MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM

Permit Fact Sheet

Permittee:	Phillips 66 Company
Permit No.:	MT0000256
Receiving Water:	Yegen Drain (Outfalls 002 – 004) Branch of Yegen Drain (Outfall 005) Yellowstone River (Outfall 006)
Facility Information:	Phillips 66 Billings Refinery
Address:	401 South 23rd Street Billings MT 59101
Contact:	Mark Cohn, Environmental Director PO Box 30198 Billings MT 59107-0198

Fee Information:

Type:	Privately Owned Treatment Works, Major	
	Number of Outfalls:	3 (For Fee Determination only)
	Outfall - Type:	002 – Treated wastewater to surface water (fee) 003 – Storm water (fee) 004 – Storm water (integrated) 005 – Storm water (integrated) 006 – Treated Wastewater to Surface Water (fee)

I. BACKGROUND

This fact sheet identifies the principal facts and significant factual, legal, methodological, and policy issues considered in preparing a draft Montana Pollutant Discharge Elimination System (MPDES) permit in accordance with Administrative Rules of Montana (ARM) 17.30.1371. The Department of Environmental Quality (DEQ) prepares a fact sheet for any draft permit that establishes new or amended effluent limits or standards, schedules of compliance, variances, nonsignificance determinations under ARM 17.30.706, denial or granting of mixing zones under ARM 17.30.515, or other significant requirements.

Phillips 66 Company (Phillips 66, also termed Permittee) is the owner and operator of the Phillips 66 Billings Refinery (also termed the Refinery or Facility). For the purposes of this Permit, references to the "discharger" or "permittee" in applicable Federal and State laws, regulations, policy, plans, or implementation procedures are held to be equivalent to references to the Permittee in this permit.

A. Permit and Application Information

The current MPDES permit was issued to ConocoPhillips Company and became effective on December 1, 2009. It was modified twice: first on May 23, 2012, in order to incorporate three storm water outfalls into the MPDES permit, and second on July 2, 2014, in order to add one direct discharge to Yellowstone River. Based upon request, the Permittee name was also changed to Phillips 66 Company as part of the modifications. The permit expired on November 30, 2014.

The Permittee submitted an application for renewal and major modification of the permit on June 4, 2014. Additional fees and information were submitted by Phillips 66 and received by DEQ on August 20, 2014; the application was deemed complete and the permit was administratively extended on August 28, 2014. Phillips 66 requested the following changes to their MPDES permit for this renewal cycle:

- Elimination of Outfall 001 (discharge of process water to the Yegen Drain); and
- Reduction of monitoring frequency at future Outfall 006 (proposed diffuser to Yellowstone River).

B. Description of Facility, Discharge Point(s), and Mixing Zone(s)

1. Description and Location of Facility

The Phillips 66 Refinery is a petroleum refinery (SIC Code 2911) designed to convert heavy sour crude oil and field butane into a variety of fuels and petroleum-based products. The Phillips 66 Refinery converts crude oil into fuel gas, liquid petroleum gas, propane, butane, gasoline, jet fuels, fuel oils, and petroleum coke [Phillips 66 Renewal Application received June 4, 2014, Form 1]. The processes and methods used at the refinery include distillation/ fractionation, crude desalting, fluid catalytic cracking, catalytic reforming, hydrotreating, and delayed coking. The current capacity of the refinery is 61,000 barrels per day (bpd) of crude oil [Phillips 66 Renewal Application received June 4, 2014, Form 2C Part III.C].

The refinery first commenced production in the late 1940s. It is located on over 250 acres along I-90 on the west side of Billings. **Appendix A** provides maps and diagrams of the Facility.

2. Description of Wastewater Sources

Based on the "Water Flow Block Diagram" prepared by CH2MHill updated in May 2014 (see **Appendix B**), the refinery uses an average of 967 gallons per minute (gpm, or 1.4 million gallons per day (mgd)) of municipal water from the City of Billings in their refinery processes. Other sources of wastewater at Phillips 66 include:

- 472 gpm (0.68 mgd) of municipal water for hydrostatic testing on a periodic basis,
- 116 gpm (0.17 mgd) treated remediation ground water, and
- 71 gpm (0.10 mgd) storm water.

Based on Form 2C, the average process wastewater discharge from the above sources permitted as part of this MPDES permit renewal *during times of discharge* are:

- Outfall 002: 0.68 mgd (472 gpm) hydrostatic test water.
- Outfall 006*: 0.73 mgd (510 gpm) treated process wastewater, and process area storm water (see **Table FS-01**).

  **Note*: Outfall 006 is a proposed outfall to the Yellowstone River. Currently all of the treated process effluent is discharged to the City of Billings Wastewater Treatment Facility (as of June 1, 2014). Prior to June 1, 2014, process wastewater was discharged through Outfall 001 to the Yegen Drain; the only wastewater discharged to the municipal sewer prior to this date was domestic wastewater at 0.029 mgd (20 gpm).

In addition, based on Form 2C and clarifying correspondence with Ashley Thorson, Phillips 66 Environmental Specialist, the following is the average discharge through Outfalls 003 - 005 *during times of discharge*:

- Outfall 003: 45 gpm (0.065 mgd) storm water plus 10 gpm (0.014 mgd) steam condensate (noncontact, from closed-loop steam heating of tanks and piping),
- Outfall 004: 54 gpm (0.078 mgd) plus 10 gpm (0.014 mgd) steam condensate (noncontact, from closed-loop steam heating of tanks and piping), and
- Outfall 005: 14 gpm (0.020 mgd) plus 10 gpm (0.014 mgd) steam condensate (noncontact, from closed-loop steam heating of tanks and piping).

The three storm water outfalls do not passively discharge; Phillips 66 needs to physically pump them out. Phillips 66 has purchased a dedicated pump for Outfall 004 that is rated at 300 gpm; this will provide the basis for the maximum daily flow estimate. The facility will use rental pumps in the case of discharging from Outfall 003 and 005.

Table FS-01. Sources of Process Wastewater to Outfall 006 (Form 2C and Water Flow Block Diagram)

Description	Average Flow (gpm)
Process Steam Condensates – Sour Waters	190
Sour Water Stripping	*72*
Crude Desalting	*118*
Coker Process Sewers	37
Jupiter Process Water & Blowdown Water	unkn
Caustic Systems/ Alky Separator	< 1
Surge Tank/SU-101 Sump	73
Refinery Laboratory	*2*
Truck Rack	*unkn*
Tank 55 Sump	*< 1*
Transportation Product Water Mix	*unkn*
West Tank Farm	*< 1*
Process Area Oily Water Sewers	*unkn*
South Tank Farm	*unkn*
Alky Sewers/ Neutralization Pit	*unkn*
Remediation Ground water	116
Miscellaneous	76
Demineralizer regeneration wastewater	*46*
Cooling Towers Blowdown	*30*
Steam Generation Blowdown	*unkn*
Process Area Storm water and Other WW	17
TOTAL gpm	**510**
mgd	**0.73**

3. Wastewater Treatment or Controls

Most of the refinery process wastewater (>85%) undergoes the following treatment after the equalization tank: two aeration tanks (No. 4 and 5) that function as activated sludge units (ASU) → ASU Clarifier → No. 1 aerated holding pond → secondary dissolved air floatation (DAF) unit. The remaining 15% of the facility wastewater is blowdown and regeneration wastewater and does not require these treatment steps.

Since June 1, 2014, the refinery process wastewater undergoes arsenic removal as a last treatment step prior to discharge. The arsenic treatment system consists of injection of ferric chloride into the wastewater. Sulfuric acid may be injected to ensure proper pH and polymer may be added to assist in forming aggregates for optimum removal conditions. The solids, ferric hydroxide and arsenic, are then filtered through multimedia filters and the collected solids are disposed of.

In addition, approximately half of the facility wastewater streams have initial treatment prior to the above treatment train, as summarized in **Table FS-02**.

Table FS-02. Wastewater Treatment Prior to Treatment Train

Treatment Process	Wastewater Sources
Desalter Break Tanks	Crude desalting
Coker Break Tanks	Coker process sewers
Neutralization Pit	Alky sewers
Alky Separator	Caustic systems
Corregated Plate Interceptor (CPI) Separators	Various processes and tank water draw
Primary Dissolved Air Floatation (DAF)	Various processes, including following the desalter break tanks, coker break tanks, and CPI separators treatment steps.

4. Discharge Points and Receiving Waters

Table FS-03 provides a description of the discharge points' locations and receiving waters.

Table FS-03. Description of Discharge Points

Outfall	Wastewater Source	Latitude	Longitude	Receiving Water	Receiving Water Classification
002	Hydrostatic Testing	45°46'53"N	-108°29'05"	Yegen Drain	C-3
003	Storm Water	45°46'35"N	-108°29'19"		
004		45°46'53"N	-108°29'05"		
005		45°47'13"N	-108°29'07"	Branch of Yegen Drain	
006	Process Wastewater	45°47'47"N	-108°28'11"	Yellowstone River	B-3

C. <u>Summary of Existing Permit Requirements and Effluent Quality Data</u>

The following summarizes the effluent data submitted in monthly Discharge Monitoring Reports (DMRs) during the period of record (POR) from January 2010 through August 2015, compared with current effluent limits for the following outfalls:

- **Table FS-04**: Process Wastewater - Outfall 001 (represents future Outfall 006 discharge);
- **Table FS-05**: Outfall 002 (data since August 2014 only, due to water supply change to city water);
- **Table FS-06**: Outfall SUM-A (sum of Outfall 001/006 and Outfall 002); and
- **Table FS-07**: Outfall 004.

Phillips 66 reported no discharge for Outfalls 003, 005, and 006 for the term of the permit.

Table FS-04. Process Wastewater - Outfall 001 DMR Data (January 2010 – August 2015[1])

Parameter	Units	Outfall 001 2009-Issued Permit Limits[2]	Outfall 006 2009-Issued Permit Limits[2]	Minimum Value[3]	Average Value[4]	Maximum Value[5]	Number of Samples[6]
Flow	mgd	NA	NA	0.33	0.67	1.13	67
pH	s.u.	6 - 9	6 - 9	5.6	--	8.7	67
Total Suspended Solids (TSS)	mg/L	NA	NA	3	16	186	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	65	622	53
Biochemical Oxygen Demand (BOD_5)	mg/L	NA	NA	<5	5	85	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	20	310	46
Chemical Oxygen Demand (COD)	mg/L	NA	NA	31	57	209	67
	lb/day	*see SUM-A*	*see SUM-A*	150	311	1,090	53
Ammonia (as N)	mg/L	2.88 / 3.96	NA	0.03	3	47	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	11	154	48
Oil & Grease	mg/L	NA / 10	NA / 10	<1	<5	14	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	<15	53	53
Sulfide, Total	mg/L	NA	NA	<0.1	<0.1	0.2	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	0.06	0.7	53
Phenols	mg/L	NA	NA	0.001	0.01	0.17	65
	lb/day	*see SUM-A*	*see SUM-A*	0.01	0.06	1.1	52
Chromium, total recoverable	mg/L	NA	NA	<0.001	<0.001	0.024	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	0.01	0.05	53
Hexavalent Chromium	mg/L	NA	NA	<0.01	<0.01	0.02	67
	lb/day	*see SUM-A*	*see SUM-A*	ND	ND	0.12	53
Total Residual Chlorine	mg/L	0.011 / 0.019 [7]	0.011 / 0.019 [7]	NA	NA	NA	NA
Arsenic, total recoverable	mg/L	NA	0.005 / 0.010 [8]	0.014	0.048	0.146	14
Selenium, total recoverable	mg/L	0.006 / 0.009	NA	0.04	0.14	1.2	67

Notes: NA = Not applicable; ND = Nondetect

(1) Outfall 001 discontinued discharge as of June 2014 and Outfall 006 not yet constructed. Current effluent data includes data from monthly pretreatment reports to City of Billings WWTF from July 2014 to August 2015.
(2) Final permit limits as of June 1, 2014: 30-day average / daily maximum, other than pH which is the acceptable range.
(3) Minimum of the monthly averages.
(4) Average of the monthly averages.
(5) Maximum of the daily maxima. The maximum flow data does not include the flow rate for May 2011 which was elevated due to pumping of flood waters.
(6) Number of samples represents monthly DMRs; actual data collected weekly for most parameters.
(7) TRC limits apply to Outfalls 001/006 only when hydrostatic test water is routed through the wastewater treatment system.
(8) Arsenic effluent limits under appeal. Arsenic data based on Industrial pretreatment report July 2014 – August 2015.

Table FS-05. Outfall 002 Hydrostatic Test Wastewater DMR Data (August 2014 – August 2015)

Parameter	Units	Outfall 002 2009-Issued Permit Limits(1)	Minimum Value(2)	Average Value(3)	Maximum Value(4)	Number of Samples(5)
Flow	mgd	NA	0.27	0.27	0.60	2
Total Suspended Solids (TSS)	mg/L	NA	<1	4.2	11	2
	lb/day	*see SUM-A*	ND	1.8	6.2	2
Biochemical Oxygen Demand (BOD_5)	mg/L	NA	<3	<3	<3	2
	lb/day	*see SUM-A*	ND	ND	ND	2
Chemical Oxygen Demand (COD)	mg/L	NA	2	2.2	7	2
	lb/day	*see SUM-A*	0.7	6.2	35	2
Ammonia (as N)	mg/L	2.88 / 3.96	0.2	0.5	0.8	2
	lb/day	*see SUM-A*	0.09	1.3	4.1	2
Oil & Grease	mg/L	NA / 10	<1	<1	1	2
	lb/day	*see SUM-A*	ND	<0.2	0.4	2
Sulfide, Total	mg/L	NA	<0.04	<0.04	<0.04	2
	lb/day	*see SUM-A*	ND	ND	ND	2
Phenols	mg/L	NA	<0.01	<0.01	<0.01	2
	lb/day	*see SUM-A*	ND	ND	ND	2
Chromium, total recoverable	mg/L	NA	<0.005	<0.005	<0.005	2
	lb/day	*see SUM-A*	ND	ND	ND	2
Hexavalent Chromium	mg/L	NA	<0.01	<0.01	<0.01	2
	lb/day	*see SUM-A*	ND	ND	ND	2
Total Residual Chlorine	mg/L	0.011 / 0.019	<0.10	<0.10	<0.10	2
Selenium, total recoverable	mg/L	0.006 / 0.009	0.001	0.002	0.003	2
pH	s.u.	6 - 9	7.0	--	7.8	2

Notes: NA = Not applicable; ND = Nondetect

(1) Permit limits as of June 1, 2014: 30-day average / daily maximum, other than pH which is the acceptable range.
(2) Minimum of the monthly averages.
(3) Average of the monthly averages.
(4) Maximum of the daily maxima.
(5) Number of samples represents monthly DMRs; actual data collected three times per event for most parameters. There were eight months with hydrostatic testing discharge ("events") between January 2010 and August 2015; however, this summary was based on the two months with discharge since the water supply for the hydrostatic testing was changed to city water in August 2014.

Table FS-06. Outfall SUM-A Process Wastewater DMR Data (January 2010 – June 2014) (1)

Parameter	Units	SUM-A 2009-Issued Permit Limits(2)	Minimum Value(3)	Average Value(4)	Maximum Value(5)	Number of Samples(6)
Total Suspended Solids (TSS)	lb/day	215 / 338	ND	65	622	53
Biochemical Oxygen Demand (BOD_5)	lb/day	270 / 485	ND	23	310	53
Chemical Oxygen Demand (COD)	lb/day	1,253 / 2,243	67	309	1,090	53
Ammonia (as N)	lb/day	143 / 314	ND	10	154	53
Oil & Grease	lb/day	78 / 148	ND	<2	53	53
Sulfide, Total	lb/day	1.38 / 3.09	ND	0.06	0.7	53
Phenols	lb/day	1.08 / 2.26	ND	0.06	1.1	53
Chromium, total recoverable	lb/day	2.07 / 4.51	ND	<0.008	0.05	53
Hexavalent Chromium	lb/day	0.17 / 0.39	ND	<0.004	0.12	53

Notes: NA = Not applicable; ND = Nondetect
(1) Outfall SUM-A is the sum of discharges from Outfall 001, Outfall 002, and Outfall 006. DEQ summarized the data before June 2014, since Outfall 001 discontinued discharge as of June 2014 and Outfall 006 is not yet constructed.
(2) 30-day average / daily maximum.
(3) Minimum of the monthly averages.
(4) Average of the monthly averages.
(5) Maximum of the daily maxima.
(6) Number of samples represents monthly DMRs; actual data collected weekly for most parameters.

Table FS-07. Storm water DMR Data (May 2012 – August 2015)

Parameter	Units	Outfalls 003 - 005 2012-Modified Permit Limits (1)	Outfall 004 DMR Data			
			Minimum Value(2)	Average Value(3)	Maximum Value(4)	Number of Samples(5)
Flow	gpm	NA	200	318	500	4
Total Organic Carbon	mg/L	NA / 110	5.4	10	14	4
Oil & Grease	mg/L	NA / 10	<5	<5	<5	4
Hydrogen Sulfide	mg/L	0.002 / 0.003	ND (6)	ND	ND	4

Notes: NA = Not applicable; ND = Nondetect
(1) 30-day average / daily maximum.
(2) Minimum of the monthly averages.
(3) Average of the monthly averages.
(4) Maximum of the daily maxima.
(5) Number of samples represents monthly DMRs; actual data collected weekly for most parameters.
(6) Results for hydrogen sulfide reported as "0" which does not have sufficient significant digits to demonstrate compliance with the permit limits.

In addition, **Table FS-08** provides an overview of the process wastewater discharge rates.

Table FS-08. Process Wastewater Discharge Summary

Year	Units	Maximum Daily (1)	Maximum Avg Monthly (2)	Annual Avg (3)
2010	mgd	0.87	0.65	0.53
2011	mgd	1.30 (1)	0.77	0.65
2012	mgd	0.98	0.79	0.61
2013	mgd	1.13	0.89	0.73
2014(4)	mgd	1.07	0.90	0.75
2015(5)	mgd	0.97	0.80	0.76
Maximum	**mgd**	**1.30**	**0.90**	**0.76**

Notes:
(1) The maximum daily flow rate is the highest reported daily flow rate. The highest maximum is used for acute aquatic life calculations. However, the maximum flow of 1.3 mgd was discounted because it was during an unusual flooding event.
(2) The maximum average monthly flow rate is the highest of the 30-day average flow rates reported on DMRs. This flow rate is used for chronic aquatic life and human health calculations.
(3) The annual average flow rate was calculated as the average of the reported 30-day average flow rates for the year.
(4) Process wastewater discharged through Outfall 001 to Yegen Drain until June 2014. After June 1, 2014, data for process wastewater discharged to City of Billings WWTF.
(5) Summary for discharge to City of Billings; data available through August 2015.

D. Compliance Summary

DEQ conducted four (4) compliance evaluation inspections since the permit was renewed in December 2009, with the following findings:

- 3/31/2010: no permit violations.
- 12/21/2010: no permit violations.
- 12/15/2011: violation letter for failure to meet sample analysis time for total residual chlorine (TRC) and pH, and failure to meet numeric effluent limits for TRC, oil & grease, and total suspended solids (TSS).
- 12/19/2013: no permit violations.

During the same time period, Phillips 66 experienced eight effluent and DMR violations:

- One failure to submit DMRs on time (December 2011);
- Oil & grease exceedances (December 2009, January 2010, and October 2011);
- TSS exceedances (May 2011, September 2011, and May 2014); and
- TRC exceedance (December 2010 - Outfall 002 daily max and monthly average).

DEQ and the Permittee entered into two Administrative Orders on Consent (AOCs):

- WQ-10-22 executed 12/17/2010 and closed 2/23/2011. Included an administrative penalty for seven (7) effluent exceedances between May 2007 and January 2010.
- WQ-13-06 executed 5/15/2013 and closed 7/16/2013. Included an administrative penalty for three (3) effluent exceedances between December 2010 and October 2011.

II. RATIONALE FOR PERMIT CONDITIONS

The Montana Water Quality Act requires that DEQ clearly specify in the permit any limitations imposed on the volume, strength, and other significant characteristics of the waste to be discharged. The control of pollutants discharged is established through effluent limitations and other requirements in the permit. There are two principal bases for effluent limitations: technology-based effluent limitations (TBELs) that specify the minimum level of treatment or control for conventional, non-conventional, and toxic pollutants; and water quality-based effluent limitations (WQBELs) that attain and maintain applicable numeric and narrative water quality standards. TBELs are based on implementing available technologies to reduce or treat pollutants while WQBELs are designed to protect the beneficial uses of the receiving water.

A. Technology-based Effluent Limits

1. Scope and Authority

Federal regulations at 40 Code of Federal Regulations (CFR) 122.44(a) require that permits include effluent limits based on applicable technology-based standards, in accordance with 40 CFR 125.3(a). These requirements are incorporated into the state regulations at ARM 17.30.1344(2) and ARM 17.30.1207. Technology-based requirements may be national standards established by the United States Environmental Protection Agency (EPA) pursuant to the CWA, or, in some cases, standards established by the permit writer on a case-by-case basis.

EPA has promulgated national technology-based standards of performance ["effluent limit guidelines (ELGs)"] at 40 CFR Subchapter N for dischargers other than publicly-owned treatment works. ELGs for industrial facilities are based on several levels of control:

- Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.
- Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.
- Best conventional pollutant control technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease.
- New source performance standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limits that represent state-of-the-art treatment technology for new sources.

A source is a new source if it meets the definition of new source in ARM 17.30.1304 and 17.30.1340(1) and a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger [ARM 17.30.1304 and 17.30.1340(2)]. A source is an existing source if it is not a new source or a new discharger [ARM 17.30.1304]. For purposes of applying ELGs, the existing sources standards (BPT, BCT, and BAT) apply to existing sources and new dischargers. NSPS apply

to new sources. Phillips 66 has not added or proposed to add any new processes (Ashley Thorson, email December 7, 2015); therefore, the Refinery is considered an existing source for purposes of applying the ELGs and the applicable requirements are BPT, BAT, and BCT.

In addition to reviewing the new source definition relating to ELGs, DEQ reviewed the potential for the facility to be considered a new or increased source under the nondegradation rules in ARM 17.30 Subchapter 7 (see discussion in Part II.B.3).

2. Applicable Technology-based Effluent Limits

a. Petroleum Refinery

EPA has established ELGs for petroleum refineries at 40 CFR Part 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*. 40 CFR Part 419 Appendix A provides a list of the processes included in the ELG development. **Table FS-09** summarizes process capacity at the facility in 1000 barrels per day (bpd) for each of the process categories listed in 40 CFR Part 419 Appendix A, as well as related processes.

Table FS-09. Phillips 66 Refinery Capacity (1000 bpd)

Process Category and Process Operation		2014 application
Crude Processes		
Atmospheric Distillation		61
Crude Desalting		61
Vacuum Distillation		32
Cracking and Coking		
Fluid Catalytic Cracking (Cat cracker)		20.5
Delayed Coking		19.5
Hydrotreating		89.4
Asphalt		
Asphalt Processes		0
Lube		
Lube Processes		0
Reforming and Alkylation		
Alkylation		0
Catalytic Reforming		14.8

DEQ reviewed the facility's petroleum processes, and confirmed that the Phillips 66 Refinery is subject to *Subpart B - Cracking Subcategory* (40 CFR 419.20), which states:

> "the provisions of this subpart are applicable to all discharges from any facility that produces petroleum products by the use of topping and cracking, whether or not the facility includes any process in addition to topping and cracking. The provisions of this subpart are not applicable, however, to facilities that include the processes specified in subparts C, D, or E of this part."

In summary, the provisions described in 40 CFR Part 419, Subpart B (Cracking) apply to all discharges from petroleum refining plants and associated areas, except for those under the following subcategories: Subpart C (Petrochemical), Subpart D (Lube), or Subpart E (Integrated).

DEQ developed facility-specific mass-loading limits for the Phillips 66 Refinery based on both relative and absolute process feedstock rates as set forth in 40 CFR Part 419 Subpart B (Cracking). The procedures are outlined in the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry*, EPA, June 1985, and remain the same as those described for the previous permit.

Regulated activities include discharges that are pumped, siphoned, or drained from preparation plant water circuits, ground water remediation, and ancillary areas related to the refining of petroleum. Details of the updated TBEL calculations, including the comparison of BPT, BAT, and BCT effluent limits using the ELG factor (lbs/1000 barrels), a facility-specific aggregate factor, and the refinery feedstock rate (bpd), are developed and presented in **Appendix C**.

b. Contaminated Storm Water Runoff

In addition to the above effluent limits, 40 CFR Part 419 Subpart B establishes BPT, BCT, and BAT level of control for contaminated runoff. 40 CFR 419.11(g) defines contaminated runoff as 'any runoff which comes into contact with any raw material, intermediate product, finished product, by-product, or waste product located on the petroleum refinery property.'

There are two types of contaminated runoff regulated under Subpart B: runoff commingled and runoff *not* commingled with process wastewater, as follows:

Runoff Commingled with Process Wastewater

Based on the 2014 renewal application's Water Flow Block Diagram, the refinery discharges 8 gpm of storm water mixed with process wastewater, which currently discharges to the City of Billings, but is permitted to discharge through Outfall 006. The previous storm water credit was calculated using the continuous allocation method, which uses one set of storm water runoff conditions for determining the credit, and that value is given throughout the year. This method is maintained with this renewal. The calculations for this credit are provided in Table C-9 in Appendix C.

Runoff not Commingled with Process Wastewater

The noncontact cooling water discharged with potentially contaminated runoff is not considered process wastewater; therefore Outfalls 003 – 005 are subject to this subsection. The refinery ELG allows the discharge of contaminated runoff that is not commingled or treated with process wastewater, provided no single grab or composite sample exceeds the TBELs of 15 mg/L oil and grease and 110 mg/L total organic carbon (TOC).

3. Calculated TBELs

Compliance with TBELs must be measured prior to dilution with the receiving water. ARM 17.30.1345(6)(a) requires that discharge limits for industrial facilities be stated as average monthly and maximum daily discharge limits unless impracticable. Effluent guidelines with numeric limits generally include both average monthly and maximum daily limits.

Outfalls 003, 004, and 005 - Storm Water

Accumulated storm water and noncontact steam condensate is pumped by the Refinery from storm water collection areas through these Outfalls 003 and 004 to the Yegen Drain and Outfall 005 to a branch of the Yegen Drain.

DEQ previously found that the discharge of accumulated storm water has a high potential to contain contaminants, and applied the ELG-based TBELs for contaminated runoff not commingled with process wastewater as best professional judgment (BPJ). This decision was based on the fact that there are raw materials, intermediate products, by-products and waste products within the drainage areas for the three proposed outfalls. Further, the facility is a complex industrial site where the presence of numerous pollutants, the potential for spills, and potential historical contamination all combine to increase the likelihood that storm water runoff from the proposed drainage areas will contain pollutants.

The TBELs for contaminated runoff not commingled with process wastewater will be applied to the three proposed outfalls. Effluent quality must meet the more stringent of either the TBELs (15 mg/L oil and grease, 110 mg/L TOC) or the applicable WQBELs, as presented in the Effluent Limits tables in Part III.C of this Fact Sheet. As the facility controls the release by determining when to pump the collected storm water, they may sample and analyze to demonstrate they meet the effluent limits by sampling either prior to release or during the first thirty minutes of any storm water discharge.

Outfall 006 Process Wastewater

The updated TBEL calculations for the process wastewater authorized to discharge through Outfall 006 to the Yellowstone River (previously Outfall 001 to the Yegen Drain) are presented in **Appendix C**.

The TBELs were developed in accordance with 40 CFR Part 419 Subpart B. DEQ included discharge from this outfall as part of "Outfall SUM-A" in conjunction with Outfall 002. A summary of the updated TBELs are presented in **Table FS-10**, which will be compared to the existing limits (see Part III.A). The most stringent will be the proposed permit limits with this renewal. In addition, this TBEL includes the requirement that the effluent pH will remain between 6.0 and 9.0 s.u. at all times.

Outfall 002 Hydrostatic Testing Wastewater

The 2009 permit renewal incorporated the hydrostatic testing discharge from Outfall 002, which had previously been permitted under a separate MPDES permit. Because hydrostatic testing discharge falls within the applicability description for 40 CFR Part 419 Subpart B, DEQ included discharge from this outfall under the process wastewater TBELs, as part of "Outfall SUM-A" in conjunction with Outfall 006. In addition, this TBEL includes the requirement that the effluent pH will remain between 6.0 and 9.0 s.u. at all times.

Table FS-10. Phillips 66 Refinery – Updated Process Wastewater TBELs - SUM-A (Sum of Outfalls 002 and 006)

Parameter	Units	Subpart B TBELs (1)	
		Maximum Daily Limits	Average Monthly Limits
Total Suspended Solids (TSS)	lb/day	831	530
5-Day Biochemical Oxygen Demand (BOD_5)	lb/day	1,192	662
Chemical Oxygen Demand (COD)	lb/day	8,907	4,622
Ammonia (as N)	lb/day	791	360
Oil & Grease	lb/day	361	193
Sulfide, Total	lb/day	7.8	3.5
Phenols	lb/day	8.9	4.3
Chromium, total recoverable	lb/day	18.0	6.5
Hexavalent Chromium	lb/day	1.20	0.53

Footnote:
(1) In addition, the pH is required to remain between 6.0 – 9.0 su at all times.

B. Water Quality-based Effluent Limits

1. Scope and Authority

Permits are required to include Water Quality-based Effluent Limits (WQBELs) if TBELs are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). Montana Code Annotated (MCA) 75-5-401(2) states that a permit may only be issued if DEQ finds that the issuance or continuance of the permit will not result in pollution of any state waters. ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any state water quality standards. In addition, dischargers are also subject to the mixing zone rules (ARM 17.30.501 et seq.) and Montana's nondegradation policy (ARM 17.30.701 et seq.).

Montana water quality standards (ARM 17.30.601 et seq.) define both water use classifications and designated uses for all state waters and numeric and narrative standards that protect those designated uses. These Surface Water Quality Standards include, by reference, *Circular DEQ-7—Montana Numeric Water Quality Standards* (October 2012), *Circular DEQ-12A* and *DEQ-12B—Montana Base Numeric Nutrient Standards* and *Nutrient Standards Variances* (July 2014), and the *Water Quality Standards Handbook, Second Edition*, EPA-823-B-94-005a, August 1994 (WQS Handbook), which sets forth procedures for development of site-specific criteria.

The purpose of this section is to provide a basis and rationale for the proposed effluent limits on the Phillips 66 discharges to protect designated uses of the receiving waters based on Montana water quality standards.

2. Receiving Water - Applicable Beneficial Uses and Numeric and Narrative Standards

This stretch of the Yellowstone River is identified as water body ID MT43F001_010, which is a B-3 waterbody subject to the water quality standards under ARM 17.30.625. According to the Clean Water Act Information Center (CWAIC) site, this segment is listed on the 2014 303(d) list as not supporting aquatic life, drinking water, and primary contact recreation. The causes of impairment include oil and grease, solids, arsenic, and nutrients (expressed as nutrient/eutrophication indicators, periphyton indicator, excess algal growth, benthic-macroinvertebrate bioassessments, and dissolved oxygen saturation).

The Yegen Drain is located within the Upper Yellowstone-Lake Basin watershed as identified on USGS Hydrological Unit Code (HUC) 10070004 and an unnumbered stream reach. The Yegen Drain is an irrigation drain ditch constructed to collect tail-waters from the Grey Eagle Ditch and intercept seasonally high groundwater in the area. The Yegen Drain enters the Yellowstone River immediately adjacent to the Burlington Northern railroad bridge between 1.3 and 1.7 miles downstream from Outfalls 002 – 004. In addition, Outfall 005 discharges to a branch of the Yegen Drain that joins with the main branch after 1,500 feet, before ultimately discharging into the Yellowstone River a total of 5,000 feet downstream. The Yegen Drain is classified as C-3 according to Montana Water Use Classifications, ARM 17.30.611(1)(c), and is subject to the water quality standards under ARM 17.30.629. It is not listed on the 2014 CWAIC list.

The beneficial uses applicable to the receiving waters are summarized in **Table FS-11**.

Table FS-11. Beneficial Uses of Receiving Waters

Outfalls	Rcvg Water	Classification	Beneficial Uses
002 – 004	Yegen Drain	C-3	• Bathing, swimming, and recreation • Growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers • Quality marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply
005	Branch of the Yegen Drain		
006	Yellowstone River	B-3	• Drinking, culinary and food processing purposes after conventional treatment • Bathing, swimming, and recreation • Growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers • Agricultural and industrial water supply

Receiving Water Characteristics

The magnitude of some numeric standards is dependent on critical characteristics of the receiving water such as pH, temperature, hardness, or the presence of certain fish species or early life stages of fish. The critical hardness value is the lower bound (25th percentile) of the interquartile range (IQR) of receiving water data. The critical pH and temperature values are the upper bound (75th percentile) of the IQR of receiving water data for these parameters.

In addition, DEQ reviewed whether salmonid fish are present: based on the beneficial use for B-3 & C-3 classified waters they are not present; however, review of MFISH for this stretch

of the Yellowstone River (mile 361) indicates that Mountain Whitefish and Rainbow Trout, both salmonids, are common. Therefore, DEQ has determined that salmonids are not present in the Yegen Drain, but are present in the Yellowstone River.

The specific data sources used to supply ambient data are as follows:

- *Yegen Drain (Outfalls 002 – 005):* The source of the ambient data for Yegen Drain remains unchanged from 2009. However, where the 75th percentile data was not previously provided, DEQ estimated it by averaging the average and maximum levels (see **Appendix Table D-4**). Much of the original data was based on *Yegen Drain Surface Water Discharge Data Collection and Surface Water Quality Sampling Report*, February 5, 2007, and *Yegen Drain 2007 Surface Water Discharge Data Collection Report*, January 11, 2008.
- *Yellowstone River (Outfall 006):* Data for the Yellowstone River ambient quality upstream from the proposed discharge are derived from the 2012 mixing zone study submitted by CH2MHILL as part of the 2014 modification (see **Appendix Table D-3**).

The receiving water characteristics used in determining specific numeric standards are shown in **Table FS-12**.

Table FS-12. Receiving Water Characteristics

Name of Receiving Water	Yegen Drain	Yellowstone River (Outfall 006)
Class of Receiving Water	C-3	B-3
Lower Bound Receiving Water Hardness (mg/L as $CaCO_3$) (1) (min. and/or default is 25 mg/L, and max. is 400 mg/L)	264	88
Upper Bound Receiving Water pH Value (2)	7.9	8.1
Upper Bound Receiving Water Temperature (°C) (2)	20.7	15.8
Are salmonid fish present in the receiving water?	No	Yes
Are fish in early life stages present in the receiving water?	Yes	Yes

Footnotes:
(1) DEQ typically uses the lower bound (25th percentile) for hardness; however, for Yegen Drain only the average hardness is available.
(2) The upper bound for pH and temperature is the 75th percentile of the datasets.

3. Nondegradation

Unless authorized by DEQ through a nondegradation analysis or exempted from review under 75-5-317, MCA, high quality waters must not be degraded [75-5-303(2)-(7), MCA and ARM 17.30.701]. High quality waters, as defined in 75-5-103(13), MCA and ARM 17.30.702(8), include all state surface waters except those not capable of supporting any one of the designated uses for their classification or that have zero flow or surface expression for more than 270 days during most years.

Both the Yegen Drain and the Yellowstone River itself are considered high quality water, except for those parameters identified as impaired for the Yellowstone River (see Part II.B.2) or found to not be meeting standards (Yegen Drain). In developing this renewed permit, DEQ

concluded that the Refinery discharge is not a new or increased discharge, and that existing uses of the receiving water are maintained and protected, as discussed below.

a. New or Increased Discharges

The provisions of ARM 17.30.701 et seq. (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit issued by DEQ prior to April 29, 1993, are not considered new or increased sources.

Phillips 66 is not a new source. In addition, the facility is not considered an increased source since, as discussed in Part II.A.3, the refinery's mass-based TBELs are capped at the most stringent level since 1993 (see **Table FS-20**). The level of treatment provided by the Facility is adequate to maintain discharge loads at current levels. Therefore, DEQ finds that Phillips 66 does not constitute a new or increased source within the definition of ARM 17.30.702.

b. Protection of Existing Uses

ARM 17.30.705(2)(a) requires that, for all state waters, existing and anticipated uses and the water quality necessary to protect those uses must be maintained. In practice, application of this regulation means that the effluent limits in an MPDES permit for a new or expanding discharge, just as the permit for any point source discharge, must be derived from and comply with all numeric and narrative standards associated with the existing and anticipated beneficial uses of the receiving water. Because there is no allowed increase in pollutant loadings from the discharge, issuance of the proposed permit complies with the requirements of this section of the regulations.

4. Mixing Zones

Under 75-5-301(4), MCA, the Board is required to adopt rules governing the granting of mixing zones. The Board adopted mixing zone regulations under ARM 17.30, Subchapter 5.

A mixing zone is defined as a limited area of a water body where initial dilution of a discharge takes place, where water quality changes may occur, and where certain numeric water quality standards may be exceeded [ARM 17.30.502(6)]. The mixing zone rules require DEQ to determine whether a mixing zone is appropriate for a particular discharge during the permit development process. Where a mixing zone is requested, DEQ must determine whether the requested mixing zone may be granted for a particular parameter and, if a mixing zone is granted, the type of mixing zone that is appropriate [ARM 17.30.515(1)].

Acute and chronic standards for aquatic life and human health standards may not be exceeded outside of the mixing zone [ARM 17.30.507(1)(a)]. The discharge must comply with the general prohibitions of ARM 17.30.637(1) which require that state surface waters, including mixing zones, must be free from substances which will:

(i) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;

(ii) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 mg/L) or globules of grease or other floating materials;

(iii) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

(iv) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and

(v) create conditions which produce undesirable aquatic life.

Acute numeric water quality standards may not be exceeded, even within a mixing zone, unless DEQ specifically finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses [ARM 17.30.507(1)(b)]. DEQ must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)].

Yegen Drain – Outfall 002 and Outfalls 003, 004, and 005

In the 2009 permit renewal, DEQ granted source-specific mixing zones for ammonia and selenium discharged through Outfalls 001 and 002 to the Yegen Drain. Chronic dilution was granted at 100% of the 7-day, l0-year low flow (7Q10) and acute dilution was granted at 10% of the 7Q10. According to the 2008 Fact Sheet for this renewal, the Yegen Drain 7Q10 is approximately one cubic foot per second (cfs, or 0.65 mgd), which occurs during February and March.

With this renewal, DEQ will continue to grant a chronic mixing zone for Outfall 002, with dilution at 100% of the 7Q10 of 0.65 mgd. The critical chronic discharge rate is 0.3 mgd based on the maximum of the monthly average for the two hydrostatic testing discharges since August 2014 (see **Table FS-05**). The resulting chronic dilution ratio used for RP analysis and effluent limit development for Outfall 002 is: 0.65 mgd/0.3 mgd = 2: 1.

In addition, 10% acute dilution will be maintained for parameters that exhibit first order rate of decay (i.e., ammonia and TRC). The critical discharge rate for the acute condition is 0.6 mgd based on the daily maximum flow reported for the two hydrostatic testing discharges since August 2014 (see **Table FS-05**). The resulting acute dilution for ammonia and TRC is calculated to be 0.065 mgd/0.6 mgd = 0.1: 1. However, available background data for Yegen Drain (see **Appendix Table D-4**) indicates that there is no assimilative capacity for ammonia (the background concentration is greater than the ammonia standards); therefore, no mixing zone is granted for ammonia.

The length of the chronic mixing zone is maintained at 200 feet (ten times the stream width at the point of discharge), and the length of the acute mixing zone is granted for 20 feet.

In addition, if needed DEQ may grant a nutrient mixing zone in the Yegen Drain based on the seasonal 14-day, 5-year low flow (14Q5). The length of the nutrient mixing zone is 200 feet. However, a seasonal 14Q5 has not been established for this receiving water.

No mixing zone was granted for the three storm water outfalls (Outfalls 003 – 005) in the 2012 modification as there was insufficient data. Since then effluent flow data and some pollutant concentration data have been provided. A chronic mixing zone will be granted for selenium in the Yegen Drain. The length of the chronic mixing zone is granted for 200 feet.

Yellowstone River- Outfall 006

DEQ first granted a mixing zone for the proposed discharge of the facility's treated process wastewater through a diffuser to the Yellowstone River at Outfall 006 in July 2014. The facility had submitted a permit modification application for chronic and acute source-specific mixing zones in September 2012 that included the results of a mixing zone study, *Outfall Mixing Zone Study Final Report, Phillips 66 Refinery, Billings, Montana*. DEQ reviewed the study, determined that it met the requirements of ARM 17.30.518(4), and granted the mixing zone in July 2014.

For this renewal, DEQ reviewed the available flow data for the Yellowstone River:

- The 7Q10 for USGS gauging station number 06214500 for the Yellowstone River at Billings is 1,130 cfs (730 mgd) [USGS draft *2015 Statistical Summaries of Streamflow in Montana*.] This is a slight increase over the 7Q10 of 1,110 cfs (717 mgd) provided in the previous USGS Statistical Summaries, issued in 2004.
- The seasonal 14Q5 for USGS gauging station number 06214500 is 2,282 cfs (1,475 mgd) for July through October [USGS draft *2015 Statistical Summaries of Streamflow in Montana*].

Chronic Dilution

The chronic mixing zone granted in 2014 extends 1,000 feet downstream in the Yellowstone River from the proposed effluent diffuser. The downstream width is approximately 65 feet. Based on the mixing zone study, the Yellowstone River will provide 430 cfs (280 mgd) of dilution, which was 39% of the previous 7Q10 (revised to 38% of the current 7Q10). In 2014, DEQ determined that the chronic dilution ratio was 280 mgd / 0.59 mgd average discharge = 475: 1.

As part of this renewal DEQ has determined that the correct discharge statistic to use in calculating the dilution ratio is the *maximum* of the average monthly flow for the POR, which is 0.90 mgd (see **Table FS-08**). Therefore, the dilution ratio used for chronic RP analysis and effluent limit development in this renewal is: 280 mgd / 0.90 mgd = 311: 1.

Acute Dilution

The acute mixing zone granted in 2014 extends 100 feet downstream from the proposed effluent diffuser with a downstream width of approximately 5 feet. Based on the mixing zone study, the Yellowstone River will provide 41 cfs (26.5 mgd) of dilution, which was 3.7% of the previous 7Q10 (revised to 3.6% of the current 7Q10).

Using the updated USGS 7Q10, the revised dilution allowance is 26.3 mgd. The maximum of the daily discharge rates, excluding the May 2011 flooding event, was 1.13 mgd. DEQ will continue to grant the acute mixing zone with a dilution ratio of 26.3 mgd / 1.13 mgd maximum daily = 23: 1 for all parameters discharged through Outfall 006.

5. Reasonable Potential Analysis and WQBEL Development

Pollutants of Concern

EPA regulations at 40 CFR 122.44(d), which are incorporated into ARM 17.30.1344 by reference, require that all effluents be assessed by DEQ to determine the need for WQBELs.

40 CFR 122.44(d)(1)(i) states, "Limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level that will *cause*, have the *reasonable potential to cause*, or *contribute* to an excursion above any state water quality standard." **Table FS-13** lists the basis for listing each Pollutant of Concern (POC), and whether a reasonable potential (RP) analysis was needed.

The below pollutants and parameters were identified as pollutants of concern (POC) for each outfall for one or more of the following reasons:

- they have listed TBELs such as the refinery ELG;
- they were identified as needing WQBELs in the previous permit;
- they are identified as present in the effluent through monitoring or otherwise expected present in the discharge; or
- they are pollutants associated with an impairment of the receiving waterbody.

Table FS-13. POC and Need for RP Analysis

Parameters	Identified as a POC- Reason?[1]			If POC, need RP Analysis[2]?
	Outfall 002 Hydrostatic (Yegen Drain)	Outfall 006 (Yellowstone River)	Outfalls 003 – 005 Storm Water (Yegen Drain)	
pH	Yes - TBEL		Yes – Known present	No
Total Suspended Solids (TSS)	Yes - TBEL		No	No – no WQS
5-Day Biochemical Oxygen Demand (BOD_5)	Yes - TBEL		No	No – no WQS
Chemical Oxygen Demand (COD)	Yes - TBEL		No	No – no WQS
Total Organic Carbon (TOC)	Yes – Known present		Yes - TBEL	No – no WQS
Ammonia (as N)	Yes - TBEL		Yes - Known present	Yes – DEQ-7
Oil & Grease	Yes - TBEL and impairment			No – Subchapter 6
Sulfide, Total	Yes - TBEL		Yes - Known present	Yes – DEQ-7 (H_2S)
Phenols	Yes - TBEL		Yes - Known present	Yes – DEQ-7
Chromium, total recoverable	Yes - TBEL		Yes - Known present	Yes – DEQ-7
Hexavalent Chromium	Yes - TBEL		No	Yes – DEQ-7
Nitrate + Nitrite	Yes - Known present			Yes – DEQ-7
Total Nitrogen	Yes - Believed present and impairment			Yes – DEQ-12A [3]
Total Phosphorus	Yes - Believed present and impairment			Yes – DEQ-12A [3]
Total Residual Chlorine	Yes - Known present and previous		No	Yes – DEQ-7
Fluoride	Yes - Known present		No	Yes – DEQ-7
Benzene	No	Yes - Known present		Yes – DEQ-7
Toluene	No	No	Yes - Known present	Yes – DEQ-7
Xylene	No	No	Yes - Known present	Yes – DEQ-7
Aluminum, dissolved	Yes - Known present		No	Yes – DEQ-7
Arsenic, total recoverableTR	Yes - Known present and impairment			Yes – DEQ-7
Barium, total recoverable	No	Yes - Known present	No	Yes – DEQ-7
Cadmium, total recoverable	No	Yes - Known present	No	Yes – DEQ-7
Copper, total recoverable	Yes - Known present			Yes – DEQ-7
Cyanide, Total	No	Yes - Known present	No	Yes – DEQ-7
Iron, total recoverable	Yes - Known present		No	Yes – DEQ-7
Lead, total recoverable	Yes - Known present			Yes – DEQ-7
Mercury, total recoverable	No	Yes - Known present	No	Yes – DEQ-7
Nickel, total recoverable	No	Yes - Known present	No	Yes – DEQ-7
Selenium, total recoverable	Yes - Known present [4] and previous		Yes – Known present	Yes – DEQ-7
Thallium, total recoverable	No	Yes – Known present	No	Yes – DEQ-7
Zinc, total recoverable	No	Yes - Known present	No	Yes – DEQ-7

Footnotes:

(1) POC listed as "known present" if there was at least one sample reported with a concentration greater than the required reporting value (RRV) in Circular DEQ-7 (DEQ-7). However, many of the Outfall 002 'known present' parameters were based on data taken before the source water was switched to city water.

(2) Reasonable Potential (RP) Analysis required if there is an applicable numeric standard.

(3) The Yellowstone River in this area is identified as a large river segment that currently does not have numeric nutrient standards in Department Circular DEQ-12A, July 2014.

(4) Although Phillips 66 indicated selenium was believed absent in the Outfall 002 discharge on the Form 2C submitted in June 2014, testing performed since then has documented 0.001 and 0.003 mg/L selenium.

RP Analysis Background

DEQ conducted an RP analysis for each POC that has an applicable water quality standard, to evaluate whether Phillips 66 has RP to exceed standards in either:

- *Outfall 002* – Yegen Drain
- *Outfall 003* to *005 (integrated storm water outfalls)* – Yegen Drain
- *Outfall 006* – Yellowstone River

RP for the discharge to cause exceedances of a WQBEL was evaluated using the following mass-balance equation (*Eq. 1*):

$$C_r = \frac{Q_d C_d + Q_s C_s}{Q_d + Q_s} \qquad (Eq.\ 1)$$

Given:

C_r = the resulting receiving water concentration
Q_d = critical discharge flow rate
C_d = critical discharge pollutant concentration
[= maximum concentration during the POR x TSD multiplier (C_{95})]
Q_s = critical stream flow (7Q10 x available dilution)
C_s = critical background receiving water pollutant concentration (75th percentile)

Where the projected receiving water concentration (C_r) exceeds the lowest applicable numeric standard for the pollutant of concern, there is RP and WQBELs must be calculated. The RP analyses are provided in **Appendix E**. The following assumptions were made:

Critical Discharge Flow (Q_d)

For industrial sources, the critical discharge flow rate is based on a reasonable measure of actual production [ARM 17.30.1345(2)(b)]. In this case, the critical discharge flow rates were based on actual flow for the past five years and are summarized below in **Table FS-14**:

Table FS-14. Critical Discharge Flow (Q_d)

	Acute Maximum daily flow	Chronic Maximum average monthly flow
Outfall 002	0.9 mgd	0.3 mgd
Outfall 006	1.13 mgd (1)	0.9 mgd
Storm Water (2)	300 gpm (0.43 mgd)	54 gpm (0.078 mgd)

Footnote:
(1) DEQ discounted the maximum daily flow of 1.3 mgd in May 2011 based on comments by Phillips 66 that this flow was elevated due to pumping flood waters.
(2) Critical discharge flow figures for storm water. The acute (maximum daily) flow is based on the maximum pump rating for the dedicated pump being installed for Outfall 004 in 2016. The chronic (maximum monthly average) flow is based on Form 2C Part II.B for Outfall 004 submitted June 2014.

Critical Discharge Pollutant Concentration (C_d)

The critical discharge concentration (C_d) is based on the 95th percentile of the expected effluent concentration observed or predicted in the discharge. Due to the low frequency of samples and the non-normal distribution of most effluents, DEQ follows the estimation procedures described in EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD) (EPA/505/2-90-001, March 1991) to estimate the 95th percentile of the daily values, by multiplying the maximum discharge concentration observed during the POR by a TSD multiplier, calculated using the number of effluent samples and corresponding coefficient of variation (CV).

The C_d is developed in **Appendix E Table E-1** (Outfall 006), **Table E-4** (Outfall 002), and **Table E-7** (Outfalls 003 – 005). These tables provide the derivation for C_d for those parameters of concern listed in **Table FS-13** that were identified as needing an RP analysis**.**

Critical Stream Flow (Q_s)

Other than for nutrients, critical stream flow is based on the available part of the 7Q10 considering dilution for any parameters with assimilative capacity (see Part II.B.4). For nutrients, critical stream flow is based on the seasonal 14Q5. This is summarized below in **Table FS-15** for the Yegen Drain and Yellowstone River:

Table FS-15. Critical Receiving Water Flow (Q_s)

Outfall	Receiving Water	Acute	Chronic / Human Health	Nutrients (14Q5)
Outfall 002 to 005	Yegen Drain	0.1 cfs (0.065 mgd) (1)	1 cfs (0.65 mgd)	Unknown
Outfall 006	Yellowstone River	41 cfs (26.3 mgd)	430 cfs (280 mgd)	2,282 cfs (1,475 mgd)

Footnote:
(1) Acute dilution granted for TRC or other parameters with assimilative capacity, which exhibit a first order rate of decay. No acute dilution is granted for metals discharged into the Yegen Drain.

Critical Receiving Water Background Pollutant Concentration (C_s)

For purposes of conducting an RP analysis and determining assimilative capacity, the critical background receiving water concentration (C_s) is defined to be the 75th percentile or upper bound estimate of the interquartile range of the data. The critical receiving water background concentrations are presented in **Appendix D**.

RP Analysis Summary

ARM 17.30.1344 requires DEQ to develop WQBELs for any pollutant for which there is RP to cause or contribute to exceedances of instream numeric or narrative water quality standards, after application of any approved mixing zones. **Appendix E** presents the numeric RP analysis for Outfall 006 (**Table E-2**), Outfall 002 (**Table E-5**), and Outfalls 003 -005 (**Table E-8**), based on the methodology described in EPA's TSD document as shown in *Equation 1*, above. Later in this section, WQBELs are developed for any parameter with RP.

Outfall 006 (Process Wastewater):

Table FS-16 summarizes the parameters with RP for Outfall 006 (see **Appendix E Table E-2** for the analysis):

Table FS-16. Summary of Parameters with RP (Outfall 006 to Yellowstone River)

Parameter	Units	Surface Water Quality Standards			Concentration after Mixing (C_r)		RP (WQBEL Needed?)
		Acute	Chronic	Human Health	Acute	Chronic/ HHS (1)	
Arsenic, total recoverable	µg/L	340	150	10	20	12 / 225	RP - HHS

Footnote:
(1) DEQ does not grant mixing zones for parameters that have no assimilative capacity (i.e. the 75th percentile ambient condition exceeds the applicable standard). In those cases $C_r = C_d$.

The following provides additional information on the RP analysis for Outfall 006 summarized in **Appendix E**:

- *Arsenic* – This segment of the Yellowstone River is listed as impaired for arsenic, with natural sources identified as the probable source. Based on information supplied by Phillips 66 in 2012, the 75th percentile of 179 ambient arsenic samples from the Billings Water Treatment Plant and 24 additional samples taken by CH2MHill is 11.2 mg/L. Therefore, the upstream arsenic concentration is greater than the HHS of 10 µg/L and there is no assimilative capacity. With the critical discharge concentration of 225 µg/L, Phillips 66 has the potential to contribute to an exceedence of the arsenic HHS. WQBELs for arsenic are developed in the next section.

- *Hydrogen Sulfide* – Total Sulfide is a TBEL and known to be present in the process wastewater discharge. However, Circular DEQ-7 does not include a water quality standard for sulfide. The relevant water quality standard is the chronic aquatic life standard for hydrogen sulfide (H_2S) of 0.002 mg/L (or 2 µg/L); however the facility did not provide H_2S discharge data.

  Based on Method 4500-S^2- H. Calculation of Un-Ionized Hydrogen Sulfide, *Standard Methods for the Examination of Water and Wastewater*, 22nd Edition, 2012 (*Standard Methods*), there is a relationship between dissolved sulfide and H_2S. Dissolved sulfide is comprised of H_2S and bisulfide ion, with the portion dependent on pH. As pH increases, the percentage of H_2S decreases, such that at pH 7.0 approximately fifty percent of the dissolved sulfide is in the form of H_2S while at pH 9.0 approximately one percent is H_2S.

  Phillips 66 provided total sulfide data, but was never requested and did not provide the percentage of total sulfide that is dissolved. Therefore, DEQ does not have sufficient data to determine RP for H_2S. Monitoring sufficient to determine RP will be required for this permit cycle.

- *Mercury* – all 12 upstream mercury samples were nondetect at 0.06 µg/L. Since this detection level was above both the RRV and the HHS, it is not known whether the facility has RP to cause or contribute to an exceedence of the HHS of 0.05 µg/L for mercury. Therefore, additional monitoring for mercury at the RRV of 0.005 µg/L will be required for this permit cycle.

- *Total Nitrogen (TN) and Total Phosphorus (TP)* – there are currently no TN or TP standards under Circular DEQ-12A for this stream assessment unit. However, DEQ conducted an RP analysis to determine whether Phillips 66 had RP to cause a problem in the Yellowstone River, because this segment is listed as impaired for nutrients (expressed as nutrient/ eutrophication indicators, periphyton indicator, excess algal growth, benthic-macroinvertebrate bioassessments, and dissolved oxygen saturation).

  TN

  DEQ based the TN RP analysis on a reasonable approximation of the expected standards under Circular DEQ-12A, in order to evaluate and prevent harm to use [ARM 17.30.637(1)]. Known TN standards for the Yellowstone River downstream from Billings are 0.815 mg/L from Powder River to the state line, and 0.655 mg/L from Bighorn River to the Powder River. Since the TN standards become more stringent further upstream, DEQ included an anticipated standard of 0.5 mg/L TN for the RP analysis.

  The critical discharge concentration was calculated as 75 mg/L TN. As 12 of the 14 upstream TN samples were nondetect at 0.5 mg/L (the other two were 0.3 and 1.0 mg/L), the 75th percentile ambient TN concentration for the Yellowstone River is "< 0.5 mg/L." This is roughly equivalent to the anticipated standard, and RP could not be determined. Additional monitoring of both the effluent and upstream conditions at the RRV listed in Circular DEQ-12A will be required for this permit cycle between August 1st and October 31st, in order to determine RP and develop any necessary WQBELs.

  TP

  Similarly, DEQ based the TP analysis on a reasonable approximation of the expected standards under Circular DEQ-12A, in order to evaluate and prevent harm to use [ARM 17.30.637(1)]. Known TP standards for the Yellowstone River downstream are 0.095 mg/L approaching the state line and 0.055 mg/L from Bighorn River to the Powder River. Since the standards become more stringent further upstream, DEQ included an anticipated standard of 0.05 mg/L TP for the RP analysis.

  The 75th percentile of the ambient TP concentrations was 0.04 mg/L; therefore there is assimilative capacity. The critical discharge TP concentration was calculated to be 5.7 mg/L. Based on the TSD method, the critical downstream concentration is calculated as 0.043 mg/L and Phillips 66 does not have RP to cause or contribute to an exceedence of the projected TP standard. Additional monitoring of both the effluent and upstream conditions at the RRV listed in Circular DEQ-12A will be required for this permit cycle between August 1st and October 31st.

- *Thallium* – all nine effluent samples and the 20 upstream samples were nondetect at 0.3 µg/L. This detection limit was insufficient to determine whether the facility had RP to exceed the HHS of 0.24 µg/L. Therefore, additional monitoring at the RRV of 0.2 µg/L will be required for this permit cycle.

- *Temperature* – the refinery discharges cooling water and other process water with elevated temperature. Temperature increases for B-3 waterbodies are regulated under ARM 17.30.625 "A 3ºF maximum increase above naturally occurring water temperature is allowed..."

Given:

- One (1) British Thermal Unit (BTU) is the amount of heat necessary to raise one (1) pound of water 1°F.
- *Discharge – critical assumptions*:
  Maximum discharge rate = 1.13 mgd = 1.13 x 10^6 gal/day
  Maximum temperature = 82.6 °F (28.1 °C in Form 2C)
- *Yellowstone River*:
  Critical flow (calculated 7Q10) = 1130 cfs = 730 mgd = 7.3 x 10^8 gal/day
  Critical ambient water temperature = 60.4 °F (15.8 °C, 75th percentile)

To determine whether the refinery has RP to exceed the temperature standard, DEQ reviewed the following:

Calculated Max BTU/day = 1.13 x 10^6 gal/day x [82.6 °F - 60.4 °F] x 8.34 lb/gal
= 2.1 x 10^8 BTU/day

Calculated Allowed BTU/day = 7.3 x 10^8 gal/day x 3 °F (Δ temp) x 8.34 lb/gal
= 1.8 x 10^{10} BTU/day

→ Since 1.8 x 10^{10} BTU/day required to cause a temperature increase greater than the standard is more than the 2.1 x 10^8 BTU/day maximum heat input expected from the refinery, there is no RP to exceed the temperature standard, and no limit is necessary. Monthly monitoring of the effluent temperature will be required.

***Outfall 002 (Hydrostatic Testing)*:**

Table FS-17 summarizes the data for the parameters with RP after mixing for Outfall 002 (see **Appendix E Table E-5** for the analysis):

Table FS-17. Summary of Parameters with RP (Outfall 002 Yegen Drain)

Parameter	Units	Surface Water Quality Standards			Concentration after Mixing (C_r)		RP (WQBEL Needed)
		Acute	Chronic	Human Health	Acute	Chronic/ HHS (1)	
Ammonia (as N) (2)	mg/L	10	1.9	NA	3.2	3.2	RP to exceed chronic
Total Residual Chlorine (TRC)	µg/L	19	11	4,000	<340	<120	RP to exceed acute & chronic
Selenium, total recoverable	µg/L	20	5	50	11	11	RP to exceed chronic

Footnotes:
(1) DEQ does not grant mixing zones for parameters that have no assimilative capacity (i.e. the 75th percentile ambient condition exceeds the applicable standard). In those cases $C_r = C_d$.
(2) Ammonia standards based on the Yegen Drain's 75th percentile of pH of 7.9 su and temperature of 20.7°C.

There is RP and DEQ will develop necessary WQBELs for ammonia, TRC, and selenium. The following discussion provides information on additional RP analysis for Outfall 002 to the Yegen Drain:

- *H_2S* – see discussion on sulfide and H_2S for Outfall 006. Additional data will be required for this permit cycle to determine RP during the next permit renewal.

- *Arsenic* – The critical arsenic concentration after mixing (C_r) was calculated as 8.8 µg/L which is below the HHS of 10 µg/L. However, additional monitoring will be required for this permit cycle since this RP analysis was based on extremely limited effluent data and an assumed upstream concentration of 0 µg/L, as there was no ambient data.
- *Hexavalent Chromium, Copper* - Since the effluent analyses were nondetect at levels that were too high to meet the RRVs (< 10 µg/L vs. 2 µg/L for hexavalent chromium and < 10 µg/L vs. 2 µg/L for total recoverable copper) and the limited data set resulted in a large TSD multiplier, the C_d may over-state the discharge concentration. In addition, there was no upstream data for these two metals. Effluent and upstream monitoring at the RRV will be required for this permit cycle.
- *TN & TP* –There are currently no nutrient standards under Circular DEQ-12A for the segment of the Yellowstone River that receives the Yegen Drain discharge. However, the immediate receiving water for Outfall 002 is the Yegen Drain which is located in the Northwestern Great Plains Ecoregion. The applicable water quality standards for this ecoregion are 1.3 mg/L TN and 0.15 mg/L TP during the growing season of July 1st and September 30th. Because the discharge is to a wadeable stream the water quality standards apply to this discharge. Furthermore, the segment of the Yellowstone that receives the Yegen Drain flow is listed as impaired for nutrients.

  An RP analysis could not be conducted for TN and TP from Outfall 002, as the following data is unavailable:
  - effluent TN or TP concentrations,
  - upstream TN and TP concentrations (only one data point, from 2008), and
  - seasonal 14Q5.

  Therefore, effluent and upstream monitoring for nutrients and the 14Q5 will be required for this permit cycle between July 1st and September 30th.
- *Oil & Grease* – Based on the two data points since August 2014, the facility does not have RP to exceed the 10 mg/L oil & grease narrative standard. However, oil & grease is a POC that could be reasonably expected in the discharge from hydrostatic testing and this parameter is regulated under the refinery ELG. The O & G limit will be maintained.

Outfalls 003 – 005 (Storm Water)

Table FS-18 summarizes the data for the parameters with RP after mixing for storm water Outfalls 003 -005 (see **Appendix E Table E-8** for the analysis):

Table FS-18. Summary of Parameters with RP (Storm Water Outfalls 003 - 005)

Parameter	Units	Surface Water Quality Standards			Concentration after Mixing (C_r)		RP (WQBEL Needed)
		Acute	Chronic	Human Health	Acute	Chronic/ HHS	
Selenium, total recoverable	µg/L	20	5	50	26	26	RP - acute & chronic

There is RP and DEQ will develop necessary WQBELs for selenium. The following discussion provides information on additional RP analysis for storm water outfalls 003 - 005:

- *Hydrogen Sulfide (H_2S)* – see discussion on sulfide and H_2S for Outfall 006.
- *Arsenic* – The critical effluent concentration of arsenic was based on scaling up 15 µg/L, which was the maximum of four samples taken from Outfall 004 and the two nondetects (<5 µg/L) results from representative samples for Outfall 003 and 005. However, there is no ambient arsenic data for the Yegen Drain; assuming an upstream concentration of "0 µg/L" indicated no RP. Monitoring of the storm water discharge and the Yegen Drain will be required for this permit cycle.
- *Hexavalent Chromium* – Since the effluent analyses were nondetect at levels that were too high to meet the RRV (< 10 µg/L vs. 2 µg/L hexavalent chromium) and the limited data set resulted in a relatively large TSD multiplier, the C_d may inflate the discharge concentration. In addition, there was no upstream data. Effluent and upstream monitoring at the RRV will be required for this permit cycle.
- *Copper* – Based on the critical discharge concentration developed using the one total recoverable copper effluent sample and high TSD multiplier, there is RP to exceed the copper standard for all three storm water outfalls. However, if there were more samples and a lower TSD multiplier, there would not be RP at this sample concentration. Effluent and upstream monitoring at the RRV will be required for this permit cycle in order to provide sufficient information to make a determination.
- *Total Nitrogen & Total Phosphorus* –The immediate receiving water for Outfalls 003 - 005 is the Yegen Drain which is located in the Northwestern Great Plains Ecoregion. The applicable nutrient standards for this ecoregion are 1.3 mg/L TN and 0.15 mg/L TP during the growing season of July 1st and September 30th. Because the discharge is to a wadeable stream the water quality standards apply to this discharge. Furthermore, the segment of the Yellowstone that receives the Yegen Drain flow is listed as impaired for nutrients.

  Assuming an upstream concentration of "0 mg/L" TN and TP, there is no RP to exceed the TN and TP standards. However, upstream data is needed to conduct an RP analysis for storm water discharges from Outfalls 003, 004, and 005 to the Yegen Drain, as follows:

  - upstream TN and TP concentrations (only one data point, from 2008), and
  - seasonal 14Q5.

  Therefore, effluent and upstream monitoring for nutrients and the 14Q5 will be required for this permit cycle between July 1st and September 30th.
- *Oil & Grease* – It is unknown whether the facility has RP to exceed the 10 mg/L oil & grease narrative standard for storm water since the six samples were all nondetect at 5 mg/L. However, oil & grease is a POC that could be reasonably expected in the discharge and this parameter is regulated under the refinery ELG. The O & G limit will be maintained as discussed below.

Summary of WQBEL Evaluation

DEQ considers the TBELs developed in Part II. A as sufficient to protect the receiving waters for the following parameters: BOD_5, COD, TSS, and pH. In this section DEQ developed WQBELs for oil & grease and any parameters with RP to exceed a water quality standard.

Oil & Grease

DEQ develops oil & grease effluent limit based on ARM 17.30.637(1)(b), which requires discharges to meet a water quality standard of 10 mg/L. Based on current data, the facility has RP to exceed this standard at Outfall 006 and the limit will be maintained. In addition, even though RP at Outfalls 002 – 005 has not been demonstrated, the oil & grease limit will be maintained for the following reasons:

- Yellowstone River is listed as impaired for oil & grease in this segment,
- The refinery ELG includes oil & grease as a regulated parameter, and
- The previous permit included concentration limits of 10 mg/L for every outfall and there was limited data (< 10 data points) for either the hydrostatic testing or the storm water discharges.

Numeric Water Quality Standards

To establish WQBELs for most parameters with RP, DEQ first calculates Wasteload Allocations (WLAs) from the applicable numeric water quality standards. These WLAs are then translated into Average Monthly Limits (AMLs) and Maximum Daily Limits (MDLs) based on the TSD approach.

As shown in *Equation 2* below, the mass-balance equation can be arranged to calculate the WLA (C_d) so that the discharge does not cause or contribute to an exceedance of the applicable water quality standard under critical conditions.

$$C_d = \frac{Q_r C_r - Q_s C_s}{Q_d} \qquad (Eq.\ 2)$$

The equation can also be expressed as:

$$C_d = C_r + [(Q_s/Q_d) \times (C_r - C_s)]$$

Given:

C_d = WLA (effluent pollutant concentration in mg/L or µg/L)
$Q_r = Q_s + Q_d$ (the resulting receiving water flow)
C_r = the resulting receiving water concentration after mixing
Q_s = critical stream flow of receiving water (available dilution of 7Q10)
C_s = critical river concentration (75th percentile ambient concentration)
Q_d = critical effluent discharge flow rate

The applicable WLA are converted to effluent limitations based on the procedures given in EPA's TSD (pp. 93-114). In most cases, there are at least two aquatic life WLAs, namely a WLA based on the acute aquatic life standard (WLAa) and a WLA based on the chronic aquatic life standard (WLAc).

For each of these WLAs, there is a corresponding long-term average effluent concentration (LTA) calculated by multiplying the WLA by a factor (WLA multiplier). Since the calculated

LTAs do not have different averaging periods, they are directly comparable in order to select the most protective aquatic life LTA (i.e., the LTA that ensures that both aquatic life WLAs are met). Effluent limitations for protection of aquatic life are calculated by multiplying the most protective aquatic life LTA by multipliers based on the lognormal distribution. Each multiplier is a statistically-based factor that reflects the relationship between the LTA and the effluent limitations.

For parameters where the HHS is the limiting criteria, the AML is set equal to the WLA, in accordance with TSD Section 5.4.4. Where the discharge is to a water body with no available dilution, or that is not meeting a numeric standard and has no assimilative capacity, the WLA_{HHS} (and therefore the AML) is equal to the HHS. However in accordance with Circular DEQ-7 Footnote 16 for HHS '…concentrations may not exceed these values;' so the MDL is also set at the HHS.

Outfall 006 – WQBELs based on Numeric Standards:

Arsenic

As discussed in the previous section, the Yellowstone River has elevated arsenic levels and there is no assimilative capacity for meeting the HHS. The critical discharge concentration (C_d) was calculated to be 225 µg/L; with no assimilative capacity the facility has RP to exceed the arsenic HHS of 10 µg/L.

DEQ recognizes that much of the arsenic contribution in the Yellowstone River is from nonanthropogenic sources, and the resulting natural condition contributes to the arsenic background exceeding the HHS. DEQ has concluded for this permit, and other permits, that it is appropriate to use the 25th percentile ambient arsenic concentration as the arsenic effluent limits for Phillip 66. This approach is consistent with MCA 75-5-306 and SB 325, and is a reasonable approach to ensure that the beneficial uses of the Yellowstone River are protected.

However, in this case the 25th percentile ambient arsenic concentration is below the 10 µg/L HHS, at 6.8 µg/L (and even the average arsenic concentration of 8.6 µg/L is below the HHS). DEQ will set the WLA_{HHS} to the standard; as a result the AML is set at the standard. In addition, the MDL was also set at the HHS based on Circular DEQ-7 Footnote 16.

Table FS-19 provides a summary of the Outfall 006 WQBELs (see **Appendix Table E-3**). The below table includes a comparison between the proposed WQBELs and the current effluent quality.

Because the diffuser is not yet constructed and the facility currently discharges their process wastewater to the City for treatment, DEQ is not proposing a compliance schedule or interim limits for Outfall 006.

Table FS-19: Proposed Numeric WQBELs (Outfall 006 – Yellowstone River)

Parameter	Units	WQBEL		Max Observed Effluent Conc.	Meet Proposed Standards?
		MDL	AML		
Oil & Grease	mg/L	10	NA	14	Yes (1)
Arsenic, total recoverable	µg/L	10	10	146	No

Footnote:
(1) The elevated concentration of 14 mg/L was observed in October 2011. Since then the highest oil & grease concentration observed was 7 mg/L.

Outfall 002 – WQBELs based on Numeric Standards:

Table FS-20 provides a summary of the Outfall 002 WQBELs for the parameters with RP to exceed numeric standards (see **Appendix Table E-6**). The table includes a comparison between the proposed WQBELs and the current effluent quality for the discharge from Outfall 002.

Table FS-20: Proposed Numeric WQBELs (Outfall 002 – Yegen Drain)

Parameter	Units	WQBEL		Max Observed Effluent Conc.(1)	Meet Proposed Standards?
		MDL	AML		
Oil & Grease	mg/L	10	NA	1	Yes
Ammonia (as N)	mg/L	4.6	2.3	0.8	Yes
Total Residual Chlorine	µg/L	21	10	< 100	Yes (2)
Selenium, total recoverable	µg/L	8.2	4.1	3	Yes

Footnotes:
(1) The maximum observed concentrations after the water supply for hydrostatic testing switched to city water in August 2014.
(2) Nondetect at the Required Reporting Value (RRV) of 100 µg/L demonstrates compliance with the TRC limits.

Outfalls 003 to 005 – WQBELs based on Numeric Standards:

Tables FS-21 provides a summary of the WQBELs at the storm water Outfalls 003, 004, and 005 for the parameters with RP to exceed numeric standards (see **Appendix E Table E-9**). The below table includes a comparison between the proposed WQBELs and the current storm water quality. DEQ has concluded that Phillips 66 cannot meet the storm water selenium effluent limits; therefore a four-year compliance schedule for this parameter has been included.

Table FS-21: Proposed WQBELs (Storm Water Outfalls 003, 004, and 005)

Parameter	Units	WQBEL		Effluent Quality Max Observed	Meet Proposed Standards?
		MDL	AML		
Oil & Grease	mg/L	10	NA	<5	Yes
Selenium, total recoverable	µg/L	8.2	4.1	15	No

6. Whole Effluent Toxicity (WET) Limits

ARM 17.30.637(1)(d) requires that state waters be free from substances which will create conditions or combinations of material which are toxic or harmful to human, animals, plant or aquatic life. ARM 17.30.646 requires the use of bioassay testing as defined in 40 CFR 136.3 to measure aquatic toxicity. Chronic and acute toxicity are measured by whole effluent toxicity (WET) testing using serial dilution of effluent and receiving water. WET tests assess any negative effects caused by aggregate or synergistic effects of pollutants in the discharge, as well as toxicity due to unknown or non-quantified pollutants present in the discharge or receiving water.

Acute toxicity occurs when 50 percent mortality is observed for any test species at any effluent concentration ($LC_{50} \leq 100\%$ effluent). Chronic toxicity occurs when the 25th percent inhibition concentration (IC_{25}) based on survival and growth, or, survival and reproduction, is less than or equal to the effluent dilution (% effluent) authorized in the permit. DEQ requires chronic testing when the effluent dilution ratio is less than 10:1. These endpoints assure no acute lethality to organisms in the mixing zone and no chronic toxicity outside of any DEQ-approved mixing zone.

The previous permit contain narrative prohibition against acute toxicity for both Outfall 002 and 006, based on ARM 17.30.637(1)(d). Furthermore, the permit required the permittee to conduct acute WET static renewal tests on two species, *Ceriodaphnia dubia* and *Pimephales promelas*, for process wastewater from Outfall 001/006 and Outfall 002 (quarterly) and Outfall 004 (annually). The permittee was allowed to reduce testing to alternating species after passing four consecutive quarters. The following summarizes the refinery's WET test results for the POR and the proposed WET testing required in the proposed permit:

- *Outfall 006:* The dilution ratio for discharge of process wastewater to the Yellowstone River is greater than 100:1, therefore the two-species acute WET test is appropriate. After passing the first four quarters with two species, the refinery conducted WET tests on alternating species. The facility passed all six quarterly WET tests for *Ceriodaphnia dubia*, but failed two out of seven quarters for *Pimephales promelas*. Therefore, there is RP and 'no acute toxicity' will be included as an effluent limit. Quarterly two-species monitoring will be required.
- *Outfall 002*: The dilution ratio is less than 10:1 which typically indicates chronic WET testing; however, the hydrostatic testing discharge is periodic and acute testing is appropriate. The facility passed all seven two-species acute WET tests conducted since 2010 (including the two conducted since the water source was changed to City water in 2014). DEQ is removing the WET testing and limit for this outfall as there were no acute WET test failures, the discharge is less than one mgd and is periodic, and monitoring and reporting of the expected pollutants of concern is already required.
- *Outfall 004* (or representative storm water outfall): DEQ incorporated the storm water discharges into the refinery's permit in 2012; however, there was no storm water discharge until 2014. As the storm water discharges are periodic, acute testing on two species is appropriate. The facility conducted and passed an acute two-species WET test in 2014. No report has been submitted yet for 2015. Since the facility passed the one WET test to date, DEQ did not find RP. Due to the extremely limited data, acute toxicity will not be an effluent limit, but will be included as monitoring.

III. FINAL EFFLUENT LIMITS

The final effluent limits in the permit are based on the more stringent of the calculated TBELs and WQBELs for each parameter, subject to an anti-backsliding analysis.

A. Anti-backsliding Analysis

Section 402(o) of the Clean Water Act and 40 CFR 122.44(l) require, with some exceptions, that effluent limits or conditions in reissued permits be at least as stringent as those in the existing permit. In Appendix C, DEQ developed the current TBELs.

Table FS-22 compares these calculated TBELs to the previous TBELs in the existing permit**.** The updated TBELs are less stringent than the existing permit limits and therefore the existing TBEL permit limits will be maintained for SUM-A.

Table FS-22. Comparison of Existing and Calculated TBELs for SUM-A (1)

Parameter	Units	Maximum Daily Limits		Average Monthly Limits	
		Previous (Existing)	Calculated (Current)	Previous (Existing)	Calculated (Current)
Total Suspended Solids (TSS)	lb/day	**338**	831	**215**	530
5-Day Biochemical Oxygen Demand (BOD_5)	lb/day	**485**	1,192	**270**	662
Chemical Oxygen Demand (COD)	lb/day	**2,243**	8,907	**1,253**	4,622
Ammonia (as N)	lb/day	**314**	791	**143**	360
Oil & Grease	lb/day	**148**	361	**78**	193
Sulfide, Total	lb/day	**3.09**	7.8	**1.38**	3.5
Phenols	lb/day	**2.26**	8.9	**1.08**	4.3
Chromium, total recoverable	lb/day	**4.51**	18.0	**2.07**	6.5
Hexavalent Chromium	lb/day	**0.39**	1.20	**0.17**	0.53
pH	s.u.	6.0 – 9.0 (2)			

Footnotes:
(1) The TBELs proposed in this renewal are the most stringent, as indicated in bold and shading.
(2) Effluent pH is required to remain between 6.0 and 9.0 s.u. at all times.

B. Stringency of Requirements for Individual Pollutants

The above evaluation identifies the TBELs which will implement the most stringent applicable federal technology-based requirements, with consideration for anti-backsliding requirements. In addition, WQBELs were developed to be more stringent than TBELs as necessary to meet water quality standards. The more stringent limits will attain both the technology and water quality standards.

DEQ is modifying the arsenic limits proposed in the previous permit renewal (10 µg/L maximum and 5 µg/L average monthly). DEQ found that these limits, which are under appeal, were not developed correctly. The currently proposed arsenic limits are 10 µg/L maximum and 10 µg/L average monthly based on the TSD and Circular DEQ-7 Footnote 16.

C. Effluent Limits

Outfall 002 – Yegen Drain

Table FS-23 presents the proposed effluent limits for Outfall 002. Upon the effective date of the permit and lasting through the term of this permit, Phillips 66 will be required to meet the following effluent limits from Outfall 002 to the Yegen Drain.

Table FS-23. Proposed Effluent Limits for Outfall 002 to Yegen Drain

Parameter	Units	Maximum Daily Limit	Average Monthly Limit
Oil & Grease	mg/L	10	--
Ammonia (as N)	mg/L	4.6	2.3
Total Residual Chlorine (1)	µg/L	21	10
Selenium, total recoverable	µg/L	8.2	4.1
pH	s.u.	6.0 – 9.0	

Footnotes:
(1) Nondetect at the Required Reporting Value (RRV) of 100 µg/L demonstrates compliance with the TRC limits.

There shall be no discharge of floating solids or visible foam other than trace amounts.

There shall be no discharge that causes visible oil sheen in the receiving stream.

There shall be no discharge of wastewater which reacts or settles to form an objectionable sludge deposit or emulsion beneath the surface of the receiving stream or upon adjoining shorelines.

Outfall 006 – Process Wastewater to Yellowstone River

Table FS-24 presents the proposed effluent limits for Outfall 006. Upon the effective date of the permit and lasting through the term of this permit, Phillips 66 will be required to meet the following effluent limits from Outfall 006 to the Yellowstone River.

Table FS-24. Proposed Effluent Limits for Outfall 006 to Yellowstone River

Parameter	Units	Maximum Daily Limit	Average Monthly Limit
Oil & Grease	mg/L	10	--
Arsenic, total recoverable	µg/L	10	10
pH	s.u.	6.0 – 9.0	
WET – Two Species Acute, LC_{50}	% effluent	No acute toxicity	

There shall be no discharge of floating solids or visible foam other than trace amounts.

There shall be no discharge that causes visible oil sheen in the receiving stream.

There shall be no discharge of wastewater which reacts or settles to form an objectionable sludge deposit or emulsion beneath the surface of the receiving stream or upon adjoining shorelines.

SUM-A: Sum of Outfalls 002 & 006:

Upon the effective date of the permit and lasting through the term of this permit, Phillips 66 will be required to meet the below effluent limits as the sum of Outfall 002 and 006:

Table FS-25. SUM-A Effluent Limits (Outfall 002 & Outfall 006)

Parameter	Units	Maximum Daily Limit	Average Monthly Limit
Total Suspended Solids (TSS)	lb/day	338	215
5-Day Biochemical Oxygen Demand (BOD_5)	lb/day	485	270
Chemical Oxygen Demand (COD)	lb/day	2,243	1,253
Ammonia (as N)	lb/day	314	143
Oil & Grease	lb/day	148	78
Sulfide, Total	lb/day	3.09	1.38
Phenols	lb/day	2.26	1.08
Chromium, total recoverable	lb/day	4.51	2.07
Hexavalent Chromium	lb/day	0.39	0.17

Outfalls 003, 004, and 005 (Storm water Discharges):

Interim Effluent Limits

Table FS-26 presents the proposed interim effluent limits for storm water Outfalls 003, 004, and 005. Upon the effective date of the permit and lasting through <*four years from effective date*>, Phillips 66 will be required to meet the following effluent limits:

Table FS-26. Interim Storm water Effluent Limits (Outfalls 003 - 005)

Parameter	Units	Maximum Daily Limit	Average Monthly Limit
Total Organic Carbon (TOC)	mg/L	110	--
Oil & Grease	mg/L	10	--
pH	s.u.	6.0 – 9.0	

There shall be no discharge of floating solids or visible foam other than trace amounts.

There shall be no discharge that causes visible oil sheen in the receiving stream.

There shall be no discharge of wastewater which reacts or settles to form an objectionable sludge deposit or emulsion beneath the surface of the receiving stream or upon adjoining shorelines.

Final Effluent Limits

Table FS-27 presents the proposed final effluent limits for storm water Outfalls 003, 004, and 005. Effective <*four years from effective date*> through the term of the permit, Phillips 66 will be required to meet the following effluent limits:

Table FS-27. Final Storm water Effluent Limits (Outfalls 003 - 005)

Parameter	Units	Maximum Daily Limit	Average Monthly Limit
Total Organic Carbon (TOC)	mg/L	110	--
Oil & Grease	mg/L	10	--
Selenium, total recoverable	µg/L	8.2	4.1
pH	su	6.0 – 9.0	

There shall be no discharge of floating solids or visible foam other than trace amounts.

There shall be no discharge that causes visible oil sheen in the receiving stream.

There shall be no discharge of wastewater which reacts or settles to form an objectionable sludge deposit or emulsion beneath the surface of the receiving stream or upon adjoining shorelines.

IV. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Regulations requiring the establishment of monitoring and reporting conditions in MPDES permits are found at 40 CFR 122.44(i) and 122.48 and ARM 17.30.1351. The following provides the rationale for the monitoring and reporting requirements for this facility.

A. Monitoring Locations and Frequency

Self-monitoring of effluent shall be conducted after final treatment, at the location specified below unless another location is requested and approved by DEQ in writing. Samples will reflect the nature of the discharge. Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR Part 136.

Data supplied by Phillips 66 must meet the Required Reporting Value (RRV), which is the detection level that must be achieved in reporting surface water monitoring or compliance data to DEQ as listed in Circular DEQ-7. The RRV is DEQ's best determination of a level of analysis that can be achieved by the majority of the commercial, university, or governmental laboratories using EPA-approved methods or methods approved by DEQ. If no RRV is provided and 'nondetect' is expected, the detection limit must be the lowest that is achievable.

As a minimum, the following constituents shall be monitored at the frequencies and with the types of measurements indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge. The parameters are to be reported by the 28th of the month following the monitoring period, unless otherwise specified. For instance, quarterly monitoring is due the 28th of the month following the quarter (i.e., January – March is due April 28th). If there is no discharge for the reporting period, 'no discharge' must be indicated on the DMR for that month.

Outfall 002 – Hydrostatic Test Water to the Yegen Drain

The parameters to be monitored and monitoring frequency for Outfall 002, upon the effective date of the permit and lasting through the term of the permit, are provided below in **Table FS-28**.

Table FS-28. Summary of Effluent Monitoring Requirements (1) – Outfall 002

Parameter	Units	Monitoring Frequency (2)	Type	RRV	Reporting Requirement
Flow	mgd	Daily	Calculated	NA	Daily Max & Mo Avg
	days	Daily	Recordkeeping	NA	Number of Days
pH	s.u.	3/Event	Instantaneous / Grab	0.1	Min / Max
Total Suspended Solids (TSS)	mg/L	1/Event	Grab	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	1/Event	Grab	5	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chemical Oxygen Demand (COD)	mg/L	1/Event	Grab	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Ammonia (as N)	mg/L	3/Event	Grab	0.07	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report

Table FS-28. Summary of Effluent Monitoring Requirements (1) – Outfall 002

Parameter	Units	Monitoring Frequency (2)	Type	RRV	Reporting Requirement
Oil & Grease	mg/L	1/Event	Grab	5	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
	Presence	3/Event	Visual (3)	NA	Absent or Present
Sulfide, Total	µg/L	3/Event	Grab	100	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Sulfide, Dissolved	µg/L	1/Month	Composite	40	Daily Max / Mo Avg
Hydrogen Sulfide (H_2S)	µg/L	3/Event	Calculated (4)	20	Daily Max / Mo Avg
Phenol	µg/L	1/Event	Grab	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chromium, total recoverable	µg/L	1/Event	Grab	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chromium, Hexavalent	µg/L	1/Event	Grab	2	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Selenium, total recoverable	µg/L	3/Event	Grab	1	Daily Max / Mo Avg
Total Residual Chlorine	µg/L	3/Event	Grab	100	Daily Max / Mo Avg
Fluoride	mg/L	1/Event	Grab	0.2	Daily Max / Mo Avg
Aluminum, Dissolved	µg/L	1/Event	Grab	9	Daily Max / Mo Avg
Arsenic, total recoverable	µg/L	1/Event	Grab	1	Daily Max / Mo Avg
Copper, total recoverable	µg/L	1/Event	Grab	2	Daily Max / Mo Avg
Lead, total recoverable	µg/L	1/Event	Grab	0.3	Daily Max / Mo Avg
Nitrate + Nitrite	mg/L	1/Event (5,6)	Grab	0.02	Monthly Avg
Total Kjeldahl Nitrogen (TKN)	mg/L	1/Event (5,6)	Grab	0.23	Monthly Avg
Total Nitrogen (TN)	mg/L	1/Event (5,6)	Grab or Calculated	0.25	Monthly Avg
	lb/day	1/Event (5,6)	Calculated	NA	Monthly Avg
Total Phosphorus (TP)	mg/L	1/Event (5)	Grab	0.003	Monthly Avg
	lb/day	1/Event (5)	Calculated	NA	Monthly Avg

Footnotes:
(1) The effluent monitoring location must be after all treatment has been completed and prior to entry to the receiving waters.
(2) Samples must be collected within 30 minutes of initial discharge for all parameters. For parameters requiring three samples per discharge event, samples must also be collected halfway through the discharge, and within 30 minutes of cessation of discharge.
(3) Report Presence or Absence. If an oil sheen is observed, a grab sample of the effluent must be collected within 30 minutes and analyzed for Oil & Grease.
(4) Calculate H_2S based on dissolved sulfide concentrations and pH in accordance with *Standard Methods* Method 4500-S^{2-}, unless another method is proposed and accepted by DEQ.
(5) Monitoring for nutrients required only during the Yegen Drain "summer season" of July 1st – September 30th.
(6) TN may be provided by calculating the sum of Nitrate+Nitrite and TKN or by conducting the persulfate digestion method. If the persulfate digestion method is used, TKN analysis is not required and "NA" may be indicated on the DMR for N+N and TKN.

Outfall 006 – Process Wastewater to the Yellowstone River

The parameters to be monitored and monitoring frequency for Outfall 006, upon the effective date of the permit and lasting through the term of the permit, are provided in **Table FS-29** below.

Table FS-29. Summary of Effluent Monitoring Requirements (1) – Outfall 006

Parameter	Units	Monitoring Frequency	Type	RRV	Reporting Requirement
Flow	mgd	Continuous	Instantaneous (2)	NA	Daily Max / Mo Avg
pH	s.u.	1/Day	Instantaneous or Grab	0.1	Min / Max
Total Suspended Solids (TSS)	mg/L	2/Week	Composite	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	1/Week	Composite	5	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chemical Oxygen Demand (COD)	mg/L	2/Week	Composite	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Ammonia (as N)	mg/L	1/Week	Composite	0.07	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Oil & Grease	mg/L	1/Week	Grab	5	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
	presence	1/Day	Visual (3)	NA	Absent or Present
Sulfide, Total	µg/L	1/Month	Composite	100	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Sulfide, Dissolved	µg/L	1/Month	Composite	40	Daily Max / Mo Avg
Hydrogen Sulfide (H_2S)	µg/L	1/Month	Calculated (4)	20	Daily Max / Mo Avg
Phenol	µg/L	1/Month	Grab	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chromium, total recoverable	µg/L	1/Month	Composite	10	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Chromium, Hexavalent	µg/L	1/Month	Composite	2	Daily Max / Mo Avg
	lb/day	1/Month	Calculated	NA	Report
Arsenic, total recoverable	µg/L	1/Month	Composite	1	Daily Max / Mo Avg
Total Residual Chlorine	µg/L	1/Quarter	Grab	100	Daily Max / Mo Avg
Fluoride	mg/L	1/Quarter	Composite	0.2	Daily Max / Mo Avg
Aluminum, Dissolved	µg/L	1/Quarter	Composite	9	Daily Max / Mo Avg
Cadmium, total recoverable	µg/L	1/Quarter	Composite	0.03	Daily Max / Mo Avg
Copper, total recoverable	µg/L	1/Quarter	Composite	2	Daily Max / Mo Avg
Iron, total recoverable	µg/L	1/Quarter	Composite	20	Daily Max / Mo Avg
Cyanide	µg/L	1/Quarter	Grab	3	Daily Max / Mo Avg
Lead, total recoverable	µg/L	1/Quarter	Composite	0.3	Daily Max / Mo Avg
Mercury, total recoverable	µg/L	1/Quarter	Composite	0.005	Daily Max / Mo Avg
Selenium, total recoverable	µg/L	1/Quarter	Composite	1	Daily Max / Mo Avg
Thallium, total recoverable	µg/L	1/Quarter	Composite	0.2	Daily Max / Mo Avg
Nitrate + Nitrite (6)	mg/L	1/Month (5)	Composite	0.02	Monthly Avg
Total Kjeldahl Nitrogen (TKN) (6)	mg/L	1/Month (5)	Composite	0.23	Monthly Avg

Table FS-29. Summary of Effluent Monitoring Requirements (1) – Outfall 006

Parameter	Units	Monitoring Frequency	Type	RRV	Reporting Requirement
Total Nitrogen (TN) (6)	mg/L	1/Month (5)	Calculated or Composite	0.25	Monthly Avg
	lb/day	1/Month (5)	Calculated	NA	Monthly Avg
Total Phosphorus (TP)	mg/L	1/Month (5)	Composite	0.003	Monthly Avg
	lb/day	1/Month (5)	Calculated	NA	Monthly Avg
Temperature	degrees C	1/Month	Instantaneous	0.1	Report
WET- Acute two species (7)	% Effluent	1/Quarter	Grab	NA	Pass/Fail

Footnotes:
(1) The effluent monitoring location must be after all treatment has been completed, prior to discharge into the receiving water.
(2) Requires recording device or totalizer.
(3) Report Presence or Absence. If an oil sheen is observed, a grab sample of the effluent must be collected and analyzed for Oil & Grease.
(4) Calculate H_2S based on dissolved sulfide concentrations and pH in accordance with *Standard Methods* Method 4500-S^{2-}, unless another method is proposed and accepted by DEQ.
(5) Nutrient monitoring required only during the Yellowstone River "summer season" of August 1 – October 31st.
(6) TN may be provided by calculating the sum of Nitrate+Nitrite and TKN, or by conducting the persulfate digestion method. If the persulfate digestion method is used, N+N and TKN analyses are not required and "NA" may be indicated on the DMR.
(7) Two species conducted quarterly. Failure of any acute WET test requires that the permittee comply with the permit's Special Conditions.

SUM-A

The parameters to be monitored and monitoring frequency for SUM-A (sum of Outfall 002 and 006), upon the effective date of the permit and lasting through the term of the permit, are provided below.

Table FS-30. Summary of Effluent Monitoring Requirements – SUM-A (1)

Parameter	Units	Monitoring Frequency	Type	RRV	Reporting Requirement
Total Suspended Solids (TSS)	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
5-Day Biochemical Oxygen Demand (BOD_5)	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Chemical Oxygen Demand (COD)	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Ammonia (as N)	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Oil & Grease	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Sulfide, Total	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Phenol	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Chromium, total recoverable	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg
Chromium, Hexavalent	lb/day	1/Month	Calculated	NA	Daily Max / Mo Avg

Footnote:
(1) SUM-A is the sum of Outfall 002 and Outfall 006 monitoring data.

Storm water – Outfalls 003, 004, and 005

The parameters to be monitored and monitoring frequency for Stormwater Outfalls 003, 004, and 005, upon the effective date of the permit and lasting through the term of the permit, are provided in **Table FS-31** below.

Table FS-31. Summary of Storm Water Monitoring Requirements – Outfalls 003, 004 & 005

Parameter	Units	Monitoring Frequency	Type	RRV	Reporting Requirement
Flow	mgd	Daily	Estimated	NA	Daily Max & Mo Avg
	days	Daily	Recordkeeping	NA	Number of Days
pH	s.u.	Daily (1)	Instantaneous or Grab	0.1	Min / Max
Total Suspended Solids (TSS)	mg/L	Weekly (1)	Grab	10	Daily Max & Mo Avg
Biochemical Oxygen Demand	mg/L	Weekly (1)	Grab	5	Daily Max & Mo Avg
Chemical Oxygen Demand	mg/L	Weekly (1)	Grab	10	Daily Max & Mo Avg
Ammonia (as N)	mg/L	Weekly (1)	Grab	0.07	Daily Max & Mo Avg
Oil & Grease	mg/L	Weekly (1)	Grab	5	Daily Max & Mo Avg
	Presence	Daily (1)	Visual	NA	Absent or Present
Sulfide, Dissolved (2)	µg/L	Weekly (1)	Grab	40	Daily Max & Mo Avg
Hydrogen Sulfide (2)	µg/L	Weekly (1)	Grab	20	Daily Max & Mo Avg
Phenol	µg/L	Weekly (1)	Grab	10	Daily Max & Mo Avg
Chromium, total recoverable	µg/L	Weekly (1)	Grab	10	Daily Max & Mo Avg
Chromium, Hexavalent	µg/L	Weekly (1)	Grab	2	Daily Max & Mo Avg
Total Organic Carbon	mg/L	Weekly (1)	Grab	2	Daily Max & Mo Avg
Selenium, total recoverable	µg/L	Weekly (1)	Grab	1	Daily Max & Mo Avg
Arsenic, total recoverable	µg/L	Weekly (1)	Grab	1	Daily Max & Mo Avg
Copper, total recoverable	µg/L	Weekly (1)	Grab	2	Daily Max & Mo Avg
Benzene	µg/L	Weekly (1)	Grab	0.6	Daily Max & Mo Avg
Toluene	µg/L	Weekly (1)	Grab	1	Daily Max & Mo Avg
Xylene	µg/L	Weekly (1)	Grab	3	Daily Max & Mo Avg
Nitrate + Nitrite (N+N) (3, 4)	mg/L	Weekly (1)	Grab	0.02	Daily Max & Mo Avg
Total Kjeldahl Nitrogen (3, 4)	mg/L	Weekly (1)	Grab	0.23	Daily Max & Mo Avg
Total Nitrogen (TN) (3, 4)	mg/L	Weekly (1)	Grab	0.25	Daily Max & Mo Avg
Total Phosphorus (TP) (3)	mg/L	Weekly (1)	Grab	0.003	Daily Max & Mo Avg
WET – Acute Two Species (5)	% Effluent	Annually	Grab	NA	Pass/Fail

Footnotes:
(1) Samples to be taken prior to or within the first 30 minutes of discharge, and daily or weekly thereafter, as specified.
(2) For dissolved sulfide, use method 4500 S^{2}- series, as specified in 40 CFR Part 136 with a RRV of 0.04 ug/L. For hydrogen sulfide, use method 4500 S^{2-} H. *Standard Methods for the Examination of Water and Wastewater*.
(3) Nutrient monitoring only required during the Yegen Drain "summer season" of July 1st – September 30th.
(4) Total Nitrogen calculated by either sum of TKN and N+N, or using the persulfate digestion method allowed per Circular DEQ-12A. If persulfate digestion is used, "NA" may be reported for N+N and TKN.
(5) WET monitoring is required at Outfall 004, only. If there is no discharge from Outfall 004 for the entire calendar year, then an additional annual WET sample may be taken the next year from any outfall.

Upstream Monitoring

Yellowstone River - Upstream

Beginning in 2018 and continuing the duration of the permit, Phillips 66 shall monitor the Yellowstone River upstream of the proposed diffuser location. The parameters to be monitored and their frequency are provided in **Table FS-32,** below.

Table FS-32. Yellowstone River Ambient Monitoring – Upstream of Proposed Diffuser (1)

Parameter	Units	Monitoring Frequency (2)	Type	RRV
pH	s.u.	Quarterly	Instantaneous	0.1
Temperature	deg C	Quarterly	Instantaneous	0.1
Hardness (as $CaCO_3$)	mg/L	Semi-annually	Grab	NA
Ammonia (as N)	mg/L	Semi-annually	Grab	0.07
Sulfide, Dissolved	µg/L	Semi-annually	Grab	40
Hydrogen Sulfide	µg/L	Semi-annually	Grab	20
Phenol	µg/L	Semi-annually	Grab	10
Chromium, total recoverable	µg/L	Semi-annually	Grab	10
Chromium, Hexavalent	µg/L	Semi-annually	Grab	2
Aluminum, Dissolved	µg/L	Semi-annually	Grab	9
Arsenic, total recoverable	µg/L	Semi-annually	Grab	1
Cadmium, total recoverable	µg/L	Semi-annually	Grab	0.03
Copper, total recoverable	µg/L	Semi-annually	Grab	2
Cyanide	µg/L	Semi-annually	Grab	3
Iron, total recoverable	µg/L	Semi-annually	Grab	20
Lead, total recoverable	µg/L	Semi-annually	Grab	0.3
Mercury, total recoverable	µg/L	Semi-annually	Grab	0.005
Selenium, total recoverable	µg/L	Semi-annually	Grab	1
Thallium, total recoverable	µg/L	Semi-annually	Grab	0.2
Nitrate + Nitrite (3)	mg/L	Semi-annually (2)	Grab	0.02
Total Kjeldahl Nitrogen (TKN) (3)	mg/L	Semi-annually (2)	Grab	0.23
Total Nitrogen (TN) (3)	mg/L	Semi-annually (2)	Calculated or Grab	0.25
Total Phosphorus (TP)	mg/L	Semi-annually (2)	Grab	0.003

Footnotes:
(1) Monitoring location to be submitted to DEQ for approval prior to initial sampling. The location should be after the Yegen Drain enters the Yellowstone, but upstream from the future diffuser location.
(2) Semiannual monitoring for all but nutrients must be one sample during the first half of the year and the second sample during the second half of the year, at least 60 days after the first sample. Semi-annual monitoring for nutrients required only during the Yellowstone River "summer months" (August 1 – October 31st). One sample to be taken third quarter (August or September) and one in the fourth quarter (October).
(3) Total Nitrogen calculated by either sum of TKN and N+N, or using the persulfate digestion method allowed per Circular DEQ-12A. If persulfate digestion is used, "NA" may be reported for TKN and N+N

Phillips 66 shall submit the Yellowstone River ambient monitoring results annually, by the 28th of January following the monitoring year, as described in Part I.E. of the permit.

Yegen Drain - Upstream

Beginning in 2018 and continuing the duration of the permit, Phillips 66 shall monitor the Yegen Drain upstream of the hydrostatic testing and storm water discharge locations. The parameters to be monitored and monitoring frequency are provided in **Table FS-33** below.

Table FS-33. Yegen Drain Ambient Monitoring – Upstream of Discharges (1)

Parameter	Units	Monitoring Frequency (2)	Type	RRV
Flow	cfs	Monthly	Estimate	NA
pH	s.u.	Monthly	Instantaneous	0.1
Temperature	deg C	Monthly	Instantaneous	0.1
Hardness (as $CaCO_3$)	mg/L	Quarterly	Grab	NA
Ammonia (as N)	mg/L	Quarterly	Grab	0.07
Sulfide, Dissolved	µg/L	Quarterly	Grab	40
Hydrogen Sulfide	µg/L	Quarterly	Grab	20
Chromium, total recoverable	µg/L	Quarterly	Grab	10
Chromium, Hexavalent	µg/L	Quarterly	Grab	2
Fluoride	mg/L	Quarterly	Grab	0.2
Aluminum, Dissolved	µg/L	Quarterly	Grab	9
Arsenic, total recoverable	µg/L	Quarterly	Grab	1
Copper, total recoverable	µg/L	Quarterly	Grab	2
Lead, total recoverable	µg/L	Quarterly	Grab	0.3
Selenium, total recoverable	µg/L	Quarterly	Grab	1
Benzene	µg/L	Quarterly	Grab	0.6
Toluene	µg/L	Quarterly	Grab	1
Xylene	µg/L	Quarterly	Grab	3
Nitrate + Nitrite (2)	mg/L	Monthly (1)	Grab	0.02
Total Kjeldahl Nitrogen (TKN) (2)	mg/L	Monthly (1)	Grab	0.23
Total Nitrogen (TN) (2)	mg/L	Monthly (1)	Calculated or Grab	0.25
Total Phosphorus (TP)	mg/L	Monthly (1)	Grab	0.003

Footnotes:
(1) Nutrient monitoring required only during Yegen Drain "summer months" of July 1st – September 30th.
(2) Total Nitrogen calculated by either sum of TKN and N+N, or using the persulfate digestion method allowed per Circular DEQ-12A. If persulfate digestion is used, "NA" may be reported for TKN and N+N

Phillips 66 shall submit the Yegen Drain ambient monitoring results annually, by the 28th of January following the monitoring year, as described in Part I.E. of the permit.

B. Whole Effluent Toxicity (WET) Monitoring

Acute Testing

Beginning on the effective date of this permit, the permittee shall conduct an acute static renewal toxicity test on a grab sample of the effluent in accordance with the frequency specified in the above monitoring tables. Testing will employ two species and will consist of five (5) effluent concentrations (100, 50, 25, 12.5, 6.25 percent effluent) and a control.

Dilution water and the control shall consist of the receiving water unless notice has been provided to DEQ that laboratory water must be used.

The toxicity tests shall be conducted in general accordance with the procedures set out in the latest revision of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, EPA-821-R-02-012 and the *Region VIII EPA NPDES Acute Test Conditions - Static Renewal Whole Effluent Toxicity Test* testing protocols. The permittee shall conduct an acute 48-hour static renewal toxicity test using *Ceriodaphnia sp.* and an acute 96-hour static renewal toxicity test using fathead minnows (*Pimephales promelas*). The control of pH in the toxicity test utilizing CO_2 enriched atmospheres is allowed to prevent rising pH drift. The target pH selected must represent the pH value of the receiving water at the time of sample collection.

Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. If more than 10 percent control mortality occurs, the test is considered invalid and shall be repeated until satisfactory control survival is achieved unless a specific individual exception is granted by DEQ. This exception may be granted if less than 10 percent mortality was observed at the dilutions containing high effluent concentrations.

If acute toxicity occurs in a routine test, an additional test shall be conducted within 14 days of the date of the initial sample for Outfall 006, or during the next pumping event for storm water Outfalls 003 - 005. Should acute toxicity occur in the second test, testing shall occur once a month until further notified by DEQ. In all cases, the results of all toxicity tests must be submitted to DEQ in accordance with Part II of the permit.

Failure to initiate, or conduct an adequate Toxicity Identification Evaluation / Toxicity Reduction Evaluation (TIE/TRE), or delays in the conduct of such tests, shall not be considered a justification for noncompliance with the whole effluent toxicity limits contained in Part I.B of this permit. A TRE plan needs to be submitted to DEQ within 45 days after confirmation of the continuance of the effluent toxicity.

The WET test results from the laboratory shall be reported along with the DMR report no later than the 28th day of the month following the completed reporting period. The format for the laboratory report shall be consistent with the latest revision of the EPA form *Region VIII Guidance for Acute Whole Effluent Reporting*, and shall include all chemical and physical data as specified.

If the results for eight consecutive quarters of testing for Outfall 006 indicate no acute toxicity, the permittee may request a reduction to semi-annual acute toxicity testing on two species. DEQ may approve or deny the request based on the results and other available information without an additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

C. <u>Reporting Requirements</u>

The Permittee must comply with reporting requirements as specified in the permit in accordance with ARM 17.30.1342.

V. RATIONALE FOR SPECIAL CONDITIONS

A. Additional Monitoring and Special Studies

1. *Whole Effluent Toxicity (TIE/TRE)*

   Should the effluent exceed the acute toxicity limitation in a routine test and toxicity is confirmed as persistent by the additional test (as discussed in this Fact Sheet Part IV.B), a TIE-TRE shall be undertaken by the permittee to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for the toxicity. Failure to initiate, or conduct an adequate TIE-TRE, or delays in the conduct of such tests, shall not be considered a justification for noncompliance with the whole effluent toxicity limits. A TRE plan needs to be submitted to DEQ within 45 days after confirmation of the continuance of the effluent toxicity.

2. *Notification Regarding Outfall 006*

   Phillips 66 currently discharges the process wastewater to the City of Billings for treatment. At least 60 days prior to commencing construction of the diffuser in the Yellowstone River, Phillips 66 shall notify DEQ, in writing, of the expected date of completion and submit the final diffuser design.

B. Schedule of Compliance for Meeting Final Effluent Limits

1. *Compliance Schedule*

   By no later than **January 1, 2018**, Phillips 66 shall submit a plan to DEQ for compliance with the Outfalls 003 – 005 storm water final effluent limits. The plan shall include, as appropriate:

   - An evaluation of each source contributing to the pollutants which have expected concentrations greater than the final effluent limits;
   - An evaluation of control methods and technology to reduce the pollutants from each source; and
   - A projected schedule for ensuring compliance as of <*four years from permit effective date*>.

   Until the final compliance date of <*four years from effective date*>, Phillips 66 must submit an annual report summarizing their progress towards meeting the effluent limits to DEQ. The annual report must be post-marked no later than January 28th of each year, and include actions taken in the previous year and planned actions for the upcoming year.

C. Storm Water Pollution Prevention Plan (SWPPP)

In the following section the term "storm water discharges" applies to the discharge of storm water, via pumping or in response to precipitation, from Phillips 66 Refinery property.

- Storm water from the facility process areas is routed through the wastewater treatment system and discharged to the City of Billings and/or Outfall 006. Effluent limits at Outfall 006 include the treated process storm water.

- Non-process area storm water discharges discharged through Outfalls 003, 004, and 005 are covered under this section of the permit. For these storm water discharges to have permit coverage, a Storm Water Pollution Prevention Plan (SWPPP) must be developed, implemented, and maintained. The purpose of the SWPPP is to identify sources of pollution to storm water and to select Best Management Practices (BMPs) to eliminate or minimize pollutant discharges at the source and/or to remove pollutants contained in storm water runoff.

  Phillips 66 has been required to develop and implement the provisions of the SWPPP since the 2012 permit modification. The SWPPP must comply with the following requirements:

  1. General SWPPP Requirements

  a. The SWPPP and associated documentation, as well as BMPs developed and implemented, must be accomplished using good standard engineering practices.

  b. The SWPPP must be retained onsite.

  c. The SWPPP must be signed in accordance with the signatory requirements stated in Part IV.G of the permit.

  d. The SWPPP must be made available upon request of DEQ staff, such as during inspections.

  e. DEQ may notify the permittee that the SWPPP does not meet one or more of the minimum requirements of this permit. After such notification from DEQ, the permittee shall make changes to the SWPPP and shall submit to DEQ a written certification that the requested changes have been made. Unless otherwise stated by DEQ, the permittee shall have 30 days after such notification to make the required changes. In addition, when DEQ makes such notification, the permittee shall provide DEQ with a copy of revisions to the SWPPP.

  f. The permittee shall amend the SWPPP whenever there is a change in design, construction, operation, or maintenance that has significant effect on the potential for the discharge of pollutants to surface waters, or if the SWPPP proves to be ineffective in achieving the general objective of controlling pollutants in a storm water discharge covered under this permit. When such revisions are made to the SWPPP based upon this permit condition, the permittee shall provide DEQ with a copy of revisions to the SWPPP.

  g. The SWPPP must identify the name of receiving surface waters. If there is a distinguishable point source discharge or outfall, the SWPPP must include a description of the size, type, and location of each point source discharge or outfall. A description of storm water runoff flow and drainage patterns into the receiving surface waters must be provided.

  h. The SWPPP must identify a specific person or persons who are responsible for SWPPP development, implementation, maintenance, and revision. The SWPPP must clearly identify the responsibilities of each person. The activities and

responsibilities of the person(s) must address all aspects of the SWPPP. Should the identity of these responsible contacts/individuals change during the permit period, the permittee shall ensure measures are in place to transfer, and familiarize replacement personnel with the requirements pertaining to the SWPPP.

i. The SWPPP must identify facility personnel training programs used to inform personnel responsible for implementing activities identified in the SWPPP or otherwise responsible for storm water management of the components and goals of the SWPPP. Training should address topics such as spill response, good housekeeping, and material management practices. A schedule must identify the frequency for such training.

j. The SWPPP must include the inspection and maintenance of storm water management BMPs. Qualified personnel shall be identified in the SWPPP to inspect the facility site and storm water management BMPs following each significant storm water rainfall event resulting in 0.5 inches of precipitation or more, or after significant snowmelt events. Inspections must be documented and maintained with the SWPPP. Inspections and their respective records must include tracking or follow-up procedures to ensure adequate response and corrective actions have been taken based on any problems or deficiencies observed during the inspection.

k. The SWPPP must address good housekeeping measures to help maintain a clean, orderly facility. Measures could include a routine schedule for the managing and removal of waste materials, as well as routine inspections of potential problem areas.

l. The SWPPP must include a General Location Map (such as a USGS topographic quadrangle map), extending one mile beyond the property boundaries of the facility, with enough detail to identify the location of the facility, any storm water discharges, and the receiving surface waters. The facility site must be clearly delineated on this map. The permittee may use the topographic map submitted with the application provided it indicates this information with respect to storm water discharges.

2. Identification of Potential Pollutant Sources

The SWPPP must provide a description of potential pollutant sources which may reasonably be expected to affect the quality of storm water discharges. The SWPPP must identify all significant activities and materials that could potentially be pollutant sources. To accomplish this, the SWPPP must include, at a minimum:

a. For each area with storm water discharges from regulated activities that have a *reasonable potential* to contain significant amounts of pollutants, the SWPPP must include a prediction of the direction of flow and an identification of the types of pollutants and parameters of concern. Factors to consider include the toxicity of chemicals; quantity of chemical used, produced or discharged; the likelihood of contact with storm water; the history of any MPDES permit violations; and the characteristics and uses of the receiving surface waters.

Items to identify and assess may include:

i. Areas and management practices used for the storage, treatment, or disposal of wastes;

ii. Areas where significant spills and leaks of hazardous substances may have occurred;

iii. Areas and management practices used for the loading or unloading of dry bulk materials and liquids;

iv. Areas and management practices used for the outdoor storage of materials and/or products;

v. Areas and management practices used for outdoor manufacturing or processing activities;

vi. Areas and management practices used for vehicle fueling, washing, and maintenance;

vii. Dust or particulate-generating processes;

viii. Illicit connections and/or management practices;

ix. Areas more susceptible to erosion; and,

x. Areas with unstabilized sediment due to ground disturbance activities.

b. A summary of existing storm water quality sampling test results which characterize historical pollutants in storm water discharges.

c. Estimate and define area(s) of relatively impervious surfaces (including paved areas and facility structural roofs) with respect to the total area drained by each point source discharge of storm water.

d. An evaluation of how the quality of any potential storm water running onto the facility site would impact the facility's storm water discharge.

3. Storm Water Management Best Management Practices

The SWPPP must include:

a. A description of storm water management BMPs appropriate for the facility, including those used to divert, infiltrate, reuse, or otherwise manage storm water runoff. The appropriateness and priorities of BMPs in a SWPPP shall reflect the identified potential sources of pollutants to storm water at the facility.

b. Reasonable and appropriate BMPs such as: reuse of collected storm water (such as for process water or as an irrigation source); inlet controls (such as oil/water separators); snow management activities; infiltration devices, detention/retention devices (including constructed wetlands); run-on/runoff controls; diversion structures; flow attenuation by use of open vegetated swales, natural depressions, and other practices; and, ponds. Where practicable, industrial materials and activities could be protected by a storm resistant shelter to prevent exposure to rain or snow.

c. The location and description of any treatment to remove pollutants from storm water.

d. A description of measures to ensure the ongoing implementation and maintenance of BMPs. Inspections and maintenance activities, such as cleaning oil and grit separators or catch basins, must be documented and recorded. Incidents such as spills, leaks, other releases of potential pollutants, and/or other material/waste management problems, must also be documented and recorded.

e. Spill Prevention and Response Measures, as follows:

   i. Areas where potential spills may occur that could contribute pollutants to storm water discharges, and their accompanying drainage points.

   ii. Where appropriate, specific material-handling procedures, storage requirements, and use of equipment, such as diversion valves.

   iii. Procedures and necessary equipment for cleaning up spills.

   iv. Emergency spill/response contact and/or notification numbers.

   SWPPP records of spills must be updated when a significant spill or leak of hazardous substances occurs and must include a description of the specific origin and location of the release, a description of the materials released, an estimate of the quantity of the release, and a description of any remediation or cleanup measures which were taken.

f. Sediment and Erosion Control BMPs, as follows:

   i. Sediment and erosion control BMPs including various structural, vegetative, and/or stabilization measures.

   ii. BMPs to be implemented as necessary.

   iii. Areas which have a higher potential for erosion due to topography, slope characteristics, facility activities, and/or other factors.

   iv. An assessment of the nature of any fill material to be used, the existing soils located at the site, and the erodibility (high, moderate, or slight) of such soils.

   v. Storm water discharges associated with construction activity at the facility site may be included under this permit provided the SWPPP is developed or revised to address these discharges as follows:

      - The SWPPP must identify and locate the BMPs to be used during and after the construction project to control sediment discharges to surface waters;
      - Final stabilization of disturbed areas must be ensured;
      - This Sediment and Erosion Control section of the SWPPP must be updated with a SWPPP modification to reflect new construction activity as necessary; and,

- The SWPPP modification must be submitted to DEQ prior to the start of construction.

vi. The SWPPP may include the use of BMPs such as sediment basins, detention/retention structures, berms, barriers, filter strips, covers, diversion structures, sediment control fences, straw bale dikes, seeding, sodding, and/or other control structures. Any SWPPP elements that require engineered structures, such as detention ponds or diversion structures, must be prepared by a qualified individual using good standard engineering practices.

4. SWPPP Site Map or Plan

The SWPPP must include a site map or plan which indicates the following:

a. An identification of each point source discharge of storm water with a delineated outline of the respective drainage area;

b. Each required point source discharge of storm water sampling location (with the formal number indicated on the map as designated on DMRs;

c. Delineated drainage patterns which clearly indicate the storm water runoff flow patterns (such as using arrows or detailed topographic contours to show which direction storm water will flow);

d. The "areas" identified in Part C.2.a. and c.;

e. The "BMPs" identified in Part C.3.;

f. Major permanent facility structures;

g. Each well where liquids associated with the facility are injected underground including any storm water conveyances;

h. Location and source of runoff from adjacent property containing significant quantities of pollutants of concern to the facility as discussed in Part C.2.d.;

i. Location of all surface waters on or near to the construction activity site (including perennial and intermittent waterbodies, ephemeral streams, springs, wetlands with standing water, etc.);

j. A map scale;

k. A north arrow; and,

l. For construction activities:

i. Areas of total development and, at a minimum, areas of "disturbance" related to construction activity (including support activities related to a construction site such as concrete or asphalt batch plants, equipment staging areas, material storage areas, soil stockpile areas, material borrow areas, etc.);

ii. Location of all erosion and sediment control BMPs;

iii. Location of impervious structures (including buildings, roads, parking lots, outdoor storage areas, etc.) after construction is completed;

iv. Areas where vegetative BMPs are to be implemented;

v. Approximate slopes anticipated after major grading activities; and,

vi. The boundary of the 100-year floodplain, if determined.

5. Comprehensive Site Inspection and Compliance Evaluation Report

a. A Comprehensive Site Inspection must be performed annually to identify areas contributing to the regulated storm water discharge and to evaluate whether BMPs to reduce pollutant loadings are adequate and properly implemented.

b. A Comprehensive Site Inspection must assess the following:

i. Whether the description of potential pollutant sources is accurate as required under Part I.C.2;

ii. Whether the site map has been updated or otherwise modified to reflect current conditions;

iii. Whether the BMPs to control potential pollutants in storm water discharges as identified in the SWPPP and Part I.C.3. are being effectively implemented; and,

iv. Whether any SWPPP revisions such as additional BMPs are necessary.

c. Based on the results of the Comprehensive Site Inspection, the description of potential pollutant sources and BMPs identified in the SWPPP must be revised as appropriate within 14 days of such inspection and must provide for implementation of the changes to the SWPPP in a timely manner.

d. A tracking or follow-up procedure, including a schedule for implementation, must be used and identified in the Report which ensures adequate response and corrective actions have been taken in response to the Comprehensive Site Inspection and/or noncompliances.

e. Records of the Comprehensive Site Inspection, the Compliance Evaluation Report, and any related follow-up actions must be maintained by the permittee.

D. <u>Rationale for Standard Conditions</u>

Standard Conditions, which apply to all MPDES permits in accordance with ARM 17.30.1342 and additional conditions applicable to specified categories of permits in accordance with ARM 17.30.1343, are included in Section III of this permit. The Permittee must comply with all standard conditions under ARM 17.30.1342 and the additional conditions that are applicable to the Permittee under ARM 17.30.1343.

VI. NONSIGNIFICANCE DETERMINATION

The proposed effluent limits have been maintained below the nondegradation levels and do not constitute a new or increased source of pollutants pursuant to ARM 17.30.702. Therefore, a nonsignificance analysis is not required [ARM 17.30.705(1)].

VII. APPENDICES

Appendix A.	Facility Diagrams
Appendix B.	Effluent Data Summary
Appendix C.	TBEL Calculations
Appendix D.	Ambient Data and Water Quality Standards
Appendix E.	RP Analysis &WQBEL Calculations

By: Christine Weaver, March 2016

Appendix A: Facility Diagrams

Appendix B: Summary of Effluent Data

The following tables summarize the data provided by Phillips 66 on the renewal application Form 2Cs submitted in June 2014, except as noted. This information and the monitoring information submitted on monthly DMRs (see Part I.C. of this Fact Sheet) were used to critical discharge concentration used in the RP analysis, as summarized in **Appendix E**.

Data from Outfall 001, which was discontinued in 2014, is representative for Outfall 006.

Table Appendix B-1. Phillips 66 Refinery Effluent Characteristics Outfall 001/006

Parameter	Units	Average	Maximum	Number of Samples
Flow	mgd	0.73	1.13	181
pH	s.u.	6.5 (min)	8.6	425
Temperature (winter)	°C	12.2	19.6	493
Temperature (summer)	°C	21.5	28.1	552
Biochemical Oxygen Demand	mg/L	2.9	41	181
Chemical Oxygen Demand	mg/L	51	138	183
Total Suspended Solids	mg/L	8.3	29	183
Oil & Grease	mg/L	<5	<5	63
Chlorine, total residual	mg/L	<0.1	0.1	5
Fluoride	mg/L	8.2	23	9
Sulfide, Total	mg/L	0.009	0.1 / 0.2 (DMR)	13 (23)
Ammonia (as N)	mg/L	1.7	16	183
Nitrate + Nitrite as N	mg/L	12.5	26	8
Total Nitrogen	mg/L	3.0	6.8	9
Total Phosphorus	mg/L	1.5	3.6	13
Cyanide, total	µg/L	<7.3	22	9
Phenols	µg/L	9	76	61
Aluminum, total recoverable	µg/L	140	380	9
Aluminum, dissolved	µg/L	18	53	9 (2012 CH2MHILL)
Arsenic, total recoverable	µg/L	108	195	72
Barium, total recoverable	µg/L	113	222	9
Cadmium, total recoverable	µg/L	<0.8	1.4	9
Chromium, total recoverable	µg/L	1	7	61
Chromium, hexavalent	µg/L	<10	20	61
Copper, total recoverable	µg/L	5.4	11	9
Iron, total recoverable	µg/L	430	1,900	9
Lead, total recoverable	µg/L	0.25	0.79	9
Mercury, total recoverable	µg/L	<0.045	0.07	9
Nickel, total recoverable	µg/L	11	44	9
Selenium, total recoverable	µg/L	119	252	61
Zinc, total recoverable	µg/L	25	98	9
Benzene	µg/L	<0.7	3.1	8

Table Appendix B-2. Phillips 66 Refinery Effluent Characteristics Outfall 002				
Parameter	Units	Average	Maximum	Number of Samples
Flow [(1)]	mgd	0.68	0.79	7
pH	s.u.	7.4 (min)	8.2	2
Temperature (summer)	°C	9.4	22	2
Oil & Grease	mg/L	<5	<5	2
Chlorine, total residual	mg/L	<0.1	0.8 (DMRs)	7
Fluoride	mg/L	0.37	0.45	2
Sulfate	mg/L	52	72	2
Nitrate + Nitrite as N	mg/L	0.25	0.43	2
Arsenic, total recoverable	µg/L	4.3	7.3	2
Copper, total recoverable	µg/L	<10	<10	2
Iron, total recoverable	µg/L	<50	<50	2
Lead, total recoverable	µg/L	<5	<5	2

Footnotes:
(1) Flow during periods of discharge. For Form 2C, Phillips 66 reported two discharge events (March 2011 and December 2013).

Table Appendix B-3. Phillips 66 Refinery Effluent Characteristics Outfall 003, 004, 005 [(1)]

Parameter	Units	Outfall 003	*No of Samples*	Outfall 004	*No of Samples*	Outfall 005	*No of Samples*
Flow	mgd	0	*0*	0.3	*1*	0	*0*
pH	S.U.	8.7	*1*	7.2 – 8.6 6.7 - 8.8	*8* *4 (DMR)*	8.7	*1*
Total Organic Carbon	mg/L	6.3	*1*	NA 14	*0* *4 (DMR)*	18	*1*
Oil and Grease	mg/L	< 1	*1*	< 5	*4*	< 1	*1*
Biochemical Oxygen Demand	mg/L	3	*1*	6.5	*4*	< 3	*1*
Chemical Oxygen Demand	mg/L	30	*1*	38	*5*	117	*1*
Total Suspended Solids	mg/L	< 10	*1*	259	*5*	< 10	*1*
Ammonia (as N)	mg/L	< 0.05	*1*	0.10 0.36	*5* *4 (DMR)*	< 0.05	*1*
Nitrate + Nitrite	mg/L	--	--	1.0	*1 (DMR)*	--	--
Nitrogen, Total	mg/L	3.2	*1*	NA 1.9	*0* *4 (DMR)*	0.5	*1*
Phosphorus, Total	mg/L	0.027	*1*	NA 0.36	*0* *4 (DMR)*	0.031	*1*
Sulfide, Total	mg/L	<0.04	*1*	<0.1 <0.04	*4* *4 (DMR)*	0.14	*1*
Hydrogen Sulfide	µg/L	--	--	ND	*4 (DMR)*	--	--
Arsenic, total recoverable	µg/L	<5	*1*	NA 15	*0* *4 (DMR)*	< 5	*1*
Chromium, , total recoverable	µg/L	<10	*1*	14	*4*	<10	*1*
Chromium, hexavalent	µg/L	<10	*1*	<10	*4*	<10	*1*
Selenium, , total recoverable	µg/L	<5	*1*	<15 15	*4* *4 (DMR)*	< 5	*1*
Phenol, Total	µg/L	20	*1*	4 25	*4* *1 (DMR)*	< 10	*1*
Copper, total recoverable	µg/L	--	--	7.8	*1 (DMR)*	--	--
Lead, total recoverable	µg/L	--	--	--	*1 (DMR)*	--	--
Mercury, total recoverable	µg/L	--	--	< 0.01	*1 (DMR)*	--	--
Nickel, total recoverable	µg/L	--	--	< 10	*1 (DMR)*	--	--
Anthracene	µg/L	--	--	< 0.2	*1 (DMR)*	--	--
Benzene	ug/L	--	--	1	*1 (DMR)*	--	--
Benzo(ghi)perylene	µg/L	--	--	< 10	*1 (DMR)*	--	--
Ethylbenzene	µg/L	--	--	< 0.5	*1 (DMR)*	--	--
Napthalene	µg/L	--	--	< 10	*1 (DMR)*	--	--
Phenanthrene	µg/L	--	--	< 0.25	*1 (DMR)*	--	--
Styrene	µg/L	--	--	< 0.5	*1 (DMR)*	--	--
Tetrachlorethylene	µg/L	--	--	< 0.5	*1 (DMR)*	--	--
Toluene	µg/L	--	--	2.7	*1 (DMR)*	--	--
Xylene	µg/L	--	--	2.1	*1 (DMR)*	--	--

Footnotes: NA = not applicable; ND = nondetect

(1) Data for Outfall 003 & Outfall 005 each was from a single grab sample; there was no discharge from these outfalls during the Period of Record. Data for Outfall 004 was taken during a flooding event in May 2011, except the DMR data was taken from the DMR report ending December 31, 2014.

Appendix C: TBELs

Appendix D: Water Quality Standards and Ambient Data

Table D-1. Water Quality Standards – Yellowstone River

Parameter	Units	Aquatic Life Standards		Human Health Standards	Required Reporting Value
		Acute	Chronic		
Ammonia (as N)	mg/L	4.6 (1)	1.9 (1)	5	0.07
Nitrate plus Nitrite	mg/L	--	--	10	0.02
Chlorine, Total Residual	µg/L	19	11	4,000	100 (2)
Fluoride	µg/L	--	--	4,000	200
Hydrogen Sulfide	µg/L	--	2	--	20 (2)
Cyanide	µg/L	22	5.2	140	3
Phenol, total	µg/L	--	--	300	10
Aluminum, dissolved	µg/L	750	87	--	9
Arsenic, total recoverable	µg/L	340	150	10	1
Barium, total recoverable	µg/L	--	--	1,000	3
Cadmium, total recoverable	µg/L	1.9 (3)	0.25 (3)	5	0.03
Chromium, total recoverable	µg/L	--	--	100	10
Chromium, hexavalent	µg/L	16	11	--	2
Copper, total recoverable	µg/L	12.4 (3)	8.4 (3)	1,300	2
Iron, total recoverable	µg/L	--	1,000	--	20
Lead, total recoverable	µg/L	69.4 (3)	2.7 (3)	15	0.3
Mercury, total recoverable	µg/L	1.7	0.91	0.05	0.005
Nickel, total recoverable	µg/L	421 (3)	47 (3)	100	2
Selenium, total recoverable	µg/L	20	5	50	1
Zinc, total recoverable	µg/L	108 (3)	108 (3)	2,000	8
Benzene	µg/L	--	--	5	0.6

Footnote:
(1) Ammonia standards based on 75th percentile of ambient pH (8.1 su) and temperature (17.9°C) as supplied for the 2014 major modification. Based on waterbody classification, salmonids are assumed present.
(2) In cases where the Required Reporting Value (RRV) as listed in Circular DEQ-7 is less stringent than a standard, DEQ accepts nondetect at the RRV for meeting the standard.
(3) Metal Standards based on 25th percentile of hardness values of 88 mg/L.

Table D-2. Water Quality Standards – Yegen Drain

Parameter	Units	Aquatic Life Standards		Human Health Standards	Required Reporting Value
		Acute	Chronic		
Ammonia (as N)	mg/L	6.77 (1)	1.88 (1)	5	0.07
Nitrate plus Nitrite	mg/L	--	--	10	0.02
Chlorine, Total Residual	µg/L	19	11	4,000	100 (2)
Fluoride	µg/L	--	--	4,000	200
Hydrogen Sulfide	µg/L	--	2	--	20 (2)
Phenol, total	µg/L	--	--	300	10
Aluminum, dissolved	µg/L	750	87	--	9
Arsenic, total recoverable	µg/L	340	150	10	1
Barium, total recoverable	µg/L	--	--	1,000	3
Cadmium, total recoverable	µg/L	5.7 (3)	0.56 (3)	5	0.03
Chromium, total recoverable	µg/L	--	--	100	10
Chromium, hexavalent	µg/L	16	11	--	2
Copper, total recoverable	µg/L	34.9 (3)	21.4 (3)	1,300	2
Iron, total recoverable	µg/L	--	1,000	--	20
Lead, total recoverable	µg/L	281 (3)	11 (3)	15	0.3
Mercury, total recoverable	µg/L	1.7	0.91	0.05	0.005
Nickel, total recoverable	µg/L	1,067 (3)	119 (3)	100	2
Selenium, total recoverable	µg/L	20	5	50	1
Zinc, total recoverable	µg/L	273 (3)	273 (3)	2,000	8
Benzene	µg/L	--	--	5	0.6

Footnote:
(1) Ammonia standards based on 75th percentile of ambient pH (7.9 su) and temperature (20.7°C) as averaged from the winter and summer data used in the 2008 renewal fact sheet. Based on waterbody classification, salmonids are assumed not present.
(2) In cases where the Required Reporting Value (RRV) as listed in Circular DEQ-7 is less stringent than a standard, DEQ accepts nondetect at the RRV for meeting the standard.
(3) Metal Standards based on average hardness values of 264 mg/L (25th percentile not available).

Table D-3. Yellowstone River Characteristics – Upstream Data (from 2014 Major Mod)

Parameter	Units	Minimum	Average	75th (1) Percentile	Maximum	Number of Samples
pH, median value	s.u.	7.4	8.0	8.1	8.2	10
Temperature	°C	1.1	10.4	15.8	20.7	12
Total Residual Chlorine	mg/L	<0.1	<0.1	<0.1	<0.1	5
Fluoride	mg/L	0.2	0.4	0.5	0.5	14
Sulfide	mg/L	<0.02	<0.02	0.02	0.02	4
Ammonia (as N)	mg/L	<0.05	<0.05	0.05	0.05	16
Nitrate + Nitrite (as N)	mg/L	0.06	0.2	0.3	0.4	14
Total Nitrogen	mg/L	<0.5	<0.5	<0.5	1.0	14
Total Phosphorus	mg/L	<0.01	0.04	0.04	0.2	14
Cyanide, total	mg/L	<0.005	<0.005	<0.005	<0.005	12
Hardness (as CaCO3)	mg/L	48	120	88(1)	148	13
Aluminum, dissolved	µg/L	8	107	39	680	10
Arsenic, total recoverable	µg/L	5	9.6	12	13	24
Barium, total recoverable	µg/L	<100	<100	<100	<100	20
Cadmium, total recoverable	µg/L	<0.02	<0.12	0.05	0.98	20
Chromium, total recoverable	µg/L	<10	<10	<10	<10	22
Copper, total recoverable	µg/L	<0.3	<1.9	2.9	1.9	22
Iron, total recoverable	µg/L	140	620	750	2,020	12
Lead, total recoverable	µg/L	<0.05	<1.5	0.54	20.3	20
Mercury, total recoverable	µg/L	<0.06 (2)	<0.06 (2)	<0.06 (2)	<0.06 (2)	12
Nickel, total recoverable	µg/L	<2	<2.4	2	6	20
Selenium, total recoverable	µg/L	<0.3	<0.56	0.65	1.5	24
Zinc, total recoverable	µg/L	<4	<5.1	5	12	20

Footnotes:
(1) To assess RP, DEQ uses the 75th percentile for all ambient data except hardness, where the 25th percentile is used.
(2) Laboratory reporting limit does not meet the DEQ-7 RRV.

Table D-4. Yegen Drain Characteristics – Upstream Data from 2008 FS

Parameter	Units	Average Conc.	75th Percentile (1)	Maximum Conc.	No. of Samples
pH	s.u.	7.6	7.9	8.2	12
Temperature	deg C	16.4	20.7	25	12
Hardness, as $CaCO_3$	mg/L	264	NA	630	12
Ammonia (as N)	mg/L	5.4	11.9	18.4	12
Total Kjeldahl Nitrogen (TKN)	mg/L	--		12.1	1
Nitrate + Nitrite, as N	mg/L	--		2.9	1
Nitrogen, Total as N	mg/L	--		15.0	Calc
Phosphorus, Total, as P	mg/L	--		0.48	1
Selenium, total recoverable	µg/L	4	5.5	7	12

Footnote:
(1) DEQ uses the ambient 75th Percentile as part of the mass balance equation for conducting RP and developing WQBELs; however the 75th percentile was not available for Yegen Drain. Therefore, DEQ approximated this value by averaging the average and maximum concentrations used in 2008. DEQ also conducted a review against the July 2008 Fact Sheet, including:

- pH: average of 75th percentile summer (8.0 s.u.) and winter (7.8 s.u.) used in 2008 Fact Sheet is 7.9 s.u.
- Temperature: average of 75th percentile summer (21.6) and winter (15.8) used in 2008 Fact Sheet is 18.7 deg C. The above calculated 75th percentile provides more conservative ammonia standards.
- Ammonia: the RP calculations in 2008 assumed the average ambient concentration was the average of 5.4 mg/L; DEQ proposes to use the above-calculated 75th percentile which is a more conservative value.
- Selenium: the RP calculations in 2008 assumed the average ambient concentration was the average of 4 ug/L; DEQ proposes to use the above-calculated 75th percentile which is a more conservative value.

Appendix E: Reasonable Potential (RP) Analysis and Water Quality-based Effluent Limit Development