Chapter NR 279

INTERIM EFFLUENT LIMITATIONS FOR THE PETROLEUM REFINING INDUSTRY WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

Note: Pursuant to Chapter 74, Laws of 1973, in sections 147.04 (3) and (5) and under the procedure of section 227.027, Wis. Stats., the department of natural resources has promulgated interim effluent limitations which become effective February 1, 1974 and will remain in effect for a period of one year. These interim effluent limitations will be periodically replaced by permanent effluent limitations.

NR 279.01 Purpose. The purpose of this chapter is to establish interim effluent limitations for discharges from industrial point sources identified herein as authorized by section 147.04 (5), Wis. Stats.

History: Emerg. cr. eff. 2-1-74.

NR 279.02 Applicability. These interim limitations apply to Standard Industrial Classification Code 2911.

(1) The petroleum refining industry is divided into five classifications on the basis of processing complexity:

(a) crude topping,

(b) topping and cracking/reforming,

(c) topping, cracking and petrochemicals production,

(d) "b" category and lube oil processing, and

(e) "d" category and petrochemicals

(2) The term "petrochemicals" excludes all conventional first generation refinery-associated production such as BTX, alkenes, alkynes, and miscellaneous items such as hydrogen, sulfur, coke, carbon black, and ammonia. A class "C" or "E" refinery must be engaged in intermediate chemical manufacture of such typical products as cumene, phthalic anhydride, alcohols, ketones, trimer (nonene) and styrene.

(3) Lube oil processing includes production of blending stocks via such operations as dewaxing, lube hydrotreating, and clay treatment; it excludes formulating blended oils and additives.

History: Emerg. cr. eff. 2-1-74.

NR 279.03 Application of interim limitations. (1) These limitations apply only to these refineries with greater than 10,000 bbl/day production capacity, except in Class D where it applies to all refineries. These limitations should be adjusted for refineries which deviate sub-

stantially from the definitions of the refinery classification categories in NR 279.02 (2). Significant differences in water use practices, and hence effluent volume, exist among refineries for reasons including the age of the plant, process employed, and the availability of water. The major difference is in water usage between

(a) refineries using once-through cooling water where there is direct process contact, as in barometric condensers, to which the interim limitations of NR 279.06 apply, and

(b) refineries which reuse or recycle cooling water where there is direct process contact, as in barometric condensers, to which the interim limitations of NR 279.07 apply and include discharges from cooling tower blowdown.

(2) Once-through non-contact cooling water as in shell and tube heat exchangers discharged into segregated sewers is excluded from effluent counted against the interim limitations. Treatment of such cooling water for such quantities of process material as may ordinarily or commonly be leaked into the cooling water is not deemed practicable because:

(a) The large volumes of water relative to the pollutant leakage result in concentrations so low as to produce dubious analytical results,

(b) Unless a specific violation of water quality standards results, such low concentrations would not ordinarily be expected to have a significant adverse impact on the receiving water, and

(c) In the absence of a significant adverse impact on the receiving water, the benefit of treating such large quantities of water does not justify the cost, i.e., such treatment is not practicable.

History: Emerg. cr. eff. 2-1-74.

NR 279.04 Description of abatement models. (1) In developing these limitations two possible treatment system models were used; one physical/chemical, the other biological. The unit operations may vary in hydraulic order and relative size and importance. Biological treatment methods are generally satisfactory in removing the major contaminants from the wastewater. Before biological treatment, some pre-treatment steps such as removal of high concentrations of hydrogen sulfide, ammonia, and oil may be required. Biological systems are sensitive to shock loads which can be overcome with good plant operation and/or equalization ponds.

(2) Physical/chemical systems normally involve the use of sand filters and activated carbon. The advantages of these systems are that shock loads do not greatly affect their performance, they are flexible and can easily be added to, and they occupy about much less land than a biological system.

(3) Ammonia nitrogen can be removed by stripping or by selective ion exchange. The cost of an activated carbon system is approximately the same as that of a biological system. Two major refineries have physical/chemical systems in development or under construction. Generally applicability to refinery effluent remains to be demonstrated.

(4) The 2 model systems include the following steps.

Physical/Chemical Systems	*Biological Systems*
1. API Oil Separators	1. API Oil Separators
2. Chemical Coagulation & Clarification	2. Equalization
3. pH Control	3. Sour Water Stripping
4. Sand or Dual Media Filters	4. Dissolved Air Flotation
5. Chromate Removal System	5. Biological Oxidation Using Aerated Lagoons or Activated Sludge
6. Ammonia Stripper or Ion Exchange	6. Secondary Clarification
7. Carbon Adsorbers	7. Chromate Removal System
8. Carbon Reactivation System	8. Sand or Dual Media Filters

History: Emerg. cr. eff. 2–1–74.

NR 279.05 Special considerations. Socio-economic impact is an important consideration in establishing water pollution abatement programs and compliance schedules for a given refinery.

(1) In applying effluent limitations it must be recognized that the costs of achieving incremental improvements in effluent quality, and therefore economic impact, will vary widely among individual refineries. Factors which could influence the relative cost of various waste treatment alternatives include:

(a) Availability of land,
(b) Types of crude oils and products,
(c) Cooling water use practices and limitations,
(d) Refinery complexity,
(e) Refinery age and layout, and
(f) Climate and geographical location.

(2) If an approved pollution abatement program should entail major modifications to in-plant process units which would result in extended shutdown time and loss of production for either the process unit affected or the refinery, the compliance schedule should be adjusted so that shutdowns will coincide with normal and reasonable refinery turn around and inspection schedules.

History: Emerg. cr. eff. 2–1–74.

NR 279.06 Table of interim effluent limitations *(Refineries Without Process Water Recycle, Except Class D) (Pounds of Pollutant per 1000 Barrels Per Stream Day).*

Parameter	Refinery Class				
	A	B	C	D	E
Ammonia N	1.6	3.3	4.1	5.0	7.5
TOC[1]	4.0	8.0	11.6	16.0	27.0
BOD_5	2.5	5.0	7.3	10.0	16.8
COD[1]	15.3	30.6	44.6	61.0	102.9
$Cr+^6$	0.0008	0.0017	0.0021	0.0025	0.0038
Cr total	0.041	0.083	0.104	0.125	0.187
Oil & Grease	1.66	3.34	4.18	5.00	7.50
Phenol	0.017	0.033	0.042	0.050	0.075
Sulfide	0.028	0.057	0.071	0.085	0.128
TSS	3.3	6.6	8.3	10.0	15.0

NOTE:
[1]TOC and COD, total organic carbon and chemical oxygen demand are shown as a possible organic monitoring parameter. Either may be used for estimating BOD, using an agreed correlation factor for the refinery.

History: Emerg. cr. eff. 2–1–74.

NR 279.07 Table of interim effluent limitations *(Class D Refineries and Other Recycling Process Water) (Pounds per 1000 Barrels per Stream Day Capacity)*

Parameter	Refinery Class				
	A	B	C	D	E
Ammonia N	1.0	2.2	1.9	3.9	2.9
TOC[1]	2.4	5.2	5.3	12.5	10.5
BOD_5	1.5	3.3	3.4	7.8	6.6
COD[1]	9.2	19.9	20.5	47.6	40.0
$Cr+6$	0.0005	0.0011	0.0009	0.0019	0.0014
Cr total	0.025	0.054	0.048	0.098	0.073
Oil & Grease	0.99	2.17	1.92	3.90	2.93
Phenol	0.010	0.021	0.019	0.039	0.029
Sulfide	0.017	0.037	0.033	0.066	0.049
TSS	2.0	4.3	3.8	7.8	5.9

NOTE:
[1]TOC and COD, total organic carbon and chemical oxygen demand are shown as a possible organic monitoring parameter. Either may be used for estimating BOD, using an agreed correlation factor for the refinery.

History: Emerg. cr. eff. 2–1–74.