

SUPPLEMENTAL FLOW QUESTION

The following data request does not relate to economics directly, but is added here because of comments made by the American Petroleum Institute that your responses to Question IV.B. of Portfolio "A" of the 1977 Petroleum Refining Industry Survey need further clarification. This is a follow-up to the original 308 questionnaire sent to refineries in February or August of 1977 by Mr. Robert B. Schaffer, Director of the Effluent Guidelines Division.

Please submit your completed response (page 3) within 14 days to:

Robert W. Dellinger (WH-552)
Effluent Guidelines Division
U.S. Environmental Protection Agency
401 M. Street S.W.
Washington, D.C. 20460

Wastewater Discharge Data

The attached figure includes a block flow diagram depicting various possible wastewater flows present at petroleum refineries. Please fill in the annual average dry weather flow, for calendar year 1976, for each flow line applicable to your refinery. Do not supply additional data sheets. The units for these flow rates should be presented in million gallons per day only. If your refinery has multiple streams of each type, the total of these streams should be used; i.e., assume your system is similar to the simplified block flow diagram attached.

Excluded Selected Wastewaters

It should be noted that the flow rates asked for may not correspond to actual streams in the refineries. For example, the physical influent to your end-of-pipe treatment system may include storm water or ballast water. However, the flow rates to be reported should not include storm water, ballast water, sanitary wastewater, once-through non-contact cooling water, other non-refinery related wastewater, nor any raw (untreated) wastewater reused within the refinery complex.

The following definitions apply to each flow line:

1. Total Refinery Wastewater Excluding Selected Wastewaters - Excluding the selected wastewaters above, this "flow line" includes non-segregated cooling water, cooling tower blowdown, boiler blowdown, oily process water, sour water, water treatment system blowdown and "other refinery-related wastewaters". It includes all of the above mentioned wastewaters regardless of disposition.

Oily process water by implication includes all wastewaters generated at the refinery and which are not covered under any other above-mentioned specific categories (i.e., sour water). Oily process water includes, but is not limited to, such wastewaters as contact process water, non-sour process condensates, vent scrubber water, tank drains, flare seal water blowdown, laboratory drains, maintenance shop drains, hydrotest waters, maintenance decontamination waters, pad wash waters, fire waters and system test waters, and barometric condenser water blowdowns. The above "other refinery-related wastewaters" would include, but are not limited to, wastewaters from blowdown from air pollution control equipment and wastewaters originating at the wastewater treatment plant. Additionally, this stream is based on net flow and includes

each wastewater only once. For example, if the sour water stripper blowdown is used in the desalter then only the desalter water would be included to avoid double accounting the sour water.

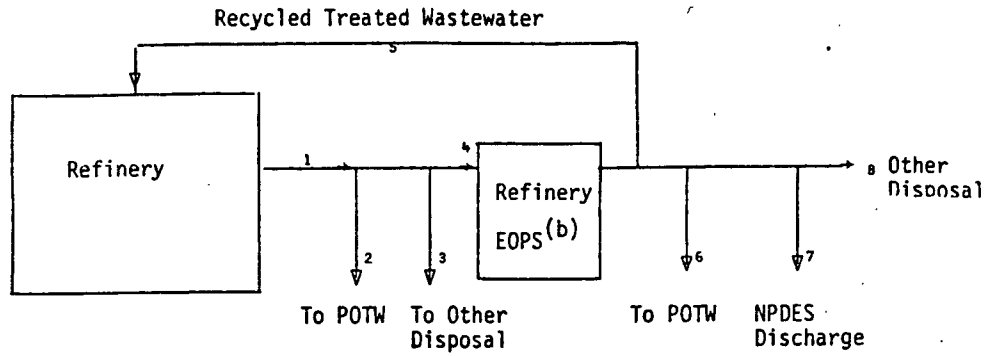
2. Untreated Refinery Wastewaters Excluding Selected Wastewaters to POTW - Excluding the selected wastewaters listed on page 1, this flow line includes untreated (by an EOPS) refinery wastewater that is discharged to a POTW (Publicly Owned Treatment Works). For the purpose of this survey, oil/water separation is considered an end-of-pipe treatment but sour water stripping is not.
3. Untreated Refinery Wastewater Excluding Selected Wastewaters to Other Disposal - Excluding the selected wastewaters listed on page 1, this flow line includes untreated (by EOPS) refinery wastewater that is not disposed of via an NPDES permit, nor discharged to a POTW. This type of discharge includes deep well disposal, land application, contract disposal, evaporation, percolation, etc.
4. Wastewater Treatment Influent Excluding Selected Wastewaters - Excluding the selected wastewaters listed on page 1, this flow line includes the dry weather refinery wastewater flow which receives end-of-pipe treatment. Please note that flow line 4 should equal flow line 1 less flow lines 2 and 3.
5. Recycled Treated Wastewater Excluding Selected Wastewaters - Excluding the selected wastewaters listed on page 1, this flow line includes that portion of the dry weather, end-of-pipe treatment effluent that is recycled for use in refinery operations.
6. Treated Wastewater Excluding Selected Wastewaters to POTW - Excluding the selected wastewaters listed on page 1, this flow line includes that portion of the dry weather, end-of-pipe treatment effluent which is discharged to a POTW.
7. NPDES Discharge Excluding Selected Wastewaters - Excluding the selected wastewaters listed on page 1, this flow line includes that portion of the dry weather end-of-pipe treatment effluent which is a direct discharge under an NPDES permit.
8. Treated Wastewater Excluding Selected Wastewaters to Other Disposal - Excluding the selected wastewaters listed on page 1, this flow line includes that portion of the dry weather, end-of-pipe treatment effluent which is not covered in flow lines 6 and 7. This type of disposal includes deep well injection, land application, contract disposal, evaporation, percolation, etc.

Please review the attached example, which is given in two steps, before answering the questions. Step 1 (pages 4 and 5) is a calculation of required flow rates and Step 2 (page 6) is essentially the example summary answer sheet that upon completion would be transmitted back to EPA.

NOTE: The main purpose of the attached example is to clarify the above definitions. In Step 2 of the example it may become apparent that only certain flows are needed to determine the required flow rates. It should be noted that the calculation procedure would vary from refinery to refinery because the required flow rates could be obtained by either additions or subtractions of various required flows. Thus for each refinery one should determine what flows are required to answer the given questions. We do not require that you submit your work sheets; you need only submit the completed summary page (page 3).

Refinery Name _____

Location _____
(city, state)



Flow Line Number	Flow Line Identification (a)	Annual Average Dry Weather Flow Calendar Year 1976 (d)	
		(million gallons/day)	Flow Basis (c)
1	Total Refinery Wastewater Excluding Selected Wastewaters	_____	_____
2	Untreated Production Wastewater Excluding Selected Wastewaters to POTW	_____	_____
3	Untreated Refinery Wastewater Excluding Selected Wastewaters to Other Disposal	_____	_____
	Specify Other Disposal _____		
4	Wastewater Treatment Influent Excluding Selected Wastewaters	_____	_____
5	Recycled Treated Wastewater Excluding Selected Wastewaters	_____	_____
6	Treated Wastewater Excluding Selected Wastewaters to POTW	_____	_____
7	NPDES Discharge Excluding Selected Wastewaters	_____	_____
8	Treated Wastewater Excluding Selected Wastewaters to Other Disposal	_____	_____
	Specify Other Disposal _____		

In addition, please indicate the source and flow rate for pump gland cooling water _____

Source _____

- (a) These flow lines are as defined in the narrative.
- (b) Refinery EOPS refers to any end-of-pipe wastewater treatment system (including oil water separation).
- (c) Indicate whether flow value is measured, estimated, or calculated (To be considered a calculated flow, the calculation must be based on all measured flows.).
- (d) Please fill in all flow lines; i.e., indicate zeros where applicable.

Step 1 Calculation of Wastewater Flows at XYZ Refining Company:

Flow Line Identification	Wastewater Included or Excluded	Annual Average Dry Weather Calendar Year 1976 Flow, Million Gallons per Day
1. Total refinery wastewater excluding selected wastewaters	Total wastewater influent to EOPS	5.97 (M) ¹
	Ballast water	-0.05 (M) ²
	Storm water	-0.02 (E) ²
	Untreated refinery wastewaters to a POTW	+0.9 (M)
	Untreated refinery wastewater to other disposal	+0.303 (M)
	Total	<u>7.103 (E)</u>
2. Untreated refinery wastewaters excluding selected wastewaters to a POTW	Boiler blowdowns	0.2 (M)
	Water treatment systems blowdown	0.7 (M)
	Total	<u>0.9 (C)³</u>
3. Untreated refinery wastewater excluding selected wastewaters to other disposal	Spent caustic wastewaters	0.003 (M)
	Air pollution control equipment blowdowns	0.3 (M)
	Total	<u>0.303 (M)</u>
4. Wastewater treatment influent excluding selected wastewaters	Total wastewater treatment influent	5.97 (M)
	Ballast water	-0.05 (M)
	Storm water	-0.02 (E)
	Total	<u>5.90 (E)</u>

EXAMPLE

Wastewater Balance

Flow Lines

1	7.103
-2	-0.9
-3	-0.303
<u>-4</u>	<u>-5.9</u>
Difference should equal 0.0	0.0

1/ Measured

2/ Estimated

3/ Calculated based on measured flows

4/ If dry weather flows are known, storm water contributions can be ignored.

Step 1 Calculation of Wastewater flows at XYZ Refining Company (continued)

Flow Line Identification	Wastewater Included or Excluded	Annual Average Dry Weather Calendar Year 1976 Flow, Million Gallons per Day
5. Recycled wastewater excluding selected wastewaters	Recycled treated wastewaters	1.98 (E) ¹
6. Treated wastewater excluding selected wastewaters to POTW	Treated wastewaters discharged to a POTW	0.0
7. NPDES Discharge excluding selected wastewaters	Total wastewater discharged to stream	3.97 (M) ²
	Ballast water plus storm water	- .047 (E) ²
	Total	3.92 (E)
8. Treated wastewater, excluding selected wastewaters to other disposal	Other disposal of treated wastewaters	0.0

Wastewater Balance

Flow Lines

5	1.98
+6	+0.0
+7	+3.92
+8	+0.0
<u>Total</u>	<u>+5.9</u>
-4	-5.9
	<u>0.0</u>

Difference should be close to 0.0

(May not be exactly 0.0 because of losses in EOPS, such as blowdowns and evaporation)

^{1/} A measured flow of 2.0 million gallons of treated effluent is recycled per day. Some storm water and ballast water are recycled with the treated effluent. This equals $(2.0/5.97)(0.05 + 0.02) = .0235$ million gallons per day. Therefore, the estimated value of $2.0 - .0235$ or 1.98 is shown. If dry weather flows are known, and no ballast water is discharged to the treatment system, this calculation is unnecessary.

^{2/} Based on calculation of that portion of ballast and storm water that is recycled. Ballast water plus storm water equals $0.07 - 0.0235 = 0.0465$ or 0.047.

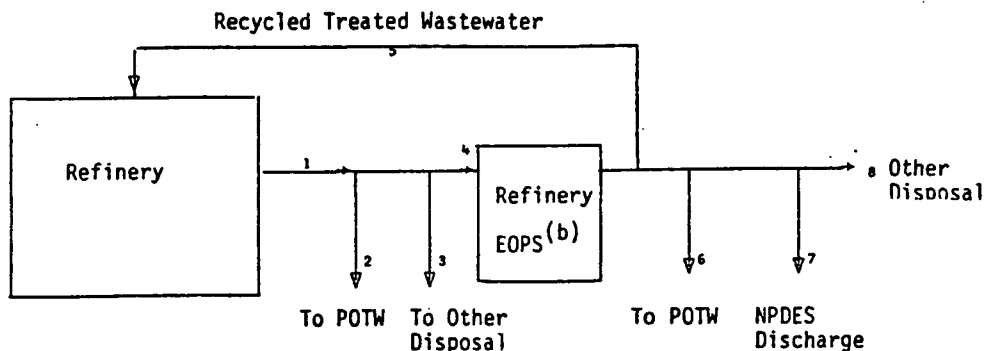
EXAMPLE

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Refinery Name XYZ Refining Co.

EXAMPLE

Location Boston, Mass.
(city, state)

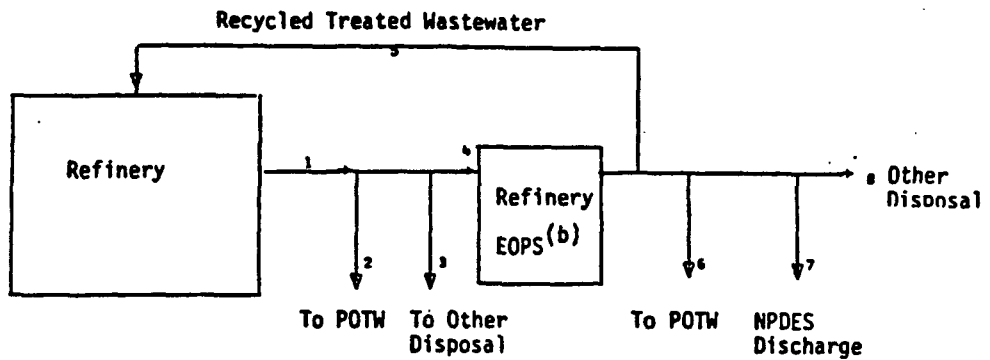


Flow Line Number	Flow Line Identification (a)	Annual Average Dry Weather Flow Calendar Year 1976 ^(d) (million gallons/day)	Flow Basis ^(c)
1	Total Refinery Wastewater Excluding Selected Wastewaters	<u>7.103</u>	Estimated (checked by balance)
2	Untreated Production Wastewater Excluding Selected Wastewaters to POTW	<u>0.9</u>	Calculated
3	Untreated Refinery Wastewater Excluding Selected Wastewaters to Other Disposal	<u>0.303</u>	Measured
	Specify Other Disposal <u>deep-well</u>		
4	Wastewater Treatment Influent Excluding Selected Wastewaters	<u>5.9</u>	Estimated
5	Recycled Treated Wastewater Excluding Selected Wastewaters	<u>1.98</u>	Estimated*
6	Treated Wastewater Excluding Selected Wastewaters to POTW	<u>0.0</u>	—
7	NPDES Discharge Excluding Selected Wastewaters	<u>3.92</u>	Estimated
8	Treated Wastewater Excluding Selected Wastewaters to Other Disposal	<u>0.0</u>	—
	Specify Other Disposal <u>—</u>		

In addition, please indicate the source and flow rate for pump gland cooling water 1.0 Estimated
Source Mainly treated river water.

- (a) These flow lines are as defined in the narrative.
- (b) Refinery EOPS refers to any end-of-pipe wastewater treatment system (including oil water separation).
- (c) Indicate whether flow value is measured, estimated, or calculated (To be considered a calculated flow, the calculation must be based on all measured flows.).
- (d) Please fill in all flow lines; i.e., indicate zeros where applicable.

* Measured flow is 2.0 million gallons/day. Subtracting ballast + storm water in recycle yields 1.98 million gallons/day.



Flow Line Number	Flow Line Identification (a)	Annual Average Dry Weather Flow Calendar Year	
		1976(d) (million gallons/day)	Flow Basis(c)
1	Total Refinery Wastewater Excluding Selected Wastewaters	<u>7.103</u>	<u>Estimated (checked by balance)</u>
2	Untreated Production Wastewater Excluding Selected Wastewaters to POTW	<u>0.9</u>	<u>Calculated</u>
3	Untreated Refinery Wastewater Excluding Selected Wastewaters to Other Disposal	<u>0.303</u>	<u>Measured</u>
	Specify Other Disposal <u>deep-well</u>		
4	Wastewater Treatment Influent Excluding Selected Wastewaters	<u>5.9</u>	<u>Estimated</u>
5	Recycled Treated Wastewater Excluding Selected Wastewaters	<u>1.98</u>	<u>Estimated*</u>
6	Treated Wastewater Excluding Selected Wastewaters to POTW	<u>0.0</u>	<u>—</u>
7	NPDES Discharge Excluding Selected Wastewaters	<u>3.92</u>	<u>Estimated</u>
8	Treated Wastewater Excluding Selected Wastewaters to Other Disposal	<u>0.0</u>	<u>—</u>
	Specify Other Disposal <u>—</u>		

Need to specify cooling water

In addition, please indicate the source and flow rate for pump gland cooling water 1.0 Estimated
Source Mainly treated river water.

- (a) These flow lines are as defined in the narrative.
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- (c) Indicate whether flow value is measured, estimated, or calculated (To be considered a calculated flow, the calculation must be based on all measured flows.).
- (d) Please fill in all flow lines; i.e., indicate zeros where applicable.

* Measured flow is 2.0 million gallons/day. Subtracting ballast + storm water in recycle yields 1.98 million gallons/day.