

Draft

ACDP No.: 26-1814  
Application No.: 021947  
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Department of Environmental Quality  
Northwest Region  
Air Quality Program

STANDARD

AIR CONTAMINANT DISCHARGE PERMIT  
REVIEW REPORT

Hercules Incorporated  
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Unassigned emissions	
Emission credits	
Source test	
COMS	
CEMS	
Compliance schedule	
Special conditions	
Annual report	X
Semi-annual report	X
Quarterly report	

Monthly report	
Excess emissions report	
NSPS	Dc
NESHAP	
NSR	
PSD	
RACT	
FCE	
Public Notice	Category II

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## PERMITTING

### PERMITTING ACTION

1. The proposed permit action is a renewal of the existing Air Contaminant Discharge Permit (ACDP 26-1814) that was issued on June 17, 2002, and originally scheduled to expire on November 1, 2006. The following changes were made during the prior permit cycle:
  - a. Tall oil facility (buildings, tanks, columns, vacuum systems) were demolished and removed in 2003.
  - b. The Dow and B & W boilers were demolished and removed in 2002 and 2004. A new primary boiler (Cleaver Brooks) was installed in June 2004 under the Notice of Intent to Construct (NC) #020809. The Cleaver Brooks boiler operates mainly on natural gas, with #2 diesel as backup fuel. There is no longer any residual fuel being used on site. The boiler bag house was removed, and the smoke stack shortened in September 2004 under NC #021132..
  - c. Hercules still has the potential to emit SO<sub>2</sub> and NO<sub>x</sub> above the major source threshold level of 100 tons per year if petroleum-based fuels are used. However, the cost of natural gas is below the cost of petroleum-based fuels. Any fuel switchovers will still be regulated by the plant site emission limits.
  - d. Special conditions pertaining to the tall oil facility operations have been eliminated to reflect the closure of that facility.

The Process Chemicals facility was installed in 2004. There was the addition of batch vessels, a circulating wet scrubber to control emissions, storage tanks, and a new warehouse to support the new facility (NC #020837). The Process Chemicals facility mixed chemicals for the production of process and water treatment products for the pulp and paper, and refinery industries.

### OTHER PERMITS

2. Other permits issued by the Department of Environmental Quality for this source include a non-contact cooling water discharge permit, 100-J.

### ATTAINMENT STATUS

3. The source is located in a maintenance area for ground-level Ozone and Carbon Monoxide (CO). The permitted facility is a moderate source (e.g., PSEL > 40 tons/yr) of VOC, an ozone precursor, and is a minor source of CO.

## SOURCE DESCRIPTION

4. The Hercules Portland facility is designed to manufacture a variety of organic and inorganic chemicals that are primarily used by the pulp and paper industry. In the past, the chemical manufacturing processes started with the tall oil distillation processes. However, a tall oil facility containing two vacuum-distillation columns in series that were used to fractionate crude tall oil has been permanently shut down (as of October, 1999). The process equipment within the tall oil facility has been removed.

The Nebraska boiler (90 MM Btu/hr) is the back up boiler and it has been retrofitted to burn natural gas in 1999. The baghouse and Continuous Opacity Monitoring System (COMS) were decommissioned when the Nebraska boiler was converted to natural gas. The Nebraska boiler has been isolated from diesel fuel, and operates only on natural gas.

The new 600 BHp (24 MM Btu/hr) Cleaver Brooks is the main boiler, installed in June 2004. NC #020809. This boiler operates mainly on natural gas with diesel as the backup fuel.

The B & W, Dow and baghouse have been removed. There is no longer any residual fuel being used on site. The boiler baghouse was removed, and the exhaust stack shortened in September 2004 (NC #021132)

The NCG generated from the tall oil facility was the number one odor-causing source. This NCG-odor problem no longer exists. The main (Cleaver Brooks) boiler at the facility now burns natural gas and consequently the smoke problems have been greatly reduced. Furthermore, boilers are operated less than before due to the permanent reduction in energy demand. Overall, a major change in terms of air quality has occurred at the Hercules plant. The current plant site emissions are significantly below the allowable level, and a major reduction in (potential) odorous emissions has occurred.

5. Hercules currently purchases their raw materials (e.g., rosin) and fuel instead of manufacturing them on-site. The current chemical manufacturing processes at the plant include the following:
  - a. Kymene Process: Kymene resins, which are cross-linked polyamide resins typically containing 70-80% water, are produced in two steps. First an intermediate water soluble polymer is prepared in batch resin kettle No.1, then later reacted with epichlorohydrin, sulfuric, formic, adipic and acetic acids in batch resin kettle No.2. The packed bed scrubber controls acid fumes, which also contain epichlorohydrin (epi) vapor. While epi does have a slightly irritating chloroform-like odor, the Kymene process itself is not a major odor source.
  - b. Paste Size Process: Rosin and fumaric acid are first reacted in the "Adduct reactor", and then fed into "Paste Size Digester" along with water and caustics/salts (e.g.,

NaOH or KOH, NaCl or KCl). A water venturi scrubber controls rosin vapors and odorous fumes from both the reactor and digester. Rosin is a chemical with pungent odor, and the Paste Size process is an odor source. Hercules now has to purchase rosin in order to run this paste size process and does not operate it currently. Unless the market condition improves, the paste size process will remain idle indefinitely.

- c. Emulsions Process: Starch mixture and various inorganic chemicals are blended together in a mixing vessel, then the mixture is homogenized to complete emulsification. This process generates very little odor.
- d. Defoamer Process: Various blends of mineral oil, paraffin oil, silicon oil, silica, anhydrous sorbitan mono-oleate and spreading agents are all mixed together in the batch kettle, then the mixture is homogenized prior to storage. This process generates very little odor. The defoamer process was shut down in 2006. Unless the market condition improves, the defoamer process will remain idle indefinitely.
- e. Neuphor Process: Variation in water phases is blended with rosin from the Adduct Reactor” and then homogenized to produce a creamy white dispersed rosin size.
- f. Process Chemicals: Various blends of oil and water based chemicals are mixed together in batch vessels, then pumped into tote bins or drums. The batch sizes range from 800 to 4500 gallons. A circulating water scrubber is used to control emissions from the blending. Production started in late 2004.

## COMPLIANCE

- 6. No enforcement actions have been taken against this source during the prior permit term. The facility was last inspected on September 4, 2002, and found to be in compliance with the existing permit terms. The number of complaints regarding smoke and odor has gone down significantly, and the Department expects the trend will continue.

## SPECIAL CONDITIONS

- 7. All applicable requirements, including monitoring, recordkeeping, and reporting requirements associated with the applicable limits, are all included in the proposed ACDP 26-1814. The proposed permit retains a special notification provision that requires the permittee to respond promptly whenever the permittee receives a public complaint.

## EMISSIONS

8. Original Baseline PSEL: The review report of ACDP issued on January 13, 1995 determined the (1977) baseline PSEL to be the following:

Source	BASELINE EMISSIONS (tons/yr)				
	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC
B&W Boiler	6.04	19.7	21.0	5.0	1.1
Dowtherm Boiler	0.59	21.1*	5.9	1.5	0.1
Cooling Towers	5.75	--	--	--	--
Process	--	--	--	--	41.8
Total:	12.4	40.8	26.9	6.5	43.0

\* This permit review determined the correct AP42 SO<sub>2</sub> EF to use for distillate fuel oil is 71 lbs/1000 gal.

The above baseline emissions were based on the best available data obtained during the preparation for Hercules' SM permit application, and they are more accurate than Hercules' prior permits.

9. History of Changes to the PSEL: Up until 1992, there have been no Department approved PSEL increases or decreases since the baseline year. The ACDPs issued on 3/30/1992 and 1/13/1995 changed and incorporated the following PSELs:

ACDP 26-1814	PSEL (tons/yr)				
	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC
1992 ACDP	30.0	70.0	75.0	7.6	--
1995 ACDP	30.0	75.2	54.9	13.1	82.0

- a. The PSEL incorporated in the 3/30/1992 ACDP did not include the process VOC emissions. The PSEL increases in the 3/30/1992 ACDP reflected the installation of Nebraska boiler and increase in fuel usage and production.
- b. The 1/13/1995 ACDP updated the baseline and existing PSEL, and included the VOC PSEL. Hercules undertook a thorough evaluation of company records in preparation for their synthetic minor permit application and determined the best available plant site emissions data. The existing PSEL was based on the fuel usage of 3,840,000 gallons of residual oil and 900,000 gallons of distillate oil. The SO<sub>2</sub> PSEL was also based on the average sulfur content of 0.13% for distillate fuel oil. The NO<sub>x</sub> PSEL was updated using the 1992 source test data for residual oil and the AP42 emission factor for distillate fuel oil.
- c. ACDP issued in January 13, 1995 granted an increase in VOC PSEL of (82.0 – 47.1) = 34.9 tons/yr. The emissions detail sheets indicate the increase was to come from the new VOC scheduled to be use in 1995. However, production has been steadily going down and no new VOC has been introduced to the process. This results in unassigned VOC emissions which may be used for actual production increases and

product changes. The benzene used during the baseline period (21 tons/yr) is no longer used at the plant. This changes the netting basis to  $(43.0-21.0) = 22.0$  tons/yr. The new VOC PSEL is set at  $(22.0+39.0) = 61$  tons/yr.

- d. Note that this permit review recognizes all particulate matters emitted at the Hercules facility are now considered PM<sub>10</sub>. The PM increase of  $(30.0 - 12.4) = 17.6$  tons/yr would have triggered the enhanced review process of OAR 340-222-0041(3)(b) if the PM particulate matter had been reclassified as PM10 at that time.
10. Current Netting Basis and PTE: The netting basis reflects permanent changes in plant processes since 1978.
  11. Proposed PSEL: The proposed PSELs have been adjusted to allow increases up to the SER except for CO. The PSEL for the Tall Oil production facility and HTF boiler remains in the permit, since the equipment is shutdown, but could be operational quickly if market conditions change for rosin products.

Pollutant	1977 Baseline (tons/yr)	Netting Basis		Plant Site Emission Limits (PSEL)			
		Previous (tons/yr)	Proposed (tons/yr)	Previous PSEL (tons/yr)	Proposed* PSEL (tons/yr)	PSEL Increase (tons/yr)	SER
PM	12.4	12	12	36	24	-12	25
PM <sub>10</sub>	12.4	12	12	26	14	-12	15
SO <sub>2</sub>	40.8	41	41	80	55	-25	40
NO <sub>x</sub>	26.9	27	27	66	39	-27	40
CO	6.5	7	7	99	99	0	100
VOC	43	43	43	61	39	-22	40

- a. The proposed annual PSEL for all pollutants other than VOC are based on boilers burning 250 million cubic feet of natural gas and 1,524,000 gallons of distillate fuel oil. The proposed annual VOC PSEL is based on boiler fuel usage plus the process VOC emissions of 8.7 tons/yr.
  - b. The proposed PSEL is based on Nebraska boiler natural gas and the Cleaver Brooks boiler burning distillate oil at capacity for 8760 hours per year. Actual firing rate will be less than capacity, and normally only one boiler operates on-line at a time.
12. As defined in OAR Chapter 340 Division 222, no unassigned emissions or emission credits are included in the permit.
  13. Significant Emission Rate Analysis: The cumulative PSEL increases since the baseline year is less than the Significant Emission Rate (SER) as defined in OAR 340-200-0020(124) for all criteria pollutants.

## ADDITIONAL REQUIREMENTS ANALYSIS

14. Potential to Emit Analysis: Based on Nebraska boiler (35 MMBtu/hr) and Cleaver Brooks boiler (600 BHp) operating continuously at their maximum capacity for the entire year, Hercules has the potential to emit about 55 tons of SO<sub>2</sub> and 33 tons of NO<sub>x</sub>. The PTE analysis was based on boilers burning fuel that yields highest emissions – the Nebraska boiler fueled by (250 million cuft) natural gas, and the Cleaver Brooks boiler fueled by (1.524 million gallons) distillate oil. The source is a real minor and not required to obtain an Oregon Title V Operating.

PTE	PM	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	VOC
Proposed PSEL (tons/year)	24	14	55	39	99	39
PTE (tons/yr)	12	12	55	33	9	18

15. Hazardous Air Pollutants (HAP) Analysis: Hercules is a minor source of hazardous air pollutant (HAP). The PTE of individual HAP emissions is less than 10 tons/yr and the PTE of combined HAPs emission on an aggregate basis total less than 25 tons/yr. The combined HAP PTE is 5.7 tons/yr based on maximum production from rosin and dimer processes. The largest single HAP PTE is 2.4 tons/yr for epichlorohydrin. This source is not subject to federal regulations for National Emissions Standards for Hazardous Air Pollutants (NESHAP).
16. New Source Review: This source is not subject to federal regulations for New Source Review (NSR) or Prevention of Significant Deterioration (PSD).
17. New Source Performance Standards: This source is subject to federal regulations for New Source Performance Standards (NSPS) 40 CFR Part 60 Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. When operating on natural gas, the Continuous Opacity Monitoring System may be turned off. Semi-annual reporting is required. The Cleaver Brooks and Nebraska boilers are both subject to the fuel monitoring requirements of the NSPS.
18. Reasonably Available Control Technology: The facility is located in the Portland AQMA, but it is not one of the listed source categories in OAR 340-232-0010, thus the categorical VOC RACT rules do not apply. Hercules facility does not have the potential to emit 100 tons of VOC per year, and therefore the source is exempt from the source-specific RACT requirements.
19. Source Testing: No source testing is proposed in this permit renewal.

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20. There has been no increase to the Plant Site Emission Limit for all regulated criteria pollutants since the previous permit. The Department records indicate the number of public complaints filed against this source has been steadily decreasing.
21. Public notice is required for this permit renewal in accordance with OAR 340-209-0030(2)(b). The proposed permit will be placed on public notice from March 9, 2007 to 5pm, April 9, 2007.

## LIST OF COMMON ABBREVIATIONS USED IN AIR CONTAMINANT DISCHARGE PERMITS

A	annual	NSR	New Source Review
ACDP	Air Contaminant Discharge Permit	O <sub>2</sub>	oxygen
ASTM	American Society for Testing and Materials	OAR	Oregon Administrative Rules
bbl	barrel (42 gal)	ORS	Oregon Revised Statutes
calendar year	The 12 month period beginning January 1 <sup>st</sup> and ending December 31 <sup>st</sup>	O&M	operation and maintenance
CFR	Code of Federal Regulations	Pb	lead
CO	carbon monoxide	PCD	pollution control device
date	mm/dd/yy	PM	particulate matter
DEQ	Oregon Department of Environmental Quality	PM <sub>10</sub>	particulate matter less than 10 microns in size
dscf	dry standard cubic foot	ppm	part per million
EPA	US Environmental Protection Agency	ppmv	part per million by volume
FCAA	Federal Clean Air Act	PSD	Prevention of Significant Deterioration
gal	gallon(s)	PSEL	Plant Site Emission Limit
gr/dscf	grains per dry standard cubic foot	Q	quarterly
HAP	Hazardous Air Pollutant as defined by OAR 340-244-0040	R	required
ID	identification number	RACT	Reasonably Available Control Technology
I&M	inspection and maintenance	S	semi-annual
lb	pound(s)	scf	standard cubic foot
M	monthly	SERP	Source Emission Reduction Plan
MMBtu	million British thermal units	SIP	State Implementation Plan
N	not required	SO <sub>2</sub>	sulfur dioxide
NESHAP	National Emissions Standards for Hazardous Air Pollutants	VE	visible emissions
NOx	nitrogen oxides	VOC	volatile organic compound
NSPS	New Source Performance Standard	year (yr)	A period consisting of any 12 consecutive calendar months