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ED - Water Division



COMMONWEALTH of VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL QUALITY

Richard M. Burton  
Director

Water Regional Office  
3015 Peters Creek Road  
Post Office Box 7017  
Roanoke, Virginia 24019  
(703) 562-3666

Neil A. Obenshain  
Regional Director

November 23, 1993

Phillip E. Lockard  
Environmental Coordinator  
Hoechst Celanese Corporation  
P. O. Box 1000  
Narrows, VA 24124

RE: Technical and Laboratory Inspection Reports  
Hoechst Celanese Corp., Wastewater Treatment Facilities  
VPDES Permit No. VA0000299

Dear Mr. Lockard:

Attached for your review are copies of the technical and laboratory inspection reports for the Hoechst Celanese Celco Plant wastewater treatment facilities. The inspections were conducted by Gerald A. Duff on September 28, 1993.

Please note that page 6 of the technical inspection report summarizes the recommendations for action related to the inspection of the treatment systems. We request that you respond to this office within 60 days on these recommendations and provide details of actions taken or proposed to correct deficiencies.

With regard to the laboratory inspection, the facility has received an unsatisfactory rating at this time. The deficiencies are summarized on the front page of the laboratory inspection report with details provided in the report. A Notice of Unsatisfactory Laboratory Evaluation (NULE) is enclosed with this report.

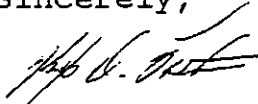
To avoid possible enforcement action, you are requested to make specific changes and send written notification to this office within 10 days after receipt of this letter. If you have not taken corrective actions and/or notified this office by the above deadline, a Notice of Violation may be issued.

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If you feel that the unsatisfactory rating for your laboratory is in error, please identify the areas that you feel should be reevaluated and submit this information in writing within 10 days. The necessary documentation to support your contentions must be included.

If you have any questions regarding these reports or the actions required to obtain a satisfactory laboratory rating, please contact Mr. Gerald A. Duff at the Water Regional Office, Roanoke (703-562-3666).

Sincerely,



Kip D. Foster  
Water Resources Manager

Attachments

Copies: G. A. Duff - DEQ-Water/Roanoke  
S. C. Hale - DEQ-Water/Roanoke  
J. F. Smith - DEQ-Water/OE  
W. E. Purcell - DEQ-Water/OWRM  
VDH - Richmond

DEQ-WRO  
WASTEWATER FACILITY  
INSPECTION REPORT  
PREFACE

VPDES/State Certificate No. VA0000299	(Re)Issuance Date 04/16/87	Amendment Date	Expiration Date 04/16/92
Facility Name Hoechst Celanese (Celco)	Address P. O. Box 1000 Narrows, VA 24124		Telephone No. 703-921-1111
Owner Name Hoechst Celanese	Address P. O. Box 1000 Narrows, VA 24124		Telephone No. 703-921-1111
Responsible Official F. Scott Fahrenbruck	Title Operations Engineer		Telephone No. Same/Ext.4029
Responsible Operator Kinney Beisel	Operator Cert. No. and Class 000298 / Class I		Telephone No. Same/Ext.4224

TYPE OF FACILITY:

	Domestic	Industrial
<input type="checkbox"/> Federal	<input type="checkbox"/> Major	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Primary
<input type="checkbox"/> Nonfederal	<input type="checkbox"/> Minor	<input type="checkbox"/> Minor <input checked="" type="checkbox"/> Secondary

INFLUENT CHARACTERISTICS - Sanitary Waste Design

Flow (MGD)	0.165
Population Served	~ 1,875
Connections Served	NA
BOD5	NA
Suspended Solids	NA

EFFLUENT LIMITS (Specify units) See attached limitations pages (Consent Order)

Parameter	Min	Avg	Max	Parameter	Min	Avg	Max

Receiving Stream: **New River**  
 Basin: **New River**  
 Discharge Point (Latitude/Longitude):  
     001 - 37°20'34" / 80°46'03"  
     002 - 37°20'48" / 80°46'13"  
     003 - 37°20'38" / 80°46'07"

DEQ-WRO  
WASTEWATER FACILITY  
INSPECTION REPORT  
PART 1

Inspection date: September 28, 1993

Date form completed: October 25, 1993

Inspection by: Gerald A. Duff *GAD*

Inspection agency: DEQ-WRO

Time spent: 9 Hours with travel

Reviewed by: *S. C. [Signature]*

Present at inspection: F. Scott Fahrenbruck, Phillip E. Lockard

TYPE OF FACILITY:

	Domestic	Industrial
<input type="checkbox"/> Federal	<input type="checkbox"/> Major	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Primary
<input type="checkbox"/> Nonfederal	<input type="checkbox"/> Minor	<input type="checkbox"/> Minor <input checked="" type="checkbox"/> Secondary

Type of inspection:

<input checked="" type="checkbox"/> Routine	Date of last inspection: 10/08/92
<input type="checkbox"/> Compliance/Assistance/Complaint	Agency: VWCB - WCRO
<input type="checkbox"/> Reinspection	

Population served: ~ 1,800      Connections served: NA

Last month average: BOD: mg/l      TSS: mg/l      Flow: MGD  
(Influent)

Other: See attached operations data for each outfall

Last month average: BOD: mg/l      TSS: mg/l      Flow: MGD  
(Effluent)

Other: See attached operations data for each outfall

Quarter average: BOD: mg/l      TSS: mg/l      Flow: MGD  
(Effluent)

Other: See attached operations data for each outfall

DATA VERIFIED IN PREFACE       Updated    No changes

Has there been any new construction?  Yes    No  
An above ground equalization basin and solids filter system have been completed and put into service. Numerous additional projects are underway.

If yes, were plans and specifications approved?  Yes    No    NA  
See attached technical memorandum which covers concept engineering report for phase III of the new construction underway at the Celco Plant.

VWCB approval date: 03/30/92, 08/06/92

## Operations Data for Outfall 001

Last month average: BOD:       mg/l       TSS:       mg/l       Flow:       MGD  
 (Influent)  
 NA                    Other:

Last month average: BOD: --- mg/l       TSS: --- mg/l       Flow: 69.77 MGD  
 (Effluent)  
 August 1993        Other: pH: 7.0 - 8.8 SU, Cl<sub>2</sub>: 0.0 mg/l, TOC: 0.09 mg/l  
                     Phenol: 0.01 mg/l, Pb: 0.001 mg/l

Quarter average:    BOD: --- mg/l       TSS: --- mg/l       Flow: 69.16 MGD  
 (Effluent)  
 Jun. - Aug. 1993   Other: pH: 5.3 - 8.8 SU, Cl<sub>2</sub>: 0.0 mg/l, TOC: 0.04 mg/l  
                     Phenol: 0.01 mg/l, Pb: 0.001 mg/l

## Operations Data for Outfall 002

Last month average: BOD:       mg/l       TSS:       mg/l       Flow:       MGD  
 (Influent)  
 NA                    Other:

Last month average: BOD: --- mg/l       TSS: 14 mg/l       Flow: 2.07 MGD  
 (Effluent)  
 August 1993        Other: pH: 6.8 - 7.6 SU, Cl<sub>2</sub> Max.: 0.2 mg/l, O&G: 1.0 mg/l

Quarter average:    BOD: --- mg/l       TSS: 17 mg/l       Flow: 2.11 MGD  
 (Effluent)  
 Jun. - Aug. 1993   Other: pH: 6.8 - 7.7 SU, Cl<sub>2</sub> Max.: 0.0 mg/l, O&G: 1.0 mg/l

## Operations Data for Outfall 003

Last month average: BOD: --- mg/l       TSS: --- mg/l       Flow: 1.97 MGD  
 (Influent)  
                     Other: pH: 3.7 - 5.0 SU

Last month average: BOD: 3.3 mg/l       TSS: 5 mg/l       Flow: 1.64 MGD  
 (Effluent)  
 August 1993        Other: pH: 7.4 - 7.9 SU, Cl<sub>2</sub>: 0.0 mg/l, Temp: 29.4°C  
                     COD: 32 mg/l, Fecal Coliform: 2 N/Cml.

Quarter average:    BOD: 5.4 mg/l       TSS: 9 mg/l       Flow: 1.83 MGD  
 (Effluent)  
 Jun. - Aug. 1993   Other: pH: 7.2 - 8.1 SU, Cl<sub>2</sub>: 0.0 mg/l, Temp: 29.6°C  
                     COD: 21 mg/l, Fecal Coliform: 3 N/Cml



COMMONWEALTH of VIRGINIA  
STATE WATER CONTROL BOARD

Richard N. Burton  
Executive Director

Post Office Box 11143  
Richmond, Virginia 23230-1143  
(804) 527-5000  
TDD (804) 527-4261

STATE WATER CONTROL BOARD ENFORCEMENT ACTION

A SPECIAL ORDER

ISSUED TO

HOECHST CELANESE CORPORATION

This is a Special Order (hereinafter referred to as the "Order") issued by the State Water Control Board (hereinafter referred to as "the Board") to Hoechst Celanese Corporation (hereinafter referred to as "Celanese") regarding their Narrows, Virginia Plant (hereinafter referred to as "Celco"). The Order is issued by the Board under the authority of Section 62.1-44.15(8a) of the Code of Virginia, 1950, as amended.

Celco is a manufacturer of cellulose acetate flake and fibers that is owned and operated by Celanese. Celco's wastewater discharges are the subjects of VPDES permit No. VA0000299 (hereinafter referred to as "the Permit"). These discharge points, which discharge to the New River, are designated as point sources 001, 002, and 003. The constituents of point source 001 are non-contact cooling water, stormwater, cooling tower blowdown, coal pile runoff, water treatment plant wastewater, boiler blowdown, and demineralizer blowdown. Point source 002 consists of ash pond effluent. Point source 003 consists of process wastewater treatment plant effluent. All of these point sources discharge into the New River. These discharges are the subject of VPDES permit No. VA0000299.

Upon its reissuance, the Permit will contain new requirements and effluent limitations for point source 003 which have been included as a result of the imposition of Federal Effluent Guidelines for the Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) Subcategory. The Board and Celanese understand that Celco will be unable to comply with these requirements and effluent limitations immediately upon the Permit's reissuance. Therefore, the Board orders and Celanese agrees to achieve compliance with the final effluent limitations and requirements of the Permit in accordance with the schedule in Appendix A attached hereto.

In addition to point source discharges 001, 002, and 003, upon reissuance, the Permit may reference four additional discharge points which are proposed to be limited in the future. These discharge points will be designated as point sources 101, 102, 103 and 104. Point Source 101 will consist of water treatment plant wastewater, point source 102 will contain boiler blowdown, point source 103 will contain demineralizer blowdown and point source 104 will contain tank farm stormwater. Monitoring requirements and limitations for these discharges contained in the soon to be reissued Permit shall become effective in accordance with the schedule established in Appendix B.

In order to allow Celanese time to research and develop alternative treatment methods for wastewater sludge, until March 30, 1994 Celco is authorized to discharge wastewater treatment plant sludge to the ash ponds which discharge to outfall 002. Thereafter, Celco shall discharge its wastewater sludge in accordance with the requirements of VPDES permit No. VA0000299.

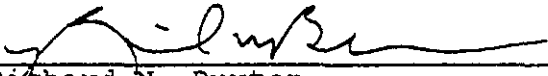
From the effective date of this Order until the final compliance dates in the applicable appendices, the Board orders and Celanese agrees to comply with the interim effluent limitations in Appendices C, D, E and F.

Celanese waives its rights to service of, a hearing on, and judicial review of this Order. Celanese also waives its rights to written findings of fact and conclusions of law to support the Order. Notwithstanding this waiver, Celanese shall not be deemed to have waived its rights to contest any aspect of such further proceedings to which Celanese is entitled under Virginia Laws or Regulations.

Celanese agrees that the Board may cancel this Order, in its sole discretion, upon thirty days written notice, and that otherwise, the Order may be modified only with Celanese's consent or after due notice and opportunity for hearing.

This Order shall become effective upon the date of its execution by the Board's Executive Director or his designee.

And it is SO ORDERED this 22 day of April, 1992.

  
Richard N. Burton  
Executive Director  
State Water Control Board

Celanese voluntarily agrees to the issuance of this Order.

By: Donald L. Lisman  
Donald L. Lisman  
Plant Manager  
Hoechst Celanese Corporation  
Narrows, Virginia

Date: March 30 1992

State of Virginia  
City/County of  Giles

The foregoing Order was executed before me this 30 day of

March, 1992 by Donald L. Lisman, Plant Manager of  
Hoechst Celanese Corporation.'s Narrows, Virginia Plant on behalf  
of said corporation.

M. Jane Lapan  
Notary Public

My commission expires: 9-30-94



HOECHST CELANESE CORPORATION

CONSENT SPECIAL ORDER

APPENDIX A

On or before April 30, 1992, Celanese shall submit, for State Water Control Board review and approval, an approvable schedule for achieving compliance with the final limits regarding point sources 001, 002, and 003 which are contained in VPDES permit No. VA0000299. The schedule of compliance shall contain dates for initiation and completion of any construction deemed necessary, interim progress reports on any required construction, and shall extend no later than March 30, 1994.

No later than fourteen (14) calendar days following the dates identified in the above mentioned schedule, Celanese shall submit to the Board's Office of Enforcement, at P. O. Box 11143, Richmond, VA 23230-1143, a written notice of compliance, or noncompliance. In the case of noncompliance, the notice shall include the cause of noncompliance, any remedial actions taken to address such noncompliance and the effect of noncompliance on the timing of completion of the project(s) identified by the schedule.

Upon approval of the above mentioned schedule, it shall be incorporated herein by reference as an enforceable part of this Order.

HOECHST CELANESE CORPORATION

CONSENT SPECIAL ORDER

APPENDIX B

Within 60 days of VPDES permit issuance, Celanese shall submit, for State Water Control Board review and approval, approvable schedules for achieving compliance with the final limits regarding point sources 101, 102, 103, and 104 which may be contained in VPDES permit No. VA0000299. The schedules of compliance shall contain dates for initiation and completion of any construction deemed necessary and interim progress reports on any required construction. The schedules of compliance regarding point sources 101, 102, and 103 shall extend no later than three years beyond permit issuance. The schedule of compliance regarding point source 104 shall extend no later than two years beyond permit issuance.

No later than fourteen (14) calendar days following the dates identified in the above mentioned schedules, Celanese shall submit to the Board's Office of Enforcement, at P. O. Box 11143, Richmond, VA 23230-1143, a written notice of compliance, or noncompliance. In the case of noncompliance, the notice shall include the cause of noncompliance, any remedial actions taken to address such noncompliance and the effect of noncompliance on the timing of completion of the project(s) identified by the schedule.

Upon approval of the above mentioned schedule, it shall be incorporated herein by reference as an enforceable part of this Order.

HOECHST CELANESE CORPORATION

CONSENT SPECIAL ORDER

APPENDIX C

FINAL TOTAL RESIDUAL CHLORINE (TRC) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. The TRC concentration in the final effluent from outfalls 001, 002 and 003 shall be non-detectable. This concentration shall be measured using one of the following procedures:
  - a. DPD Titration
  - b. DPD Colorimetric
  - c. Iodate Back Titration (Starch)
  - d. Amperometric Direct Titration
  - e. Any proven and EPA accepted method that can reach an equal level of detection.
2. The permittee shall notify the appropriate Regional Office of the Board of the selected procedure within 30 days of the effective date of this permit.

When the TRC concentration in the final effluent results in a detectable measurement, the permittee shall take immediate steps to achieve a non-detectable concentration. Where the TRC is within the limit of (3), the permittee shall also take up to two additional grab samples within one hour of the original sample. The first of these additional samples shall be taken within 45 minutes after the original sample. Should this TRC sample measurement indicate a non-detectable concentration, then the original sample shall be considered as being in compliance with the permit limit in (1). Should this TRC sample measurement indicate a detectable concentration within the limit of (3), then a second additional sample shall be taken within 15 minutes after the first additional sample, but within one hour of the original sample. If the second of these additional sample measurements indicates a non-detectable concentration, then the original and the first additional sample shall be considered as being in compliance with the permit limitation in (1). Should this second additional sample measurement indicate a detectable concentration, then the original sample will be considered as exceeding the permit limitation in (1). Should more than one sample be collected, only the original sample shall be considered for permit violation.

The permittee shall report all results of the above monitoring scheme with the monthly Discharge Monitoring Report (DMR).

3. The instantaneous maximum TRC concentration in the final effluent shall not exceed 1.0 mg/l.
4. Where applicable the permittee shall operate the dechlorination facilities in a manner which will ensure continuous compliance with the TRC concentration in (1), but not to the extent that will result in violations of other permitted effluent characteristics, or the Water Quality Standards.

APPENDIX D

A. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Hoechst Celanese Corporation, Narrows, Virginia Plant

- From the effective date of this Order and until two years after permit reissuance, Hoechst Celanese Corporation, Narrows, Virginia Plant is authorized to discharge from outfall serial number 001 (noncontact cooling water, stormwater, cooling tower blowdown, coal pile runoff, water treatment plant wastewater, boiler blowdown, and demineralizer blowdown) in accordance with the effluent limitations and monitoring requirements as specified below:

<u>EFFLUENT CHARACTERISTIC</u>	<u>DISCHARGE LIMITATIONS</u>				<u>MONITORING REQUIREMENTS</u>	
	kg/day		Other Units (Specify)		<u>Frequency</u>	<u>Sample Type</u>
	<u>Monthly Avg.</u>	<u>Daily Max.</u>	<u>Monthly Avg.</u>	<u>Daily Max.</u>		
Flow (MGD)	NA	NA	NL	NL	Continuous	Recorded
Temperature	NA	NA	NL	41.7°C	Continuous	Immersion Stab.
Cl <sub>2</sub> Residual Chlorine <sup>5</sup>					1/Day	Grab
TOC (net)	NL	NL	NL	NL	3 D/Week	24 Hr. Comp.
Phenols, total (4AAP)	NL	NL	NL	NL	1/Month	Grab
Lead, total recoverable	NL	NL	NL	NL	1/Month	24 Hr. Comp.

- The discharge shall have a pH value between 6.0 and 9.0 at all times, except as noted herein, and shall be monitored continuously. The total time limit for pH excursions of 7 hours and 26 minutes in any calendar month specified in 40 CFR 401.17 shall apply. The time limit of 60 minutes for an individual excursion shall also apply. The time limitations only apply to pH excursions outside the range of 6.0 and 9.0 but within the range 4.0 and 11.0. All excursions exceeding the range 4.0 to 11.0 shall be reported.
- There shall be no discharge of floating solids or visible foam in other than trace amounts.
- Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): discharge canal prior to mixing with river water and TOC at the intake also.
- See Appendix C of this Order.

APPENDIX E

A. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Hoechst Celanese Corporation, Narrows, Virginia Plant

- From the effective date of this Order and until two years after permit reissuance, Hoechst Celanese Corporation, Narrows, Virginia Plant is authorized to discharge from outfall serial number 002 (ash pond effluent) in accordance with the effluent limitations and monitoring requirements as specified below:

<u>EFFLUENT CHARACTERISTIC</u>	<u>DISCHARGE LIMITATIONS</u>				<u>MONITORING REQUIREMENTS</u>	
	kg/day		Other Units (Specify)		<u>Frequency</u>	<u>Sample Type</u>
	<u>Monthly Avg.</u>	<u>Daily Max.</u>	<u>Monthly Avg.</u>	<u>Daily Max.</u>		
Flow (MGD)	NA	NA	NL	NL	Continuous	Recorded
TSS	NL	NL	30 mg/l	100 mg/l	1/Week	24 Hr. Comp.
Oil and Grease	105	140	NL	NL	1/Week	Grab
Cl <sub>2</sub> Residual <sup>5</sup>					1/Day	Grab

- The discharge shall have a pH value between 6.0 and 9.0 at all times, except as noted herein, and shall be monitored continuously. The total time limit for pH excursions of 7 hours and 26 minutes in any calendar month specified in 40 CFR 401.17 shall apply. The time limit of 60 minutes for an individual excursion shall also apply. The time limitations only apply to pH excursions outside the range of 6.0 and 9.0 but within the range 4.0 and 11.0. All excursions exceeding the range 4.0 to 11.0 shall be reported.
- There shall be no discharge of floating solids or visible foam in other than trace amounts.
- Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): discharge canal prior to mixing with river water and TOC at the intake also.
- See Appendix C of this Order.

APPENDIX F

A. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Hoechst Celanese Corporation, Narrows, Virginia Plant

- From the effective date of this Order and until two years after permit reissuance, Hoechst Celanese Corporation, Narrows, Virginia Plant is authorized to discharge from outfall serial number 003 (process wastewater treatment plant effluent) in accordance with the effluent limitations and monitoring requirements as specified below:

<u>EFFLUENT CHARACTERISTIC</u>	<u>DISCHARGE LIMITATIONS</u>				<u>MONITORING REQUIREMENTS</u>	
	kg/day		Other Units (Specify)		Frequency	Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow (MGD)	NA	NA	NL	NL	Continuous	Recorded
BOD NL	973	1877	NL	NL	3/Week	24 Hour Composite
TSS	2023	3170	NL	NL	3/Week	24 Hour Composite
COD	NL	NL	NL	NL	3/Week	24 Hour Composite
Fecal Coliform	NA	NA	200/100 ml	400/100 ml	1/Week	Grab
Temperature	NA	NA	NL	39° C	Continuous	Recorded
Cl <sub>2</sub> Residual					1/Day	Grab

- The discharge shall have a pH value between 6.0 and 9.0 at all times, except as noted herein, and shall be monitored continuously. The total time limit for pH excursions of 7 hours and 26 minutes in any calendar month specified in 40 CFR 401.17 shall apply. The time limit of 60 minutes for an individual excursion shall also apply. The time limitations only apply to pH excursions outside the range of 6.0 and 9.0 but within the range 4.0 and 11.0. All excursions exceeding the range 4.0 to 11.0 shall be reported.
- There shall be no discharge of floating solids or visible foam in other than trace amounts.
- Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): wastewater treatment plant effluent.
- See Appendix C of this Order.

**TECHNICAL MEMORANDUM**

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**PREPARED FOR:** Hoechst Celanese Corporation  
Celco Plant  
Narrows, Virginia

**PREPARED BY:** Scott Fahrenbruck/Hoechst Celanese  
John Novak, Ph.D./VPI  
Joan Giltner/CH2M HILL

**COPIES:** Richard Langford/Hoechst Celanese  
Phil Lockard/Hoechst Celanese

**DATE:** June 24, 1992

**SUBJECT:** Clarification of Concept Engineering Report

**PROJECT:** WDC28170.L3.34

RECEIVED  
JUN 26 1992

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During the June 8, 1992, meeting with the Virginia State Water Control Board (SWCB), the following concerns were identified:

- Design of the chlorine contact (sanitary pretreatment) facility
- Disposal of blowdown from the WWTP cooling towers
- Elimination of the aerobic digester

The objective of this memorandum is to provide documentation to the SWCB that eliminates these concerns and facilitates approval of the Concept Engineering Report (CER) for Phase 3 of Celco's WWTP Upgrade Project. The following sections are presented:

- Sanitary Pretreatment Design
- WWTP Blowdown Disposal
- Digester Closure

### **Sanitary Pretreatment Design**

Since the 1940s, Celco's sanitary wastewater has been treated in Imhoff facilities (tank and sand drying beds). To achieve pathogen reduction prior to combining the sanitary wastewater with the industrial wastewater for advanced treatment, Celco plans to replace the Imhoff tank with prechlorination facilities. Because Celco's sanitary wastestream is less than 10 percent of total wastestream treated at the WWTP, the Virginia Department of Health (DOH) is not required to review plans and specifications for modifications to the sanitary pretreatment system. However, the



SWCB has requested that Celco incorporate DOH regulations in designing the new facilities.

DOH sewage regulations specify chlorination as a means of disinfecting wastewater that has already received treatment (i.e., screening, sedimentation, and/or biological treatment). The design approach incorporates DOH criteria for disinfecting wastewater which includes the following:

- Equipment must be provided to ensure disinfection with any unit out of operation for maintenance or repairs
- Chlorinators must be equipped with a sufficient water supply and chlorine measuring device
- Uniform mixing at the point of application must be maintained (a mean velocity gradient ( $G$ ) of 500 to 1,000  $\text{sec}^{-1}$  is recommended)
- Minimum contact periods to be provided:
  - 30 minutes at average daily flow
  - 20 minutes at maximum daily flow
- Contact tank geometry:
  - Plug flow reactor(s)
  - Flow path length to width ratio = 20
  - Depth to width ratio = 1.0

Figure 1 presents the proposed preliminary design of Celco's prechlorination system which satisfies the intent of DOH's requirements. Sanitary wastewater will flow by gravity through the existing comminutor and new contact tanks, to a new lift station which will combine the pretreated sanitary waste with other wastestreams. Wastewater will be pumped from the lift station to the new biological selectors (see CER).

Installation of a serpentine contact tank for the untreated wastewater will result in solids deposition within the chambers and subsequent operation and maintenance problems. To prevent the solids deposition anticipated in a rectangular serpentine tank, three circular chlorine contact tanks will be operated in series to simulate the plug flow regime required by DOH. Each tank will be equipped with a mixer sized to maintain the required mean velocity gradient and prevent solids deposition. Chlorine from Celco's existing plant-wide chlorinators, which consist of a series of chlorine tanks manifolded together, will be metered to each tank. To maintain the required 20-minute contact time, the tanks were sized such that two tanks will provide the required contact, allowing one tank to be out-of-service for maintenance. As required in Celco's VPDES permit, effluent from the WWTP will be monitored for pathogens (i.e., fecal coliforms) and total chlorine residual.

## WWTP Blowdown Disposal

As stated in the CER, heat exchangers and cooling towers will be provided to maintain the mixed liquor in the biological system at a temperature adequate for effective treatment (approximately 95°F). Make-up water for the cooling towers will be pumped from the noncontact cooling water ditch (VPDES Outfall 001). As directed by the SWCB, blowdown from the cooling towers (approximately 125 gpm) will be routed to the biological selectors for treatment.

## Digester Closure

As stated in the CER, closure of the aerobic digester is necessary to construct the new biological treatment facilities and satisfy regulatory compliance deadlines. The SWCB is concerned that undigested sludge will decompose in Celco's landfill. Discussions with the Virginia Department of Waste Management (DWM) indicate that as long as the sludge is not hazardous and is dewatered (i.e., passes EPA's Paint Filter Test), land disposal in Celco's on-site landfill will not be a problem. The sludge generated at Celco's WWTP has been confirmed to be nonhazardous and will pass the paint filter test after dewatering.

During closure of the digester and prior to completion of the new mechanical dewatering facilities, Celco intends to operate the WWTP without digestion facilities. Additionally, Celco does not intend to construct replacement digestion facilities. For both interim and future operating conditions, sludge digestion is not required because (1) activated sludge systems operating at long sludge ages produce stable solids, and (2) historical performance at similar HCC facilities indicates that sludges generated at industrial wastewater treatment plants operating at long sludge ages do not require digestion prior to landfilling. The higher operating temperatures of the upgraded WWTP will also enhance solids stabilization.

The principle purposes of sludge digestion are to reduce pathogens, eliminate the potential for formation of offensive odors, and to stabilize sludge prior to disposal. At Celco, pathogen reduction is achieved by chlorinating the effluent from the Imhoff tank prior to the WWTP. As discussed above, these facilities will be replaced with a sanitary pretreatment system (prechlorination) during the WWTP upgrade project. Odors are usually generated from anaerobic digestion of proteins which contain organic sulfur compounds. Celco is implementing a project that will stop the discharge of sludge to the fly ash ponds eliminating the anaerobic environment the sludge is currently exposed to. Additionally, since Celco's raw wastewater is devoid of proteins, the potential for odor formation will be significantly reduced.

## Existing WWTP

An article from the *Journal of the Water Pollution Control Federation* titled "Stabilization of Sludge from an Oxidation Ditch," by John Novak, Ph.D., of Virginia Polytechnic Institute and State University, suggests that (1) activated sludge processes operated at long sludge ages (greater than 9 days) yield organically stable sludges, and (2) aerobic digestion achieves little reduction in volatile suspended solids (VSS) in systems operated at longer than 10-day sludge ages. Novak also suggests that the specific oxygen uptake rate (SOUR) is a good measure of sludge stability because it reflects the level of activated sludge activity and the concentration of degradable organics present. For fresh municipal sludges SOUR values of 10 to 30 mg/gm-hr are common. More stable sludges or digested sludges typically range from 1 to 6 mg/gm-hr.

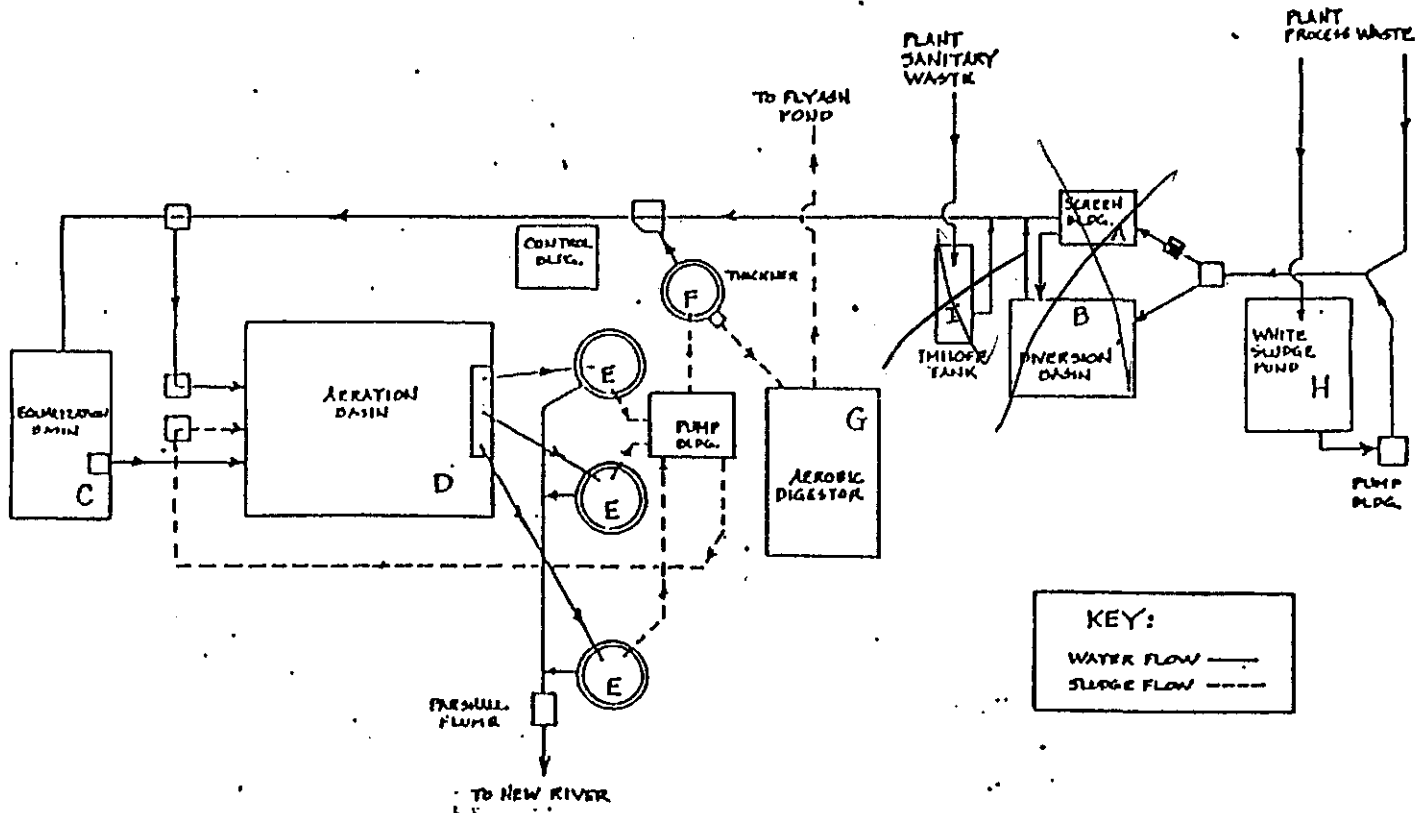
Operating data from Celco's existing WWTP is presented in Table 1. Because Celco's system operates at a long aeration basin sludge age (approximately 14.6 days) and short digester sludge age (approximately 8.2 days), the VSS reduction in the digester (9.6 percent) is insignificant, indicating an organically stable sludge. SOUR values for both the aeration basin and aerobic digester are much lower than SOUR values for fresh municipal sludge and within the range anticipated for stable sludges. The SOUR reduction in the digester is most likely due to the reduction in organism activity. Pathogens are not a problem since Celco's sanitary wastestream is chlorinated at the Imhoff tank prior to the WWTP. Since the digester does not improve the organic stability of Celco's sludge, closure of the unit should not be detrimental to the operation of the WWTP or landfill.

## Future WWTP

Celco's new activated sludge system is being designed to operate at a 15-day sludge age and 95°F. The higher operating temperature in the BIOHOCH system will enhance sludge stabilization due to increased decay. Table 2 summarizes the impact of temperature on sludge production rates. The average estimated sludge production rate of 10,500 lb TSS/d ( $(11,700 + 9,300)/2$ ) from the existing WWTP is within approximately 10 percent of the actual 1991-92 production rate of 11,700 lb TSS/d (see Table 1). The increased operating temperature of the new activated sludge facilities will reduce the quantity of solids produced at Celco by approximately 18 percent under summer conditions (from 9,300 to 7,600 lb TSS/d) and 35 percent under winter conditions (from 11,700 to 7,600 lb TSS/d).

HCC operates over 13 activated sludge plants located in the United States that treat wastewaters generated from a variety of chemical manufacturing processes. Because these plants generate stable solids, sludge digestion has not been installed at any of these facilities including Celriver (another HCC cellulose acetate manufacturing plant in Rock Hill, South Carolina). Celriver currently disposes undigested sludge in their on-site landfill and has not experienced operational problems.

# SWTP PROCESS FLOW DIAGRAM



*Handwritten notes:*  
BVP  
SWTP Diagram  
HAS BEEN  
Upgraded