

FACT SHEET FOR NPDES PERMIT WA-000294-1

FACILITY NAME Shell Oil Products US

DATE OF THIS FACT SHEET - May 30, 2007

PURPOSE of this Fact Sheet

This fact sheet explains and documents the decisions Ecology made in drafting this proposed National Pollutant Discharge Elimination System (NPDES) permit.

The Environmental Protection Agency (EPA) developed the NPDES permitting program as a tool to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” EPA delegated to Ecology the power and duty to write, issue, and enforce NPDES permits within Washington State. Both state and federal laws require any industrial facility to obtain a permit before discharging waste or chemicals to a water body.

An NPDES permit limits the types and amounts of pollution the permittee may discharge. Those limits are based either on (1) the pollution control or wastewater treatment technology available to the industry, or on (2) the receiving water’s customary beneficial uses. This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit *and accompanying fact sheet* for public evaluation before issuing an NPDES permit.

PUBLIC ROLE in the Permit

Ecology places a copy of the draft permit and fact sheet within the community, for public review and comment, at least thirty (30) days before we issue the final permit to the facility operator (WAC 173-220-050). Copies of the fact sheet and draft permit for Shell Oil Products US, NPDES permit WA-000294-1, are available for public review and comment from (insert month day, year) until the close of business (month day, year). For more details on reading the draft documents and on preparing and filing comments about them, please see **Appendix A - Public Involvement**.

Before Ecology published this draft NPDES permit, Shell Oil Products US, reviewed it for factual accuracy. Ecology corrected any errors or omissions about the facility’s location, product type or production rate, discharges or receiving water, or its history.

After the public comment period closes, Ecology will weigh the merits of each comment. Then we will summarize substantive comments and our responses to them. We will attach our summary and responses to comments to this Fact Sheet as **Appendix D - Response to Comments**, and publish it when we issue the final NPDES permit. The rest of the fact sheet will not be revised, but the full document will become part of the legal history contained in the facility’s permit file.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

TABLE OF CONTENTS

I. INTRODUCTION	1
Applicant.....	1
SIC Code.....	1
Discharge Locations.....	1
Process Wastewater Outfalls.....	1
II. BACKGROUND INFORMATION.....	2
A. Facility Description.....	2
History--	2
Industrial Process.....	2
General Chemical Corporation's wastewater	3
March Point Cogeneration Company's wastewater.....	3
Air Liquide Corporation's wastewater.....	4
Wastewater Treatment--.....	4
Discharge Outfall--	5
B. Permit Status	5
C. Summary of Compliance with Previous Permit Issued.....	6
D. Wastewater Characterization	6
III. PROPOSED PERMIT CONDITIONS	7
A. Design Criteria	8
B. Technology-Based Effluent Limits	8
Process Wastewater--.....	8
Ballast and Stormwater Allocations--	12
Stormwater Discharge Monitoring (Outfalls 002/005, 003, and 006).....	13
Pollution Prevention to Date--	16
New Requirements--	16
C. Surface Water Quality-Based Effluent Limits	17
Numerical Criteria for the Protection of Aquatic Life and Recreation--	17
Numerical Criteria for the Protection of Human Health--	17
Narrative Criteria--.....	17
Antidegradation--	18
Mixing Zones--	18
D. Description of the Receiving Water.....	23
E. Designated Uses and Surface Water Quality Criteria	23
F. Evaluation of Surface Water Quality -Based Effluent Limits for Numeric Criteria	25
G. Whole Effluent Toxicity	29
H. Human Health	30
I. Sediment Quality	32
J. Ground Water Quality Limits.....	32
K. Comparison Of Effluent Limits With The Previous Permit Issued January 2002.....	33
IV. MONITORING REQUIREMENTS.....	34

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

A. Lab Accreditation.....	35
V. OTHER PERMIT CONDITIONS	35
A. Reporting and Recordkeeping.....	35
B. Non Routine and Unanticipated Discharges	35
C. Outfall Evaluation	35
D. Treatment System Operating Plan	36
E. General Conditions.....	36
F. Construction Stormwater	36
VI. PERMIT ISSUANCE PROCEDURES	37
A. Permit Modifications.....	37
B. Proposed Permit Issuance.....	37
VII. REFERENCES FOR TEXT AND APPENDICES	38
APPENDIX A--PUBLIC INVOLVEMENT INFORMATION	39
APPENDIX B--GLOSSARY	40
APPENDIX C--TECHNICAL CALCULATIONS	44
APPENDIX D--RESPONSE TO COMMENTS	45

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

I. INTRODUCTION

Table 1: General Facility Information

Applicant	Shell Oil Products US – Puget Sound Refining Company	
Facility Name and Address	Puget Sound Refining Company South Texas Road March Point PO Box 622 Anacortes WA 98221	
Type of Facility	Petroleum Refinery	
SIC Code	2911	
Discharge Locations	Waterbody name: Fidalgo Bay	
Water Body ID Number	WA-03-0020	
Process Wastewater & Stormwater Outfalls		
Outfall 001	Latitude: 48° 30' 34" N	Longitude: 122° 34' 36" W
Outfall 001A	Latitude: 48° 28' 12" N	Longitude: 122° 34' 09" W
Stormwater Outfalls		
Outfall 002	Latitude: 48° 28' 0" N	Longitude: 122° 32' 15" W
Outfall 003	Latitude: 48° 28' 32" N	Longitude: 122° 32' 35" W
Outfall 004	Latitude: 48° 28' 00" N	Longitude: 122° 34' 12" W
Outfall 005	Latitude: 48° 28' 00" N	Longitude: 122° 32' 15" W
Outfall 006	Latitude: 48° 28' 06" N	Longitude: 122° 32' 27" W
Outfall 009	Latitude: 48° 28' 32" N	Longitude: 122° 32' 35" W
Outfall 010	Latitude: 48° 28' 00" N	Longitude: 122° 34' 08" W
Outfall 011	Latitude: 48° 28' 06" N	Longitude: 122° 34' 08" W
Outfall 012	Latitude: 48° 28' 08" N	Longitude: 122° 34' 08" W
Outfall 013	Latitude: 48° 28' 12" N	Longitude: 122° 34' 09" W
Outfall 014	Latitude: 48° 28' 16" N	Longitude: 122° 34' 09" W
Outfall 015	Latitude: 48° 28' 30" N	Longitude: 122° 34' 12" W

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), designed by the federal Environmental Protection Agency (EPA). The EPA authorized the State of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in Chapter 90.48 RCW (Revised Code of Washington).

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Ecology adopted rules describing how we exercise our authority:

- Procedures Ecology follows for issuing NPDES permits (Chapter 173-220 WAC),
- Water quality criteria for surface waters (Chapter 173-201A WAC) and for ground waters (Chapter 173-200 WAC)
- Sediment management standards (Chapter 173-204 WAC).

These rules require any industrial facility operator to obtain an NPDES permit before discharging wastewater to state waters. They also define the basis for limits on each discharge and for other performance requirements imposed by the permit.

Under the NPDES permit program Ecology must prepare a draft permit and accompanying fact sheet, and offer it for public review. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments on the draft permit, during a period of thirty days (WAC 173-220-050). (See [Appendix A--Public Involvement](#) for more detail about the Public Notice and Comment procedures). After the Public Comment Period closes, Ecology may change a condition or requirement in the draft NPDES permit, as suggested by a timely comment, to improve the facility's environmental performance.

II. BACKGROUND INFORMATION

A. Facility Description

History--

Texaco constructed and began operating the refinery in 1957 and 1958. Effective July 1, 1998 Texaco transferred the refinery to a new owner, Equilon Enterprises LLC, following the joint venture of Equilon and Texaco. In 2003 Shell Oil purchased the refinery.

The refinery is located on the northwestern coast of Washington State, on March Point, which extends into Fidalgo Bay to the west and Padilla Bay to the east. The facility is located in Skagit County, approximately five miles east of the city of Anacortes, Washington.

The refinery's wastewater outfall (001) is supported on the Shell shipping pier and extends approximately 5000 feet from the shore, in a north/northwesterly direction, into Fidalgo Bay. Twenty-five additional stormwater discharges are located on the refinery property. Most of these discharges drain agricultural land (leased) or pipeline right-of-ways. Three stormwater discharges located on Shell's property may contain refinery wastewater constituents (Outfalls numbered 002/005, 003, and 006).

The Environmental Protection Agency classifies Shell as a major facility.

Industrial Process-

Texaco originally designed the refinery to process 45,000 barrels (bbls) of crude oil per day. It has been expanded and upgraded since it was built.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Several major events impacted production at the refinery since then: In late fall of 1998 an industrial accident occurred in the coker unit which caused a significant decrease in production. In the years 1999 and 2000 Shell completed several major equipment turnarounds (equipment repair, major maintenance & up-grades) which kept production numbers down. From April of 2000 to April 2002 the refinery processed 144,000 bbls/day of crude oil (average throughput). From January 2004 to November 2006 Shell processed 135,000 bbls/day of crude oil with a maximum production rate of 160,000 bbls/day. For the next NPDES permit term Shell anticipates processing crude oil at a rate of at least 145,000 bbls/day.

The majority of crude oil processed at the refinery arrives by tanker from the Alaskan North Slope and by pipeline from Canada. The refinery separates crude oil into its various component parts. Separated components are further processed and blended into a variety of petroleum products. These products include gasoline, jet fuel, diesel fuel, coke, sulfur, and propane.

The refinery directly employs about 390 people with an estimated indirect employment of approximately 130 jobs.

General Chemical Corporation's Wastewater

General Chemical Corporation discharges wastewater into the Shell wastewater treatment system under authority of State Waste Discharge Permit No. ST 7309, issued by Ecology's Northwest Regional Office. General Chemical operates a sulfuric acid manufacturing plant consisting of three sulfuric acid sub-plants, two sulfur dioxide abatement units, and a small sulfur recovery unit (SRU). The plant manufactures various grades of sulfuric acid (H_2SO_4).

The plant produces approximately 176,000 tons per year of H_2SO_4 from spent alkylation acid and hydrogen sulfide (H_2S) gas received from the two adjacent petroleum refineries, Tesoro and Shell. The raw feed enters the plant by pipe lines. The H_2S feed is burned in the combustion chamber units to form sulfur dioxide (SO_2). Spent acid is decomposed in the burner to form SO_2 , O_2 , and H_2O . After the combustion process, the gas is cooled, purified and dried, then passed through a three stage fixed-bed converter with a vanadium pentoxide (V_2O_5) catalyst to form sulfur tri-oxide (SO_3). The SO_3 gas then combines with free water in an absorption tower to make H_2SO_4 . General Chemical Corporation ships the family of sulfuric acids produced (a quality of 99%, 93%, and 30% H_2SO_4) in either pipelines or tank trucks.

Wastewater from the facility includes weak acid, stormwater runoff from the process area, washdown, cooling tower blowdown, and occasional spills. General Chemical neutralizes this wastewater with sodium hydroxide. This neutralized wastewater settles in two lined lagoons. General Chemical pumps it into a final storage tank for a pH check prior to discharge into Shell's wastewater treatment system. General Chemical's state permit limits the pH, flow, and total suspended solids in the discharge.

March Point Cogeneration Company's Wastewater

The March Point Cogeneration Company applied for a state waste discharge permit on September 12, 2000. A temporary permit covered operations at the facility until Ecology issued final permit with conditions on September 8, 2006.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

The cogeneration facility discharges wastewater into Shell's treatment system. The discharge includes heat recovery steam generator blowdown, cooling water tower blowdown, Manufactured Refinery Gas (MRG) waterwash column blowdown, turbine wash effluent, boiler tube wash, sample streams, stormwater runoff, and sanitary wastewater from the March Point Cogeneration Company. This wastewater consists of process wastewaters, stormwater runoff, and sanitary wastewaters from the office building.

The wastewater contains traces of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS); ammonia, total residual chlorine, nitrogen; phosphate, oil and grease, and various metal compounds. The pollutants are similar in nature to those present in the refinery wastewater. The maximum daily wastewater flow from the cogeneration facility is 241,000 gallons per day.

Uncontaminated stormwater from the facility discharges through Shell's stormwater system.

Air Liquide Corporation's wastewater

Air Liquide Corporation (ALC) applied for a state waste discharge permit on March 20, 2000. Ecology issued a temporary state permit on May 17th 2000 and modified the temporary permit on June 16th 2003. Ecology issued a final permit with conditions on September 8, 2006.

The Air Liquide facility extracts nitrogen (N₂) and oxygen (O₂) from atmospheric air by cryogenic distillation and supplies it to the refinery. The cooling water (27,000 gallons/day) from the Air Liquide facility discharges into the Shell Refinery wastewater treatment system. Stormwater from the Air Liquide facility discharges into the refinery's stormwater system.

Materials stored on the ALC site include: 55 gallons of lubrication oil, 55 gallons of sodium hypochlorite, 55 gallons of NALCO Chemical 8365 (Orthophosphate) a corrosion control chemical and 55 gallons of sulfuric acid.

Ecology determined that this wastewater is compatible with Shell's wastewater treatment system

Wastewater Treatment--

Wastewater Treatment - In June of 1996, Equilon (now Shell) began construction to upgrade the biological and clarification portions of the effluent treatment plant. The new units came on-line in August of 1997. The upgrade of the biological system included: taking the trickling filter out of service, construction of an oxidation channel and two new clarifiers, retrofitting the old aerator/clarifier units for use as sludge thickeners, and constructing a new biosolids landfarm. Shell also upgraded the disinfection system used for treating sanitary wastewaters.

Shell treats process water, domestic wastewaters, and stormwater, in primary and secondary systems consisting of two tanks (tanks 72 and 73) which serve as both surge and overflow tanks; a three bay API oil/water separator, three dissolved air flotation units, and an equalization tank; a three bay oxidation channel, two clarifiers, and an intermediary retention basin, a stormwater pond, a final holding pond, and a chlorination system. The refinery aerobically digests waste activated sludge in two tanks and then thickens the sludge in tank S16. Shell sprays the digested and thickened sludge onto its permitted land application site. The refinery also treats wastewater and off-spec products from its off-site petroleum marketing and terminal facilities.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Discharge Outfall--

Shell discharges process water, sanitary wastewater, stormwater, and ballast water from the refinery via a 24-inch multi-port submerged diffuser, at Outfall 001 (constructed in 1993).

The total discharge volume generally ranges from 3.0 to 7.0 million gallons per day (MGD). The highest daily discharge from January 1991 to the present was 17 MGD, which occurred in December 1993. More recent maximum discharge values include, 11.7 MGD in March 1997, 11.6 MGD in July 1998, 10.7 MGD November 2003, and 8.3 MGD January 2005. Low flows generally occur in the summer and early fall. Shell discharged an average flow rate of 3.8 MGD during the most recent permit term.

In past years and at various times, Shell has operated in a continuous pumpout and a batch pumpout mode. Currently, Shell discharges treated effluent into Fidalgo Bay by a batch pumpout. This method of discharge allows Shell to monitor the effluent prior to discharge, to confirm its compliance with NPDES permit standards.

Shell uses Outfall 001A as an emergency bypass of the main effluent outfall. Outfall 001A is an emergency spillway, which prevents overtopping of the dikes during very heavy rainfall events. The refinery has not used Outfall 001A during the current permit term although there was one instance when the refinery nearly exceeded its pumping capacity. The refinery site includes four other industrial stormwater discharge points--Outfalls numbered 003-006--which discharge stormwater that may contain refinery wastewater constituents. Historically, Outfall 002/005 had released high total suspended solids (TSS) in the discharge. The facilities pollution prevention effort has corrected this problem and TSS levels have been controlled. We describe these outfalls in more detail in the stormwater section of this fact sheet.

B. Permit Status

Shell submitted an application for permit renewal in August 2006. Ecology determined the application included complete information in September 2006.

Ecology issued the previous permit for this facility on January 9, 2002. We have listed the 2002 permit effluent limits below.

Table 2: 2002 Permit Effluent Limits.

Parameter	Units	Effluent Limits	
		Average Monthly	Maximum Daily
Biochemical Oxygen Demand (5-day) ^d	lbs/day	801	1466
Chemical Oxygen Demand	lbs/day	5519	10750
Total Suspended Solids	lbs/day	643	1017
Oil and Grease	lbs/day	236	438

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Parameter	Units	Effluent Limits	
		Average Monthly	Maximum Daily
Oil and Grease	mg/l	The concentration of oil and grease in the discharge shall at no time exceed 15 mg/l (milligrams per liter), and shall not exceed 10 mg/l more than three days per month.	
Phenolic Compounds	lbs/day	5.2	10.8
Ammonia as N	lbs/day	583	1283
Sulfide	lbs/day	4.3	9.5
Total Chromium	lbs/day	10.3	21.8
Hexavalent Chromium	lbs/day	0.76	1.7
Total Residual Chlorine	mg/l	0.38	0.81
Fecal Coliforms	organisms/100mls	200/100 mls average monthly limit, 400/100 mls maximum daily	
pH	pH shall be maintained within the range of 6.0 to 9.0		

C. Summary of Compliance with Previous Permit Issued

Ecology staff last conducted a sampling compliance inspection on **May 17, 2006**.

Shell's wastewater treatment discharge has been in compliance during the history of the permit issued on **January 9, 2002**. Ecology determined facility compliance based on our review of the facility's Discharge Monitoring Reports (DMRs) and on inspections conducted by Ecology.

D. Wastewater Characterization

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. Ecology's monitoring results are included in the data that follows. The effluent is characterized as follows:

Table 3: Wastewater Characterization – Maximum Daily Value.

Parameter	Concentration	Parameter	Concentration
BOD	24.5 mg/l	Carbon Disulfide	0.001 mg/l
COD	308.5 mg/l	Cyanide (WAD)	0.033 mg/l
TOC	38 mg/l	Arsenic	0.029 mg/l (05insp)
TSS	42.4 mg/l	Chromium (Total)	0.004 mg/l
Ammonia	12.5 mg/l	Chromium	< 0.002 mg/l

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Parameter	Concentration	Parameter	Concentration
		(Hexavalent)	
Temperature (winter)	23°C	Lead	0.009 mg/l
Temperature (summer)	32.5°C	Mercury	0.00014 mg/l
pH	6.15 minimum, 8.6 maximum	Nickel	0.011 mg/l
Chlorine (Total Residual)	0.18 mg/l 04insp	Selenium	0.037 mg/l
Fecal coliforms	98 colonies/100ml	Zinc	0.096 mg/l (06insp)
Nitrate	0.25 mg/l	Aluminum	0.326 mg/l
Nitrogen (Total Organic)	4.34 mg/l	Boron	0.075 mg/l
Oil and Grease	14.8 mg/l	Titanium	0.01 mg/l
Phenols	0.12 mg/l	Magnesium	4.80 mg/l
Phosphorous	3.78 mg/l	Iron	0.520 mg/l
Sulfate	156 mg/l	Copper	0.0045 mg/l (04insp)
Sulfide	0.1 mg/l	Manganese	0.055 mg/l
Surfactants	0.2 mg/l		
Dichlorobromoethane	0.004 mg/l		
Benzene	0.002 mg/l		
Chloroform	0.015 mg/l		
Toluene	0.003 mg/l		

III. PROPOSED PERMIT CONDITIONS

Federal and State regulations require that each NPDES permit set forth either technology- or water quality-based effluent limits

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC).
- Water quality-based limits are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC),

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36). The most stringent of these limits apply to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application. Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the State of Washington. But Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, or do not have a reasonable potential to cause a water quality violation.

Nor does Ecology usually develop permit limits for pollutants that were not reported in the permit application but that may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology, as described in 40 CFR 122.42(a), if significant changes occur in any constituent. Industries may be in violation of their permit until the permit is modified to reflect additional discharge of pollutants.

A. Design Criteria

Under WAC 173-220-150 (1)(g), neither flows nor waste loadings may exceed approved design criteria. Ecology obtained the approved design criteria for this facility's treatment plant from the 2004 engineering report prepared by Shell/VECO engineering and the 1996 plant upgrade specifications.

Table 4: Design Criteria for Wastewater Treatment Plant.

Parameter	Design Quantity
Monthly average flow (max. month)	MGD
Instantaneous peak flow through the wastewater plant	7000 gpm
BOD influent loading to Bioreactor	9900 lbs./day

B. Technology-Based Effluent Limits

Process Wastewater--

Ecology based the effluent limits for the Shell refinery on Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), Best Practicable Control Technology Currently Available (BPT), and on New Source Performance Standards (NSPS), as developed by the Environmental Protection Agency (EPA).

EPA published guidelines for developing effluent limitations on August 12, 1985 under [40 CFR Part 419] for the cracking subcategory of petroleum refining. EPA based these limits on terms of a settlement agreement dated April 17, 1984, between EPA and the Natural Resources Defense Council, resolving litigation about the EPA guidelines. The August 12, 1985 guidelines establish Best Available Technology (BAT) and Best Conventional Technology (BCT) as equal to Best

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Practicable Technology (BPT) for all parameters except phenols and chromium. Ecology regulates phenols and chromium by whichever guideline is more stringent. Shell must use all known, available, and reasonable methods (AKART) to control toxicants in its wastewater.

On December 31, 2003 EPA published its intention to review the petroleum refining industry's practices to decide whether it should revise the industry's effluent guidelines. EPA evaluated pollution prevention opportunities, emerging treatment technologies, trends reflected in the effluent guidelines, and expanding the list of regulated pollutants. EPA reviewed information and comments on several issues including: control technologies for polycyclic aromatic hydrocarbons (PAHs), dioxin sources and reduction/control technologies, sources of toxic metals, process modifications to reduce metals content, and toxics commonly released but remain unreported. EPA reviewed the available dioxin information collected by refineries nationwide much of which was collected at the Washington state refineries.

On September 2, 2004 (Federal Register Volume 69 No. 170) EPA published its decision about the refinery effluent guidelines. EPA concluded:

- there is little evidence that PAHs are present in refinery wastewater discharges in concentrations above the detection limit.
- the concentration of metals being discharged by refineries is at or very near treatable levels, leaving little to no opportunity to reduce metals discharges through conventional end-of-pipe treatment
- dioxins are only occasionally discharged, in relatively low concentrations, in treated refinery effluent. In EPA's opinion this data did not warrant the development of national categorical limitations on dioxin in refinery wastewater discharges. But EPA did note that on a case-by-case, best-professional-judgment basis, permit writers may decide to include effluent limitations for dioxin.

As a result of the evaluation, EPA found no need to revise the federal effluent guidelines at this time. But EPA encourages permit writers and refineries to consider pollution prevention opportunities.

Ecology must decide whether the effluent guidelines also constitute "all known, available and reasonable methods of treatment" (AKART). As a general rule, if the effluent guidelines for a particular pollutant/source category are five years old or newer, Ecology presumes they will be AKART. If the effluent guidelines are over 10 years old, Ecology reviews the federal effluent guidelines development document and analyzes unit processes design and efficiencies to determine that the effluent guidelines constitute AKART and meet the intent of RCW 90.48.520. The federal effluent guidelines development document describes production processes, pollutants generated, treatment efficiencies, and unit process designs present nationwide in the specific industry at the time of effluent guideline development.

In the 2002 permit, Ecology required Shell to prepare an engineering report predicting design capacities for the facility's wastewater treatment system based upon current operating conditions. This permit condition also required that Shell collect additional treatment unit influent and effluent data. The data was evaluated to determine current treatment unit operating efficiencies. The operating efficiencies and design/flow capacities detailed in the study yielded results better

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

than standards and predicted loadings. Ecology reviewed the reports and determined that Shell is providing AKART for its wastewater. EPA's 2003 effluent guidelines evaluation also supports Ecology's determination.

Ecology also applied new source performance standards on the basis of AKART, making our permit limitations more stringent than those applied in other states. Ecology began applying the more stringent new source performance standards to all crude throughput increases in 1984.

The refinery's crude oil throughput rate has changed slightly since we issued the previous NPDES permit (March 2002). The refinery's highest 12-month rolling average crude throughput was 141,700 bbls/day from February 2006. Shell anticipates being at or above this crude throughput rate during the proposed NPDES permit's term. The rate changes in refinery processes are shown below. We documented the size and process factor determination in **Appendix F**. We multiplied the size and process factors by the actual feedstock rate, to obtain an adjusted feedstock rate for our use in determining effluent limits--except for determining BAT limits for phenols and chromium.

Table 5: Refinery Processes and Flows.

Parameters	1990 Permit	2002 Permit	Proposed Permit
Actual Feed Stock, bbls/day	98,500	144,000	141,700
Desalting, bbls /day	98,500	144,000	141,700
Atmospheric Distillation, bbls/day	98,500	144,000	141,700
Vacuum Distillation, bbls/day	35,800	60,100	66,515
Fluid Catalytic Cracking, bbls/day	35,000	50,100	58,375
Coking, bbls/day	20,700	24,600	26,130
Butane Deasphalting, bbls/day	4,600	0	0
Hydrotreating, bbls/day	33,300	71,500	127,872
H ₂ SO ₄ Alkylation, bbls/day	10,000	9,600	11,505
Catalytic Reforming, bbls/day	18,800	24,700	29,820
Process Factor	1.09	1.0	1.0
Size Factor	1.13	1.35	1.35
Adjusted Feed Stock, bbls/day	121,322	194,400	191,295
New Source Performance Standards Increment, bbls/day	38,787	111,865	113,471

Ecology applied New Source Performance Standards to the increases in the feedstock rate above the 1984 baseline production levels. We calculated these limits by multiplying the increase in

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

adjusted feed stock, $(191,295 - 82,535 = 108,760$ barrels (bbls) per day) by the New Source Performance Standards (NSPS). We then added the resulting NSPS increment (based upon a current feedstock rate of 141,700 bbls per day), to BAT and BPT limitations (based upon the adjusted baseline feedstock rate of 82,535 bbls per day). But we did not include BCT limitations in our recalculations because they are equivalent to BPT limitations.

The EPA/NRDC settlement agreement provided separate factors for calculating phenols, total chromium, and hexavalent chromium for the BAT limitation. These calculations required feedstock rate data for additional processes including: hydrotreating, catalytic reforming, and alkylation. This information is included in the Table 5 above.

We tabulated the permit limit calculations in **Appendix G**. The actual permit limit is the more stringent of the BAT and BPT determinations. BPT limitations are more stringent for phenols and BAT limits are generally more stringent for chromium. We listed the proposed effluent limits in pounds per day in Table 6.

Table 6: Proposed Effluent Limits.

PARAMETERS		
(pounds/day unless otherwise specified)	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	791	1448
Chemical Oxygen Demand	5453	10621
Total Suspended Solids	635	1005
Oil and Grease	233	432
Phenolic Compounds	5.15	10.68
Ammonia as N	574	1263
Sulfide	4.24	9.39
Hexavalent Chromium	50 µg/l (micrograms per liter)	
pH shall be maintained within the range of 6.0 to 9.0.		
Fecal Coliform (colonies per 100 mls)	200	400

The EPA determined federal effluent guidelines for total and hexavalent chromium, back when chromium was commonly used in cooling water systems and discharged at much higher levels in the effluent. Since the EPA banned chromium from use in cooling systems, in the early 1990's, the only remaining source at refineries is any low levels of chromium present in the crude oil.

But because federal effluent guidelines still include limits for chromium, Ecology must include an effluent limit for chromium in the proposed permit to ensure that refineries in Washington are

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

subject to the same requirements as refineries located in other states. Ecology believes the guideline-derived effluent limitation is artificially high, now that chromium levels in the effluent have decreased to levels bordering on non-detectable. All detectable samples of chromium in the Shell effluent have been below 5 µg/l (micrograms per liter) which is less than 1/10th the marine chronic water quality standard of 50 µg/l of Hexavalent Chromium (acute standard = 1100 µg/l).

Based on this information, Ecology's **Best Professional Judgment** concludes that a **50 µg/l hexavalent chromium concentration limit** is technologically achievable, reasonable, and protective of the receiving water quality. This permit condition imposes a technology-based limit and not a water quality-based limit. The 50 µg/l limit, at a 3.0 MGD effluent flow, converts to 1.25 lbs/day--which is more stringent than the federal effluent guideline limit of 1.71 lbs/day. This technology-based limit therefore adequately replaces both the total chromium limit and the hexavalent chromium limit in the permit.

If chromium level changes in the crude oil refined at Shell result in concentration increases, Ecology will modify the permit to increase the limit as needed to allow continued facility compliance. We will evaluate any revised limit to ensure that the effluent continues to meet water quality standards within the authorized mixing zone, and to ensure that chromium concentrations do not exceed limits allowed under the federal effluent guidelines. In the event that federal effluent guidelines are promulgated without chromium limitations, we will drop the limit from the permit unless the situation changes and Ecology determines a water quality limit is necessary. Shell will continue to perform semi-annual hexavalent chromium monitoring.

Ballast and Stormwater Allocations--

Contaminated stormwater from the process areas discharges to the oily water sewer and commingles with process wastewater. Shell treats this combined wastewater stream at the refinery's treatment facility. Stormwater runoff from the tank farms, and from areas with no potential for contamination, discharges to the clean water sewer system. Shell discharges stormwater run-off to the clean water sewer only if the waters are found to be uncontaminated. Shell directs any contaminated stormwater to the oily water sewer. Stormwater from the clean water sewer discharges to the clean water flume adjacent to the final pond at the effluent treatment plant. Some settling occurs in this pond, and oil and grease can be skimmed from the surface as necessary. Shell directs stormwater from the flume into the final pond, where it commingles with the treated process wastewater, prior to discharge. Occasionally Shell discharges ballast water into the process wastewater treatment system.

Shell does not directly measure stormwater flow at the facility. Direct measurement is not feasible because a portion of the stormwater is diverted into the oily water sewer at many collection points, and a portion of the stormwater is collected in the stormwater system. The stormwater flow is calculated by subtracting an estimated dry weather flow from the total flow discharged each day.

Shell provided the daily flow and rainfall information in an electronic format. To analyze dry weather conditions, Ecology removed all data where rain fell within three and five days of the data point. We removed wet weather months' rainfall data from the analysis entirely. From our

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

analysis of this data Ecology determined Shell's dry weather stormwater flow as approximately 3.5 MGD which we included in the proposed permit.

Ecology based the ballast and stormwater allocations in the permit on the guidelines published in 40 CFR 419.12(c) and 419.22(e). Ecology will not include a chromium stormwater allocation in the proposed permit, based on the performance of the facility. The stormwater allocations provided in the EPA guidelines apply to runoff from areas associated with industrial activity, not to outlying areas such as parking lots and surrounding acreage. Shell's employee parking lots do discharge into the stormwater flume. But the volume of run-off from the parking lots is small compared to the total amount of stormwater; it will have a negligible impact on the stormwater allocation. During the summer months of June through October Shell may only claim the stormwater allocation after demonstrating that measurable rain fell at the refinery site during the previous ten calendar days. Table 7 shows the allocations.

Table 7: Stormwater and Ballast Water Allocations.

Parameters	Stormwater Allocation lbs./million gallons		Ballast Water Allocation lbs./million gallons	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	220	400	210	400
Chemical Oxygen Demand	1500	3000	2000	3900
Total Suspended Solids	180	280	170	260
Oil and Grease	67	130	67	126
Phenolic Compounds	1.4	2.9	----	----

Stormwater Discharge Monitoring (Outfalls 002/005, 003, and 006)

Stormwater monitoring data for Outfalls 002/005, 003, and 006 were collected during the previous permit term. The data indicate that pollutant concentrations in stormwater runoff from the areas drained by the outfalls are lower than Ecology and EPA stormwater benchmarks, except for TSS and COD. Therefore the proposed permit requires Shell to maintain annual stormwater monitoring.

Benchmark values are not water quality standards or permit limits. They are indicator values. Values at or below benchmark are considered unlikely to cause a water quality violation. Using the Industrial General Stormwater Permit as a guideline, Ecology added total zinc to the list of parameters to be monitored at these outfalls.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Stormwater sampling data

Parameters (mg/L)	Stormwater Outfalls			
	002/005	003	006	Benchmark
	max/ave	max/ave	max/ave	
Biochemical Oxygen Demand (5-day)	3.4/1.5	2.0/0.6	3.0/1.1	
Chemical Oxygen Demand	28/19.3	74/27.5	68/29.1	60
Total Suspended Solids	45/19.2	11.2/5.6	18.8/8.1	25
Oil and Grease	1.5/1.0	1.5/0.8	1.7/1.0	15
pH min/max	7.4/7.8	6.6/7.6	7.3/7.9	6 - 9

Outfalls 004 and 009 - 015 are stormwater outfalls that drain areas with little or no exposure to industrial activities or materials. As in the previous permit, the proposed permit requires no routine monitoring of these outfalls. In the event of oil or hazardous substance spills in the vicinity of these outfalls, monitoring will be required.

Outfalls 017 – 025 were included in previous permits in case of spills from pipelines. These stormwater sources/outfalls are not on Shell property or near industrial activities conducted by Shell. Ecology will not regulate these outfalls by this proposed permit.

The proposed permit includes standard language regarding general prohibitions, and requiring permittee actions to respond to monitoring results above benchmark values for outfalls numbered 002/005, 003, and 006. The permit does not establish limits for discharges from these outfalls.

The table which follows identifies the stormwater outfalls, the activities within the basins, and whether the permit requires the permittee to monitor the outfalls on an ongoing basis.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Stormwater Outfalls – Identification of On-Site Activities												
Outfall #	Area (Acres)	Monitoring Required	Industrial Activity	Spills within the last 3 years	Pipeway	Road	Woods	Agricultural Land	Train Tracks	Wastewater Treatment Plant Dikes	Parking	Other
001	377	x	x	x	x	x		x	x	x	x	Treated Stormwater/process wastewater
001A												Emergency bypass for Outfall 001 – weir
002	26.5	x				x					x	Contractor Parking
003	54.6	x	x		x	x		x				Recovery yard, cooling tower
004					x	x	x	x				Emergency bypass for booster pump basin
005	41.3	x	x			x	x					Wood & Old metal storage
006	12	x	x				x		x			Sulfur tanks, laydown area
009	10.5					x	x	x				Clean dirt stockpile
010	18					x	x	x	x			Lawn/field
011	3.6					x				x		Wastewater treatment plant field
012	1.1					x				x		Wastewater treatment plant dikes
013	0.6					x				x		Wastewater treatment plant dikes
014	6.5				x	x		x	x			Fields around truck rack containment
015	8.1					x		x				Hayfield
017	1.1				x	x		x				Pipeline to wharf
018	0.5				x	x		x				Pipeline to wharf
019	0.5				x	x		x				Pipeline to wharf
020	0.5				x	x		x				Pipeline to wharf
021	0.5				x	x		x				Pipeline to wharf
022	1.1				x	x		x				Pipeline to wharf
023	0.5				x	x		x				Pipeline to wharf
024	5.9				x	x		x				TARA campground
025	15.7				x	x		x			x	Wharf parking

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Pollution Prevention to Date--

Shell submitted a Pollution Prevention Plan as required by the current NPDES permit. As a result of the plan Shell:

- Installed stainless steel packing and differential pressure gauges in its Poly treater vessels;
- Changed amine specifications; and
- Changed operational procedures, to reduce the amount of amine and caustic entering the process wastewater stream.

Additional operational changes helped reduce pollutants, such as hydrocarbons (oil), benzene, ammonia, and high temperature water from entering the waste water stream.

Shell also includes pollution prevention elements in its ongoing training for employees at the facility.

Although many of the pollution prevention strategies identified and implemented under Hazardous Waste Planning requirements also reduce pollutant impacts on water quality, Ecology did not direct Shell to specifically review and evaluate facility processes and activities for the source reduction and control of water pollutants, until the previous NPDES permit cycle. Ecology intended the NPDES Pollution Prevention Plan incorporated in the previous permit to be an ongoing process that achieves continued improvements.

New Requirements--

In the proposed permit, Ecology requires Shell to update the water-oriented NPDES Pollution Prevention plan. Ecology's goals and objectives for developing and implementing pollution prevention plans are to identify, reduce, eliminate, and prevent the generation and release of pollutants to influent wastewater streams, stormwater, and/or waters of the state; and to prevent violations of surface water, ground water, and sediment quality standards. The objective of this update is to identify any new sources of pollutants, to reevaluate previously identified pollution prevention opportunities, and to identify any new opportunities and implement those that are technically and economically achievable.

Required NPDES Pollution Prevention plan elements include identification and implementation of Best Management Practices (BMPs). Pursuant to 90.48 RCW and Sections 302 and 402 of the Clean Water Act, Ecology may incorporate BMPs as permit conditions. BMPs are actions or procedures that prevent or minimize the potential for release of pollutants or hazardous substances, in significant quantities, to surface waters. BMPs, though normally qualitative, are most effective when used in conjunction with numerical (quantitative) effluent limits in NPDES permits.

The NPDES Pollution Prevention plan also addresses stormwater. Ecology published guidance for the prevention of stormwater runoff contamination, titled *Stormwater Pollution Prevention Planning for Industrial Facilities* (September 1993). Shell may incorporate (into the pollution prevention plan) the appropriate sections of Ecology's guidance--or any other plans previously developed by the refinery--which include procedures for prevention of stormwater runoff

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

contamination. These plans, however, will not necessarily include all of the BMPs necessary for preventing stormwater contamination by more conventional pollutants – in particular, total suspended solids (TSS). Pollution Prevention plans do not generally address “clean” areas of the facility (those areas where petroleum products or hazardous materials are not stored or used). These “clean” areas may contribute conventional pollutants to the facility’s stormwater.

Ecology included a review of solid waste handling and disposal procedures in the NPDES Pollution Prevention Plan to prevent solid waste and solid waste leachate from causing pollution of state waters. In addition, Shell’s latest plan describes measures already taken to prevent the accidental release of pollutants to state waters and to minimize damages if such a spill should occur.

C. Surface Water Quality-Based Effluent Limits

The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) were designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet established surface water quality standards (WAC 173-201A-060). The Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation--

"Numerical" water quality criteria are numerical values published in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the permit must include the water quality-based limits.

Numerical Criteria for the Protection of Human Health--

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The Water Quality Standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria--

Narrative water quality criteria (e.g., WAC 173-201A-260(2); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-600, and WAC 173-201A-602; 2006) and of all marine waters (WAC 173-201A-610, 612; 2006) in the State of Washington.

Antidegradation--

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities that are likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three Tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

This facility must meet Tier I requirements.

- Existing and designated uses must be maintained and protected. No degradation may be allowed that would interfere with, or become injurious to, existing or designated uses, except as provided for in this chapter.

Ecology's analysis described in this section of the fact sheet demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

Mixing Zones--

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the diluting wastewater doesn't interfere with designated uses of the receiving water body (e.g., recreation, water supply, and aquatic life and

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control and treatment (AKART). Mixing zones typically require compliance with water quality criteria within 200 to 300 feet from the point of discharge; and use no more than 25% of the available width of the water body for dilution. We use modeling to estimate the amount of mixing within the mixing zone. Through modeling we determine the potential for violating the water quality standards at the edge of the mixing zone and to derive any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's Permit Writer's Manual). Each critical condition parameter (by itself) has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water comprises 90% of the total volume at the boundary of the mixing zone. We use dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life **acute** criterion is based on the assumption that organisms are not exposed to that concentration for more than one-hour and more often than one exposure in three years. Each aquatic life **chronic** criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two liters/day for drinking water

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400; 2006). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. Ecology must specify both the allowed size and location in a permit.

This permit specifies the size and location of the allowed mixing zone.

2. The facility must fully apply “all known available and reasonable methods of prevention, control and treatment” (AKART) to its discharge.

Ecology has determined that the treatment provided and the pollution prevention activities practiced at Shell meet the requirements of AKART (see “Technology based Limits”).

3. Ecology must consider critical discharge conditions.

Surface water quality-based limits are derived for the water body’s critical condition, (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated water body uses). The critical discharge condition is often pollutant-specific or water body-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology’s Permit Writer’s Manual describes additional guidance on criteria/design conditions for determining dilution factors. The Manual can be obtained from Ecology’s website at: <http://www.ecy.wa.gov/biblio/92109.html>.

Ecology used the following critical conditions to model the discharge:

- Water depth at MLLW of 42 feet.
- Density profile with a difference of 23.20 sigma-t units between 42 feet and the surface.
- 50th percentile current speeds of 5.5 cm/sec for chronic and human health mixing zones.
- 10th percentile current speeds of 1 cm/sec for acute mixing zone.
- Maximum average monthly effluent flow of 2.9 MGD for chronic and human health non-carcinogen.
- Annual average flow of 2.78 MGD for human health carcinogen.
- Maximum daily flow of 9500 gallons per minute for acute mixing zone.
- Effluent temperature of 18.32 degrees C.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Ambient data at critical conditions in the vicinity of the outfall was taken from Ch2M study conducted in 1992.

4. Supporting information must clearly indicate the mixing zone would not:

- **Have a reasonable potential to cause the loss of sensitive or important habitat,**
- **Substantially interfere with the existing or characteristic uses,**
- **Result in damage to the ecosystem, or**
- **Adversely affect public health.**

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms, and set the criteria to generally protect 95% of the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for 1-hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for 4 days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of being discharged.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than 2 seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing. See Ecology's Permit Writer's Manual for details.
<http://www.ecy.wa.gov/biblio/92109.html>

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics, and the discharge location. Based on this review we conclude that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem or adversely affect public health

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant. We concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone changes. The plume rises through the water column as it mixes therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed the discharge and the receiving water is more completely mixed in a shorter time period. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor and the lowest flow occurring once in every 10 years to perform the reasonable potential analysis.

The facility continues to conduct pollution prevention activities and has completed pollution prevention projects. These activities also minimize the concentrations of pollutants in the discharge.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

8. Acute Mixing Zone.

- **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable**
We determined the acute criteria will be met at 10% of the distance of the chronic mixing zone.
- **The pollutant concentration, duration and frequency of exposure to the discharge, will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**
As described above the toxicity of any pollutant depends upon the exposure, the pollutant concentration and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organism near the point of discharge (below the rising effluent).

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

- **Comply with size restrictions.**
The mixing zone authorized for this discharge complies with the size restrictions published in Chapter 173-201A WAC.

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

D. Description of the Receiving Water

Shell discharges to Fidalgo Bay. The Tesoro Northwest Company is located on property to the north of Shell's facilities. Tesoro's wastewater treatment plant outfall is located in the vicinity of the Shell outfall (at a latitude of 48N 30' 30" and a longitude of 122W 34' 00"). The outfalls are physically located within 3000 feet of each other.

The ambient background data used for this permit includes the following information from Ecology's Water quality monitoring data:

Table 8: Ambient Background Data

Parameter	Value used
Temperature (highest annual 1-DADMax)	19.54 ° C
pH Maximum / Minimum	7.1 – 8.7
Dissolved Oxygen	7.8 mg/L
Total Ammonia-N	0.02 mg/L
Fecal Coliform	1 org./100 mL dry weather
Salinity	30.27 psu
Turbidity	4 NTU
Lead	0.0443 µg/l
Copper	0.5120 µg/l
Zinc	1.2600 µg/l

E. Designated Uses and Surface Water Quality Criteria

Applicable designated uses and surface water quality criteria are defined in Chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). Criteria applicable to this facility's discharges are summarized below in **Table 9**.

- Aquatic life uses are designated using the following general categories. It is required that all indigenous fish and nonfish aquatic species be protected in waters of the state.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

- (a) **Extraordinary quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
- (b) **Excellent quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
- (c) **Good quality** salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
- (d) **Fair quality** salmonid and other fish migration.

The Aquatic Life Uses for this receiving water are identified below.

Table 9: Aquatic Life Uses & Associated Criteria

Excellent quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1 Day Minimum	6.0 mg/L
Turbidity Criteria	<ul style="list-style-type: none"> • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- To protect **shellfish harvesting**, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
- The **recreational uses** are primary contact recreation and secondary contact recreation.

The recreational uses for this receiving water are identified below.

Table 10: Recreational Uses

Recreational use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.
Secondary	Enterococci organism levels must not exceed a geometric mean value of 70

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Contact Recreation	colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 208 colonies/100 mL.
--------------------	--

- The **miscellaneous marine water uses** are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

F. Evaluation of Surface Water Quality -Based Effluent Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely a pollutant such as biochemical oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

Pollutant concentrations in the proposed discharge exceed water quality criteria despite using technology-based controls which Ecology determined fulfills AKART. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones described in Chapter 173-201A WAC.

Shell's diffuser is 200 feet long with a diameter of 24 inches. It consists of 24 ports, each of which is 4 inches in diameter. The distance between ports is 8 feet. The MLLW depth at the diffuser is 40 feet. This and additional information is available in the Outfall Dilution Study Report submitted to Ecology in May of 1992

Chronic Mixing Zone--

WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports as measured during MLLW.

The horizontal distance of the chronic mixing zone is 240 feet. The mixing zone extends from the seabed to the top of the water surface.

Acute Mixing Zone--

WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for Outfall 001 extends 24 feet in any spatial direction from any discharge port.

In preparation of the 2002 NPDES permit, Ecology determined the dilution factors of effluent to receiving water that occur within these zones by the use of a dye study and the use of modeling. Ecology used diffuser information in the modeling obtained from the January 1992 engineering report prepared by CH2M HILL entitled "Engineering Report Outfall Diffuser Design". We

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

obtained current speed information from the report dated May 1992 prepared for Texaco by CH2M HILL entitled “Outfall Dilution Study Report - NPDES Permit No. WA000294-1”. We evaluated density profiles obtained from the May 1992 report cited above, and from the February 1991 report prepared for Shell Refining by CH2M Hill, titled, “Dilution Ratio Study Shell Oil Company Anacortes Refinery”.

The model used for near field effects was the EPA funded dilution model UDKHDEN. Far field effects were predicted using the EPA PLUMES model (EPA/600/R-94-086) with the addition of a linear eddy diffusivity algorithm (based on the Brooks model presented by R. A. Grace, Marine Outfall Systems: Planning, Design, and Construction, Prentice-Hall, Inc.).

For this fact sheet and proposed permit Ecology’s review of the previous dilution analysis assumptions determined that the bases of those assumptions in the 2002 permit had not changed significantly. Our review of monthly discharge reports shows the daily average discharge flow remains unchanged from the flow averages used in the 2002 permit. Specifically, *the current discharge flow averages 3.9 MGD* and we used a flow of 3.9 MGD for modeling the 2002 permit dilution. The current high monthly average discharge flow is 4.7 MGD and this matches the high flow (4.7 MGD) used in the previous permit. The discharge outfall and ambient conditions within the receiving water remain unchanged since 2002.

The dilution factors are listed in Table 11:

Table 11: Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	62	127
Human Health, Carcinogen		152
Human Health, Non-carcinogen		127

Ecology determined the impacts of immediate oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, nutrients and other toxics as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

Biochemical Oxygen Demand (BOD₅)--This discharge (with technology-based limits) results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limits will protect dissolved oxygen criteria in the receiving water.

Temperature--The state temperature standards include multiple criteria, each with different durations of exposure and points of application. Each criterion needs to be independently evaluated when determining reasonable potential and deriving permit limits.

Ecology analyzed the impact of the discharge on the temperature of the receiving water using the guidance for the State’s temperature standards. To determine the reasonable potential to exceed temperature standards, Ecology evaluated the following criteria:

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

1. Annual Summer Maximum Criteria – Each water body has an annual maximum temperature criterion. For the discharge into **Fidalgo Bay this criteria is 16 °C**. These threshold criteria protect specific categories of aquatic life by controlling the effect of human actions on summer water temperatures. We determined the reasonable potential for Outfall 001 to exceed the annual summer maximum temperature criteria by using the following equation:

$$T_{\text{chronic}} = T_{\text{ambient90}} + (T_{\text{effluent95}} - T_{\text{ambient90}})/DF$$

Where:

- T_{chronic} = Receiving water temperature at the chronic mixing zone boundary
- $T_{\text{ambient90}}$ = 90th percentile of annual maximum background temperatures at Station GRG002 from January 1998 through June 2006 (19.54 °C)
- $T_{\text{effluent95}}$ = 95th percentile of daily maximum effluent temperatures from Jan1999 through June 2006. (Used 100% max temp of 32.5 °C)
- DF = Chronic dilution factor at the critical condition (127)

If T_{chronic} is greater than the criterion of 16 °C for the excellent quality receiving water of Fidalgo Bay, an effluent limit is needed.

$T_{\text{ambient90}}$ (19.54 °C) in this case, is greater than the temperature criterion of 16 °C. Therefore, no further analysis for this segment of the criteria is required.

2. Supplemental Spawning Criteria – In some waters, Ecology assigned a threshold criterion to protect spawning and incubating salmonids. This criterion applies in addition to the annual summer maximum temperature criteria discussed above. But Shell's Outfall 001 discharges to a marine environment. Salmonids do not spawn in a marine environment so the supplemental spawning criteria do not apply.

3. Incremental Warming Criteria – Where background temperatures are cooler than criterion - At locations and times when background temperatures are cooler than the assigned threshold criterion (16 °C), point sources are permitted to warm the water by only a defined increment t and remain below the criteria. We determined the permittee's reasonable potential to exceed incremental warming criteria, using the equations below:

$$T_{\text{chronic}} = T_{\text{ambient}} + (T_{\text{effluent95}} - T_{\text{ambient}})/DF$$
$$t = 12/(T_{\text{ambient}} - 2)$$

Where:

- T_{chronic} = Receiving water temperature at the chronic mixing zone boundary
- T_{ambient} = background temperature cooler than criteria from Jan 1998 - June 2006 (15.0 °C) where $T_{\text{ambient}} + t$ is less than criterion (16 °C)
- $T_{\text{effluent95}}$ = 95th percentile of daily maximum effluent temperatures from January 1999 through October 2006 (used max temp 32.5 °C)
- DF = Chronic dilution factor at the critical condition (127)

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Anytime ambient background temperatures (T_{ambient}) are cooler than the threshold criterion (16 °C), and if T_{chronic} is greater than ($T_{\text{ambient}} + t$), an effluent limit is needed.

In this case the defined increment $t = 0.92$ °C and

$$(T_{\text{ambient}} + t) = 15.92 \text{ °C}$$

$$T_{\text{chronic}} = 15.14 \text{ °C}$$

In this overly conservative case (maximum effluent temperature), the T_{chronic} is less than ($T_{\text{ambient}} + t$). Therefore, an effluent limit is not required because we predict no violation of Water Quality Standards.

4. Incremental Warming Criteria – When the criterion is exceeded due to natural conditions – At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition. If the ambient temperature, $T_{\text{ambient90}}$ (expressed as the 90th percentile of annual maximum background temperatures), is warmer than the threshold criterion, then an incremental warming analysis must be performed.

The $T_{\text{ambient90}}$ for the Strait of Georgia, during Jan 1998 to Jun 2006 in the vicinity of Outfall 001 is 19.54 °C, which is more than the threshold temperature criterion of 16 °C. Therefore, an incremental warming analysis must be performed.

The reasonable potential to exceed incremental warming criteria was determined using the equation below:

$$T_{\text{chronic}} = T_{\text{ambient90}} + (T_{\text{effluent95}} - T_{\text{ambient90}})/DF$$

Where:

- T_{chronic} = Receiving water temperature at the chronic mixing zone boundary
- $T_{\text{ambient90}}$ = 90th percentile of annual maximum background temperatures at Station GRG002 from January 1998 through June 2006 (19.54 °C)
- $T_{\text{effluent95}}$ = 95th percentile of daily maximum effluent temperatures from Jan1999 through June 2006. (Used 100% max temp of 32.5 °C)
- DF = Chronic dilution factor at the critical condition (127)

In this case $T_{\text{chronic}} = 19.64$ °C

Comparing T_{chronic} to $T_{\text{ambient90}}$ the temperature rise is 0.10 °C. This is less than the allowed 0.3 °C, and therefore no limit is required.

pH-- Compliance with the technology-based limits of 6 to 9 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Turbidity—Ecology evaluated the impact of turbidity based on the range of turbidity in the effluent and turbidity of the receiving water. Due to the large degree of dilution, Ecology expects no violations of the turbidity criteria outside the designated mixing zone.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Toxic Pollutants--Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: arsenic, mercury, nickel, cyanide, phosphorus, sulfide, copper, lead, selenium, zinc, chlorine, and ammonia. We conducted a reasonable potential analysis (See Appendix C) on these parameters to determine whether effluent limits would be required in this permit.

Ecology determined whether the pollutants listed above pose a reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991(Appendix C).

Valid ambient background data was available for the metals listed above and ammonia. Ecology determined no reasonable potential for this discharge to cause a violation of water quality standards, using all applicable data. Our determination assumes that this facility meets the other effluent limits of this permit.

Shell may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Ecology may adjust metals criteria on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Ecology may also adjust metals criteria using the water effects ratio approach established by the EPA, as generally guided by the procedures in U.S. EPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

G. Whole Effluent Toxicity

The water quality standards for surface waters forbid discharge of effluent that causes toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly, by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- *Chronic toxicity tests measure various sublethal toxic responses* such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

Ecology-accredited WET testing laboratories use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC₅₀, EC₅₀, IC₂₅, etc. Ecology gives

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

all accredited labs the most recent version of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (<http://www.ecy.wa.gov/biblio/9580.html>), which is referenced in the permit. Ecology recommends that Shell send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

WET testing conducted during the previous permit term showed the facility's effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will impose an acute toxicity limit. **The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC equals 1.6% effluent.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. Shell is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not impose a chronic WET limit. Shell must begin effluent characterization for chronic toxicity within 90 days of permit issuance.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization
- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased. Shell may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

H. Human Health

Washington's water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology determined the effluent may contain chemicals of concern posing a risk to human health. Ecology determined this because the volume of wastewater flow to the receiving water, and data or process information indicate regulated chemicals occur in the discharge.

Ecology conducted a determination of the discharge's potential to cause an exceedance of the water quality standards as required by 40 CFR 122.44(d). We followed the procedures published in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and Ecology's Permit Writer's Manual (Ecology Publication 92-109, July, 1994) to make

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

this reasonable potential determination. Our evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards excepting arsenic, thus effluent limits are not warranted.

Arsenic--

In 1992 the USEPA adopted risk-based arsenic criteria for the protection of human health for the State of Washington. The criterion for marine waters is 0.14 µg/L inorganic arsenic, and is based on exposure from fish and shellfish tissue ingestion. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and water ingestion. These criteria have caused confusion in implementation because they differ from the drinking water maximum contaminant level (MCL) of 10 µg/L, which is not risk-based, and because the human health criteria are sometimes exceeded by natural background concentrations of arsenic in surface water and ground water.

In Washington, when a natural background concentration exceeds the criterion, the natural background concentration becomes the criterion, and no dilution zone is allowed. This could result in a situation where natural groundwater or surface water used as a municipal or industrial source-water would need additional treatment to meet numeric effluent limits even though no arsenic was added as waste. Although this is not the case for all dischargers, we do not have data at this time to quantify the extent of the problem.

A regulatory mechanism to deal with the issues associated with natural background concentrations of arsenic in groundwater-derived drinking waters is currently lacking. Consequently, the Water Quality Program, at this time, has decided to use a three-pronged strategy to address the issues associated with the arsenic criteria. The three strategy elements are:

1. Pursue, at the national level, a solution to the regulatory issue of groundwater sources with high arsenic concentrations causing municipal treatment plant effluent to exceed criteria. The revision of the MCL for arsenic offered a national opportunity to discuss how drinking water sources can affect NPDES wastewater dischargers, however Ecology was unsuccessful in focusing the discussion on developing a national policy for arsenic regulation that acknowledges the risks and costs associated with management of the public exposure to natural background concentrations of arsenic through water sources. The current arsenic MCL of 10 µg/L could also result in municipal treatment plants being unable to meet criteria-based effluent limits. Ecology will continue to pursue this issue as opportunities arise.

2. Additional and more focused data collection. The Water Quality Program will in some cases require additional and more focused arsenic data collection, will encourage or require dischargers to test for source water arsenic concentrations, and will pursue development of a proposal to have Ecology's Environmental Assessment Program conduct drinking water source monitoring as well as some additional ambient monitoring data. At this time, Washington NPDES permits will contain numeric effluent limits for arsenic based only on treatment technology and aquatic life protection as appropriate.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

3. Data sharing. Ecology will share data with USEPA as they work to develop new risk-based criteria for arsenic and as they develop a strategy to regulate arsenic.

Ecology must evaluate whether or not the discharge has reasonable potential to violate human health criteria at the edge of the chronic zone. To thoroughly evaluate human health criteria the permit requires Shell to re-characterize the effluent by sampling for the 91 human health criteria listed pollutants (priority pollutants), excluding PCB's, PBB's, asbestos, and all pesticides except any listed pesticide that is used on the refinery site. The effluent shall be sampled and analyzed annually during the life of the permit.

I. Sediment Quality

The aquatic sediment standards (Chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400).

Review of previous sediment surveys in 1994 and 2004, by Ecology's sediment management unit, shows no violation of sediment standards.

Through this review and of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the Sediment Management Standards.

J. Ground Water Quality Limits

The Ground Water Quality Standards, (Chapter 173-200 WAC), protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

Shell has no unpermitted direct discharges to ground.

Shell's wastewater facility includes two final holding ponds, which polish the refinery's final effluent. The center of the final pond is located approximately 200 feet from Fidalgo Bay, while the center of the smaller south pond is approximately 375 feet from Fidalgo Bay. According to Shell, the original owner constructed these two ponds—in the early 1950s—with a clay liner. But no engineering plans document this and the construction details are no longer available. These ponds could therefore potentially discharge to groundwater.

If wastes from these holding ponds leak into the groundwater, then those wastes discharge almost directly into the Bay--where the refinery's final (treated) effluent discharges via a marine outfall. The ponds' discharge to groundwater would consist of high quality wastewater (having been treated to secondary levels).

The concentrations of ground water quality parameters in Shell's effluent measured, in general, less than that allowed by groundwater quality criteria. Only 2 metal parameters—selenium and arsenic—exceeded the allowed criteria. Arsenic was the only parameter that was significantly higher than its exceptionally low criteria (influenced by drinking water standards). Incidental

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

leakage of effluent of this quality and in this location will have undetectable or minimal impacts to ground water quality. The volume of potentially impacted groundwater would be very small, and any impacts would occur just prior to the groundwater flowing into surface water, which is the current discharge location.

Shell's wastewater facility includes a waste activated sludge land treatment unit. Shell sprays its thickened and digested, waste activated-sludge, onto its land treatment field. The sprayfield's plastic liner and leachate collection system return the leachate to Shell's wastewater treatment system. The liner and leachate collection system should prevent any leakage to the groundwater.

Historic and continuing cracks in the API oil water separator unit of the waste water treatment system produce oily leaks. Shell manages these small visible leaks that reach the ground, as a Hazardous Waste. Ecology believes this unit has the potential to leak from the bottom of the tank and impact ground water. At our request and as a part of the ongoing monitoring program, Shell collects ground water samples from a down-gradient well, adjacent to the API. No contamination has been seen to date. Ecology will continue to monitor the extent of the leaks and will require Shell to provide a permanent fix when warranted.

Based on our analysis (above) Ecology did not include groundwater limitations, or monitoring or studies requirements as conditions in the proposed permit.

K. Comparison Of Effluent Limits With The Previous Permit Issued January 2002

Shell's production decreases, since Ecology issued the previous permit, allow for slight changes to the discharge limits provided by federal guidelines.

Table 12: Comparison of Effluent Limits (pounds per day)

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Biochemical Oxygen Demand (5-day)	Technology	801	1466	791	1448
Chemical Oxygen Demand	Technology	5519	10750	5453	10621
Total Suspended Solids	Technology	643	1017	635	1005
pH	Technology	shall be maintained within the range of 6.0 to 9.0.			
Fecal Coliform (colonies per 100 mls)	Technology	200/100 mls	400/100 mls	200/100 mls	400/100 mls
Ammonia as N	Technology	583	1283	574	1263
Sulfide	Technology	4.3	9.5	4.24	9.39

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Parameter	Basis of Limit	Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Hexavalent Chromium	Technology	0.76	1.7	50 µg/l	
Oil and Grease	Technology	236	438	233	432
Phenolic Compounds	Technology	5.2	10.8	5.15	10.68

L. Dangerous Wastes – Permit By Rule Requirements

The proposed permit authorizes Shell to treat dangerous wastes--whether generated on or off-site—at the wastewater treatment facility, under the state’s permit-by-rule provisions of WAC 173-303-802(5). Ecology limited this authorization to the on-site and off-site waste streams identified and characterized on Shell’s permit application and to application amendments approved by Ecology. Off-site wastes include ballast water and retail distribution water. Ecology reviewed descriptions of those identified off-site waste streams and determined that they are similar in nature to the wastes generated on-site. We concluded that Shells wastewater facility should effectively treat the off-site wastes and that established effluent sampling and monitoring adequately address the pollutants in these waste streams.

Permit-by-rule provisions cover the identified waste streams so long as the permittee complies with the conditions of the permit, and complies with the dangerous waste requirements pertaining to:

- notification and identification numbers
- designation of dangerous wastes
- performance standards
- general waste analysis
- security
- contingency plans and emergency procedures
- emergencies
- the manifest system
- the operating record
- facility reporting

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit’s effluent limits. The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The monitoring frequencies for BOD, Ammonia, Phenols, Sulfides, and Fecal Coliforms have been reduced based on the excellent performance of the facility. If performance levels deteriorate during the term of the permit, the monitoring frequencies shall revert to daily monitoring. Ecology will notify the facility by letter to increase monitoring upon Ecology's determination of deteriorating performance.

A. Lab Accreditation

Ecology requires that all monitoring data (with the exception of certain parameters) be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Shell is accredited for the following parameters: ammonia, BOD, COD, Total residual chlorine, dissolved oxygen, hexane extractable O&G, pH, total phenolics, TSS, sulfide, chromium, hexavalent chromium, and fecal coliforms.

V. OTHER PERMIT CONDITIONS

A. Reporting and Recordkeeping

Ecology bases permit condition S3 on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Non Routine and Unanticipated Discharges

Occasionally, this facility may generate wastewater which was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems, or of leaks from drinking water systems. These generally clean waste waters may be contaminated with pollutants.

The permit authorizes non-routine and unanticipated discharges under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the water directly via the process wastewater outfall or through a stormwater outfall for clean water.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

C. Outfall Evaluation

Ecology requires Shell to conduct an outfall inspection and submit a report detailing the findings of that inspection. (Permit Condition S.10). The facility must inspect its discharge pipe and diffusers to determine their physical condition, and to evaluate the extent of sediment accumulations in the vicinity of the outfall.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

D. Treatment System Operating Plan

Ecology requires industries to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations (40 CFR 122.41(e) and WAC 173-220-150 (1)(g)). The facility has prepared and submitted an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the Treatment System Operating Plan ensures the facility's compliance with the terms and limits in the permit.

E. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual industrial NPDES permits issued by Ecology.

F. Construction Stormwater

The proposed permit authorizes the discharge of stormwater associated with construction activity and construction support activity from Outfall 001, subject to a number of requirements and limitations. Construction activity refers to the clearing, grading, excavation, and other land disturbing activities which result in the disturbance of one or more acres. Construction support activity includes equipment staging yards, material storage areas, borrow areas, etc.

The permit states that stormwater discharges must comply with water quality standards and it presumes that discharges are in compliance with water quality standards if the Permittee is in compliance with permit conditions, unless site-specific information shows otherwise.

The permit establishes a narrative technology-based effluent limitation of AKART. AKART specifically includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

The permit includes an enforceable adaptive management tool called a benchmark. Ecology is using a turbidity benchmark in this permit because it is an effective management tool for highly variable stormwater discharges. A benchmark value is not a water quality standard or a numeric effluent limit. Rather it is an indicator value used to determine the effectiveness of BMPs on-site. Meeting the benchmark established in the proposed permit in no way precludes the requirement for discharges to be in compliance with applicable permit conditions and water quality standards. If the benchmark is exceeded, the Permittee is required to take appropriate actions to identify and correct the problems causing the exceedance.

The proposed permit also includes basic monitoring and reporting requirements.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for ground waters, after obtaining new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed Permit Issuance

This proposed permit includes all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to control toxics as needed to, protect human health and aquatic life, and the beneficial uses of waters of the State of Washington. Ecology proposes to issue this permit for a term of 5 years.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

VII. REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Re-aeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Washington State Department of Ecology.

Laws and Regulations(<http://www.ecy.wa.gov/laws-rules/index.html>)

Permit and Wastewater Related Information

(<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to Shell Puget Sound Refinery. The permit prescribes operating conditions and wastewater discharge limits. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology will place a Public Notice on September 14, 2007 in the Bellingham Herald and the Anacortes American to inform the public and to invite comment on the proposed reissuance of this National Pollutant Discharge Elimination System permit as drafted.

The Notice –

- tells where copies of the draft Permit and Fact Sheet are available for public evaluation (a local public library, the closest Regional or Field Office, posted on our website.).
- offers to provide the documents in an alternate format to accommodate special needs.
- asks people to tell us how well the proposed permit would protect the receiving water.
- invites people to suggest fairer conditions, limits, and requirements for the permit.
- invites comments on Ecology's determination of compliance with antidegradation rules.
- urges people to submit their comments, in writing, before the end of the Comment Period
- tells how to request a public hearing of comments about the proposed NPDES Permit.
- explains the next step(s) in the permitting process.

[attach printed copy of the Public Notice mail-out]

Ecology has published a document titled **Frequently Asked Questions about Effective Public Commenting** which is available on our website at <http://www.ecy.wa.gov/biblio/0307023.html>.

You may obtain further information from Ecology by telephone, at 360/407-6057, or by writing to the permit writer at the postal address listed below:

Water Quality Permit Coordinator
Department of Ecology
Industrial Section
PO Box 47706
Olympia, WA 98504-7600

The primary author of this permit and fact sheet is J. Mark Dirx, P.E.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART-- An acronym for “all known, available, and reasonable methods of prevention, control and treatment”.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring --Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor (DF)--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Responsible Corporate Officer-- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's homepage at <http://www.ecy.wa.gov>.

FACT SHEET FOR NPDES PERMIT WA-000294-1

Shell, Anacortes

APPENDIX D--RESPONSE TO COMMENTS