and Maintenance Cost**—The ongoing, repetitive costs of operating a water system; for example, employee wages and **costs** for treatment chemicals and periodic equipment maintenance.

**Other Assets (net of depreciation)**—Any non-current assets (assets that cannot be easily converted to cash) other than property, plant and equipment.

**Owner/Operator**—The entity (firm or division, if a profit center) responsible for the management and day-to-day operation of a well. The owner/operator is generally a working interest owner or a company under contract to the working interest owner(s). Management decisions might include whether well(s) should be shut-in, worked over or abandoned, whether additional or replacement wells should be drilled, whether additional or different production equipment should be installed, and any other decision factor used by DOE in the General Instructions to Form EIA-23.

**Owner Firm**—The next level up in the corporate hierarchy from the owner/operator. This firm owns the owner/operator firm or division, regardless of whether the owner/operator is a contract operator or a working interest operator.

**Payback Period**—The amount of time taken to break even on an investment. Since this method ignores the time value of money and cash flows after the payback period, it can provide only a partial picture of whether the investment is worthwhile ([www.investorwords.com](http://www.investorwords.com)).

**Payments to Principal**—Payments made on the principal portion of a loan or other borrowing mechanism classified as either long-term or current debt (excludes the interest payments on these loans).

**Pollutant**—Under the *Clean Water Act*, a dredged spoil, solid waste, incinerator residue, filter backwash, sewage *sludge*, munitions, chemical waste, biological material, certain radioactive material, heat, wrecked or discarded equipment, rock sand, cellar dirt, and industrial, municipal, and agricultural waste (40 CFR 122.2).

**Pollution Prevention**—The use of materials, processes, or practices that reduce or eliminate the creation of *pollutants* or wastes. It includes practices that reduce the use of hazardous and non-hazardous materials, energy, water, or other resources, as well as those practices that protect natural resources through conservation or more efficient use. Pollution prevention includes but is not limited to source reduction, in-process recycle and reuse, and water conservation practices.

**Primary Collection Point**—The first point in the Produced Water Management System where produced water from all wells flowing to one final destination are combined. In example 4, the sedimentation/equalization pond would be the primary collection point.

**Privately Owned or Held**—A company whose shares are not traded on the open market ([www.investorwords.com](http://www.investorwords.com)).

**Produced Water**—Water drawn from any hydrologic unit for the purpose of producing hydrocarbons.

**Produced Water Management System**—For the purposes of this questionnaire, a Produced Water Management System is defined as the production area or grouping of wells that is managed by the operator as a single unit for produced water management which may include treatment, transfer to disposal locations, and reuse/use. The Produced Water Management System may be a lease, field, project, or plan of development (POD). Water discharge permits, land application permits, and applications for permits to drill (APD) typically use one of these terms to define the well grouping. Operators may also report production information to state agencies by lease, field, project, or POD. Note that the Produced Water Management System can have multiple disposal options but it is managed as a single unit. For example, an operation may use a combination of stock tanks, irrigation, and storage ponds on a single Produced Water Management System.

**Produced Water Treatment or Treatment**—The treatment of water with physical, chemical, biological, or other processes to remove specific pollutants from the water stream or to alter the physical or chemical state of specific pollutants in the water stream. Produced water treatment is performed to allow for discharge, disposal or beneficial use of the water.

**Profit Center**—A business unit or department which is treated as a distinct entity enabling revenues and expenses to be determined so that profitability can be measured ([www.investorwords.com](http://www.investorwords.com)). For the purposes of this survey a profit center is defined as an entity that tracks finances at least through earnings before interest and taxes.

**Property, Plant and Equipment**—A type of asset a company owns that is vital to business operations but cannot be easily liquidated. The value of property, plant and equipment is typically depreciated over the estimated life of the assets, because even the longest-term assets become obsolete or useless after a period of time.

**Publicly Owned or Held**—A company which has issued securities through an offering, and which are now traded on the open market. ([www.investorwords.com](http://www.investorwords.com)).

**Publicly Owned Treatment Works (POTW)** —Any device or system owned by a state or municipality that is used to recycle, reclaim, or treat liquid municipal sewage and/or liquid industrial wastes.

**Receiving Waters**—A stream, river, or other surface water body to which wastewater or other pollutants are discharged.

**Retained Earnings**—Earnings not paid out as dividends but instead reinvested in the core business or used to pay off debt; also called earned surplus or accumulated earnings or unappropriated profit ([www.investorwords.com](http://www.investorwords.com))

**Reverse Osmosis (RO)**—A method of water treatment that involves the application of pressure to a concentrated solution which causes the passage of a liquid from the concentrated solution to a weaker solution across a semi-permeable membrane. The membrane allows the passage of the solvent (water) but not the dissolved solids (solutes). This water treatment method is typically used for desalinization and the removal of ions, radionuclides, bacteria, and viruses.

**River**—Water which flows in a channel from high ground to low ground and ultimately to a lake or sea.

**Royalty Payments**—Payments made to the mineral rights owner. These payments may be based on a percentage of the gas produced or as a percentage of the revenues received. A royalty is not a working interest share (see working interest).

**S Corporation**—A form of corporation, allowed by the IRS for most companies with 75 or fewer shareholders, which enables the company to enjoy the benefits of incorporation but be taxed as if it were a partnership. Also called Subchapter S Corporation ([www.investorwords.com](http://www.investorwords.com)).

**SEC Proved Reserves**—Proved oil and gas reserves are the estimated quantities of crude oil, natural gas, and natural gas liquids which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions, i.e., prices and costs as of the date the estimate is made. Prices include consideration of changes in existing prices provided only by contractual arrangements, but not on escalations based upon future conditions. See SEC SX Reg. 210.4-10 (November 18, 1981).

**Sedimentation Pond**—An impoundment constructed at the produced water treatment site to remove suspended solids from the produced water. These impoundments can also provide equalization of the produced water prior to treatment or discharge.

**Selling, General and Administrative Costs**—Income statement item which combines salaries, commissions, and travel expenses for executives and salespeople, advertising costs, and payroll expenses ([www.investorwords.com](http://www.investorwords.com)).

**Severance Tax Payments**—Payments made to a state for the right to remove a natural resource, usually applied to gas for use in another state.

**Sludge**—The accumulated solids and solid residues separated from liquids by settling or treatment.

**Sodium Adsorption Ratio (SAR)**—Irrigation water containing large amounts of sodium is of special concern due to sodium's effects on the soil and poses a sodium hazard. Sodium hazard is usually expressed in terms of sodium adsorption ratio (SAR). SAR is calculated from the following equation with sodium to calcium and magnesium concentrations expressed in units of millimoles per liter (mmol/L).

$$\text{SAR} = \frac{[\text{Na}^+]}{\sqrt{\frac{1}{2}([\text{Ca}^{2+}] + [\text{Mg}^{2+}])}}$$

**Storage Pond**—An impound for liquid wastes.

**Sum of Liabilities and Owner Equity**—Current Liabilities + Long-Term Debt + Retained Earnings + Other Owner Equity.

**Surface Owner**—Party owning land that has been or will be used for the purposes of producing minerals or hydrocarbons. Party may or may not own mineral rights beneath that land.

**Surface Use Plan**—Agreement between a landowner and a coalbed methane producer describing the conditions of land use for coalbed methane production including existing and proposed facilities (e.g. wells, roads, pipelines, and treatment systems), compensation for property damages, and considerations for land reclamation.

**Surface Waters**—Waters of the United States including, but not limited to, oceans and all interstate and intrastate lakes, rivers, streams, creeks, mudflats, sand flats, wetlands, sloughs, wet meadows, playa lakes, and natural ponds (40 CFR 122.2).

**Total Assets**—Total Current Assets + Total Non-current Assets (including Property, Plant, and Equipment and Other Assets Net of Depreciation).

**Treatment Unit**—A unit operation used to remove pollutants from produced water. Treatment units include, but are not limited to sedimentation ponds, ion exchange systems, and filters.

**Ultimate Parent**—The firm at the highest level of the corporate hierarchy. If the owner firm is not owned by another firm, the owner firm is the ultimate parent. If the owner/operator is not owned by any other firm, there is no ultimate parent.

**Ultrafiltration (UF)**—A method of water treatment that utilizes membranes in a pressure-driven process for concentrating solutions containing colloids and higher molecular weight materials. This water treatment method typically removes viruses, colloids, clays, bacteria, humic acids, and fulvic acids, but not ions or radionuclides.

**Underground Injection**—The technology of placing fluids underground, in porous formations of rocks, through wells or other similar conveyance systems. See injection well.

**Variable Operating Costs**—Any operating and maintenance costs that increase or decrease depending on the amount of production. Energy costs for production would be variable costs.

**Water Reuse**—Beneficial use of coalbed methane produced water (e.g., livestock watering, irrigation, or dust control) in lieu of discharge/disposal.

**Wellhead Price of Gas**—The price of gas at the wellhead, which is different from the price at natural gas hubs, reflecting the implicit cost to transport the gas to buyer, including the cost of gathering, compression, dehydration, etc.

**Working Interest**—Percentage of ownership in an oil and gas lease granting its owner the right to explore, drill and produce oil and gas from a tract of property. Working interest owners are obligated to pay a corresponding percentage of the cost of leasing, drilling, producing and operating a well or unit. After royalties are paid, the working interest also entitles its owner to share in production revenues with other working interest owners, based on the percentage of working interest owned ([www.glossary.oilfield.slb.com](http://www.glossary.oilfield.slb.com)). Working interest is not royalty; mineral rights owners who do not have working interests do not contribute to the costs of production.

**Workover, Stimulation, or Recompletion**—Major, intermittent tasks. Workovers are major maintenance or remedial treatments on a well. Well stimulation includes fracturing, for example, either performed initially or later in the productive life of the well. Recompletion is a process undertaken to restore the productivity of a well, including to complete a well in a new stratum or strata.

**Zero Discharge**—Disposal of produced water other than by direct discharge to surface water or by indirect discharge to a POTW. Zero discharge does not allow for periodic or infrequent discharges attributed to activities such as maintenance, blowdown, or system purges. Examples include evaporation, underground injection, contract hauling, and/or water reuse.

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