Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	**NPDES PERMIT FACT SHEET INDIVIDUAL INDUSTRIAL WASTE (IW) AND IW STORMWATER**	Application No.	**PA0262072**
Facility Type	**Industrial**		APS ID	**814767**
Major / Minor	**Minor**		Authorization ID	**1333482**

Applicant and Facility Information

Applicant Name	**Knouse Foods Cooperative Inc.**	Facility Name	**Knouse Foods Peach Glen Fruit Proc Facility**
Applicant Address	53 East Hanover Street, PO Box 807	Facility Address	800 Peach Glen Idaville Road
	Biglerville, PA 17307		Peach Glen, PA 17375-0001
Applicant Contact	Anthony Bretzman	Facility Contact	Anthony Bretzman
Applicant Phone	(717) 677-9115	Facility Phone	(717) 677-9115
Client ID	80974	Site ID	773696
SIC Code	2033	Municipality	Huntington Township
SIC Description	Manufacturing - Canned Fruits And Vegetables	County	Adams
Date Application Received	November 10, 2020	EPA Waived?	Yes
Date Application Accepted	November 17, 2020	If No, Reason	
Purpose of Application	NPDES renewal permit re-draft.		

Summary of Review

A draft permit was prepared on December 17, 2021 and published in the *Pennsylvania Bulletin* on January 8, 2022 for public comments for 30 days. During the 30-day public comment period, no draft permit comments were received from the public. On January 31, 2022, the permittee provided a letter with draft permit comments (see attached). The draft permit is revised and republished in the *Pennsylvania Bulletin* for another 30 days for public comments.

A summary of the comments and the Department's responses are as follows.

Fact Sheet
Comment No. 1 – Facility contact is Anthony Bretzman, not Charles Bennett.
Response – **Page 1-** The fact sheet will be updated to reflect this new information.

Comment No. 2 – Page 2 & 15- Summary of review Total Selenium Mass average monthly and daily maximum limits incorrect to proposed values of permit.
Response – **corrected** - Mass average monthly of 0.013 lbs/day and daily maximum of 0.02 lbs/day are also add in the proposed permit, (this factsheet, pages 18 & 19). However, the mass average monthly and daily maximum limits in the permit are correct on Part A, Outfall 001, page 3.

Comment No. 3 – Page 13 - Technology-Based Limitations table to be removed/revised (appears to be a duplicate of outfall 002 table on page 25 of the fact sheet); add TSS, O&G, etc. Revise the Technology-Based Limitations and Water Quality-Based Limitations sections to include the TBELs and WBELs in the appropriate sections.
Response – it is revised, (this fact sheet, page 16).

Comment No. 4 – Page 15 -Total Iron limit from TMS shows report with no concentration and mass values to this portion of the factsheet.

Approve	Deny	Signatures	Date
X		*Hilaryle* Hilary H. Le / Environmental Engineering Specialist	April 1, 2022
X		*Maria D. Bebenek for* Daniel W. Martin, P.E. / Environmental Engineer Manager	May 2, 2022

Summary of Review

Response – The existing permit has Total Iron limit of 1.815 mg/l average monthly, 2.832 mg/l daily maximum, and 4.538 mg/l IMAX will remain in the proposed permit, due to anti-backsliding requirements (the fact sheet, page 18)

Comment No. 5 – Page 15 -Total Zinc: Fact sheet discusses using a multiplier of 1.5 for an "average weekly limit" of 0.138 mg/L. Calculation should be completed using "Daily Maximum".
Response – corrected "Daily Maximum" (this fact sheet, page 18).

Comment No. 6 – Page 17 - remove non-contact cooling water reference; change to process wastewater. And provide comment regards "DEP will use five years of data in the next renewal".
Response – corrected from "non-contact cooling water' to "process wastewater", (this factsheet, page 20). And added "DEP will use five years of data in the next renewal." (this fact sheet, page 20).

Comment No. 7 – **Page 26** - UV reported intensity (mW/cm^2), not transmittance (%).
Response – updated to reflect new information (this fact sheet, page 30).

Comment No. 8 – Page 31 –Revise stormwater outfall descriptions (also page 31 in the permit).
Response – This fact sheet (page 35) & permit (page 31) updated to reflect new information.

NPDES Permit, Part A, Outfall 001
Comment No. 1 – Oil and Grease – a review of facility past years DMRs show results non-detect. Knouse requests that Oil and Grease be removed from the permit. If the Department does not agree that oil and grease should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.
Response – The revised draft will include a reduction in sample frequency to quarterly (Permit, page 2).

Comment No. 2 – Total Copper –

a. Limits have been added for total copper. A review of facility past years DMRs show that reported results evaluated with newly proposed effluent limitations would cause an exceedance in all limitations. Knouse requests a delayed compliance schedule of same timeframe as proposing for newly imposed temperature effluent limitations.
b. The instantaneous maximum limit is the same as the daily maximum limit in the proposed permit, the limits should be:

Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX
Total Copper (ug/L)	0.018	0.028	10.1	15.7	25.2

Knouse request the limits shown above to be in the proposed permit.

Response –

a. The Department agrees with the facility request to delay compliance schedule to the same timeframe as they are proposing for newly imposed temperature effluent limitations. We have updated the Permit on page 4.
b. We corrected the MDL limit of (10.1 x 1.5) 15.2 ug/L, and IMAX limit of (10.1 x 2.5) 25.2 ug/L (Permit, page 4).

Comment No. 3 – **Total Iron** – The results of the reasonable potential analysis resulted in no reasonable potential for total iron to exceed the WQBEL; therefore, Knouse requests that total iron be removed from the permit. If the Department does not agree that total iron should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.
Response – The existing permit has **Total Iron** limit of 1.815 mg/l average monthly, 2.832 mg/l daily maximum, and 4.538 mg/l IMAX will remain in the proposed permit, due to anti-backsliding requirements, (this factsheet, page 18). We agree to a reduction in sample frequency to quarterly (Permit, page 3).

Comment No 4 – **Total Lead** – A review of facility past years DMRs show reported results were non-detect. Knouse requests that total Lead be removed from the permit. If the Department does not agree that total Lead should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.
Response - We agree to a reduction in sample frequency to quarterly (Permit, page 3).

Comment No. 5 – **Total Manganese** - The results of the reasonable potential analysis resulted in no reasonable potential for total manganese to exceed the WQBEL; therefore, Knouse requests that total iron be removed from the permit. If the Department does not agree that total manganese should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.

And the statement is: "*Effluent limitations for manganese will remain in the proposed permit based on the fact that DEP protects for all water uses, not just the critical uses stated in 25 Pa. Code § 93.7. During the next permit renewal cycle, the need for manganese monitoring in the permit will be re-evaluated.*"

Summary of Review

Response – the statement will add in the fact sheet, (page 18). We will agree to a reduction in sample frequency to quarterly (Permit, page 3).

Comment No. 6 – **Total Selenium** – Limits have been added for total selenium. Total selenium was not a parameter of previous issued Knouse Foods, Peach Glen permit, so there has been no facility past year years DMRs reported results to evaluate ability to be compliant with newly proposed effluent limitations. Knouse requests a delayed compliance schedule of same timeframe as proposing for newly imposed temperature effluent limitations.
Response – The Department agreed with the Facility requested to delay compliance schedule of same timeframe as proposing for newly imposed temperature effluent limitations and updated the permit (Permit, pages 4, 5, & 6).

Comment No. 7 – Temperature – The Department notes that review of the past years DMRs show that facility temperatures at discharge point were higher than the new temperature limits. Review of facility temperature data for periods Jan 1 to Apr 15 and Oct 1 to Dec 31, the three-year average upstream temperatures exceeded CWF Ambient Default Temperatures and 6 of the 19 periods of the year exceeded the CWF Maximum Stream Temperatures utilized to generated the daily waste load allocations. Knouse requests further site-specific review for average monthly temperature effluent limitations and clarification of outfall location.
Response

- The Department has adjusted the model inputs to use the ambient stream temperature (site-specific data) where appropriate. The default value or the highest upstream temperature that facility collected in the time period rounded up to the next degree was used to run the thermal model for warm & cold fishes for this review, (this fact sheet, page 19-23).
- To provide for more site-specific data in the next renewal, we have added the monitoring of the up and down stream temperature requirements to the permit, (Permit, pages 4, 5, & 6).

<u>**NPDES Permit, Part A, Outfall 002**</u>**:**
Comment No. 1 – Ultraviolet light transmittance – Facility past year DMRs have been reported as measure of UV intensity (mW/cm^2). Knouse requests that the report parameter be changed from transmittance (%) to intensity (mW/cm^2).
Response – updated to reflect new information, (Permit, page 8).

Comment No. 2 – Cap load Offsets – "(3) *The permittee is authorized to use 475 lbs/year as Total Nitrogen (TN) offsets and 57 lbs/year as Total Phosphorus (TP) offsets toward compliance with the Annual Net TN and TP mass load limitations (Cap Loads). These offsets may be applied throughout the Compliance Year or during the Truing Period. The application of offsets must be reported to DEP as described in Part C."* Knouse requests these Cap Load Offsets be reinstated.
Response - updated to reflect new information (Permit, page 9).

<u>**NPDES Permit, Part C**</u>
Comment No. 1 - Schedule of Compliance – Knouse requests the following be granted for compliance with final effluent limitations:

1. Submit WQM permit application	<u>Effective date of permit + 18 months</u>
2. End construction	<u>WQM approval + 24 months</u>
3. Compliance with effluent limitations	<u>WQM approval + 30 months</u>

Knouse would suggest lessening the proposed time to submittal of WQM believing that evaluation for systems required can be completed within 18 months; however, requests construction and final compliance be based upon WQM approval which is Department dependent. Implementation of construction couldn't commence until WQM approval.
Response – The Department agreed with the facility proposed and updated (Permit, page 27)**.**

Comment No. 2 – Stormwater outfall descriptions – Knouse requests to revise the descriptions as follows:

003 – Concreted, paved, and grassy areas with a PennDOT, Township roadway around Controlled Atmosphere storage building. Experience high traffic at various times throughout the year.
004 – Concreted, paved, and grassy areas around Cold Storage # 2 / warehouse building. Experience high traffic at various times throughout the year.
005 – Concreted, paved, and grassy areas around warehouse with shipping docks and parking area.
006 – Concreted, paved, and grassy areas behind main production building. Supplies and finished product loading and unloaded with single dock door.
007 – Paved high traffic areas in front of main offices and production buildings. Raw and finished product loading and loading with single dock door. Residential, agricultural areas.

Summary of Review

008 – Grassy and wooded areas with high travel paved and gravel parking area around fleet building.
Response – The fact sheet and permit updated to reflect this new information (Permit, page 31).

The Facility summaries as follows.

ARCADIS, on behalf of Knouse Foods Cooperative Inc. (Peach Glen Facility), has applied to the Pennsylvania Department of Environmental Protection (DEP) for reissuance of its NPDES permit. The permit was last reissued on April 20, 2016 and became effective on May 1, 2016. The permit expired on April 30, 2021. This re-draft incorporates the changes resulting from the comments described above.

Knouse Foods Cooperative Inc. operates a fruit processing and drink bottling facility in Peach Glen, Adams County, and is subject to federal Effluent Limitation Guidelines (ELGs) for fruit processing found in 40 CFR § 407 Subpart A, B and F, respectively.

The U.S. EPA promulgated federal ELGs for fruit processing wastewater; however, the ELGs were written for "existing dischargers" and "new source" fruit processors. Knouse Foods is an existing source, but new discharger; therefore, the ELGs are not applicable. Also, based on Technology Based Effluent Limitation (TBEL) analysis (*Reference page # 61 of this factsheet*), the pollutants (aluminum, copper, lead, manganese, zinc, total nitrogen, and total phosphorus) are not covered by the current ELGs. Therefore, this facility is considered a 'Minor Industrial Wastewater (IW) without ELGs' by the Department.

The industrial wastewater treatment facility (outfall # 001) has annual average design flow of 0.1065 MGD, and hydraulic capacity of 0.2172 MGD. The discharge is to Trib. 08741 to Bermudian Creek.

The sanitary wastewater treatment facility (outfall # 002) has annual average design flow of 0.0045 MGD, and hydraulic capacity of 0.00792 MGD. The discharge is to Trib. 08741 to Bermudian Creek.

The outfalls # 003, 004, 005, 006, 007, & 008 are stormwater discharge to Trib. 08741 to Bermudian Creek.

WQM No. 0115201 original issued on 4/20/2016.

<u>Changes from the previous permit</u>:

Charlies Bennett retired on January 31, 2022. The new permittee contact person is Anthony Bretzman.

. Outfall # 001:

- The average monthly limit for Total Zinc changed from 0.0929 mg/l to 0.092 mg/l (daily max and IMAX changed to 0.138 mg/L & 0.23 mg/l).
- *Osmotic Pressure*: the monitor and report requirements changed to quarterly in the proposed permit.
- *Total Lead*: limit of 3.02 ug/L average monthly, 4.71 ug/L daily maximum, and 7.54 ug/L IMAX will be added in the proposed permit. Mass average monthly of 0.005 lbs/day and daily maximum of 0.009 lbs/day are also in the proposed permit with a sample frequency of quarterly.
- *Total Iron*: The TMS analysis results indicated Total Iron limit of report average monthly. However, the existing permit has Total Iron limit of 1.815 mg/l average monthly, 2.832 mg/l daily maximum, and 4.538 mg/l IMAX will remain in the proposed permit with a sample frequency of quarterly, due to anti-backsliding requirements.
- *Total Manganese*: the frequency monitoring & report requirements changed to quarterly.
- *Total Selenium*: limit of 7.05 ug/L average monthly 11.0 ug/L daily maximum, and 17.6 ug/L IMAX will be added in the proposed permit. Mass average monthly limit of 0.013 lbs/day and daily maximum of 0.02 lbs/day are also in the proposed permit. The monitor & report requirement will be added as an interim limit to allow for time along with the Temperature compliance schedule. The company needs to comply with TMS recommended limit according to the approved schedule.
- *Total Copper*: limit of 10.1 ug/L average monthly, 15.2 ug/L daily maximum, and 25.2 ug/L IMAX will be added in the proposed permit. Mass average monthly of 0.018 lbs/day and daily maximum of 0.028 lbs/day are also in the proposed permit. The monitor & report requirement will be added as an interim limit to allow for time along with the Temperature compliance schedule. The company needs to comply with TMS recommended limit according to the approved schedule.
- *Temperature*: the compliance schedule in Part C of the proposed permit for the facility needs to have a plan to achieve the new temperature limits from the NPDES permit submitted18 months after the effective date of the permit. End construction: WQM approval + 24 months, and compliance with effluent limitation: WQM approval + 30 months.
  a. Stream temperature monitoring upstream, downstream and at the discharge point will be added to the proposed permit.
  b. The new Temperature at discharge limits will be effective based on the approved compliance schedule: WQM approval plus 30 months through the permit term.

Summary of Review

c. The ambient stream temperature (site-specific data) which either the default value or the highest upstream temperature that facility collected in the time period is rounded up to the next degree to run the thermal model for warm & cold fishes for this review**.**

. Outfall # 002:

- Unit of Fecal Coliform changed from CFU/100 ml to No./100 ml.
- E. Coli monitoring & reporting yearly was added to the proposed permit.
- UV reported changed from transmittance (%) to UV in intensity (mW/cm^2).
- Cap Load offsets – will add to the permit part A, 1 F *"(3) The permittee is authorized to use 475 lbs/year as Total Nitrogen (TN) Offsets and 57 lbs/year as Total Phosphorus (TP) Offsets toward compliance with the Annual net TN and TP mass load limitations (cap Loads) for Outfall 002, in accordance with Part C in this permit. These Offsets may be applied throughout the Compliance Year or during the Truing Period. The application of offsets must be reported to DEP as described in Part C.*"

. Part C:

- item # I – Other Requirements – (E) added the cleaning chlorine limit language.
- item # II – Schedule of Compliance – Temperature is added in the proposed permit.
- item # III – Schedule of Compliance & item # IV – Requirement To Use eDMR System were removed from the proposed permit.
- item # V – Requirements Applicable to Stormwater outfalls – updated the Stormwater outfalls descriptions.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	001	Design Flow (MGD)	0.217
Latitude	40º 1' 5.31"	Longitude	-77º 13' 18.17"
Quad Name	Mount Holly Springs	Quad Code	
Wastewater Description:	IW Process Effluent without ELG		

Outfall No.	002	Design Flow (MGD)	0.005
Latitude	40º 1' 5.31"	Longitude	-77º 13' 18.17"
Wastewater Description:	Sewage Effluent		

Receiving Waters	Unnamed Tributary to Bermudian Creek (WWF, MF)	Stream Code	08741
NHD Com ID	57468857	RMI	0.26
Drainage Area	0.99 mi.^{2}	Yield (cfs/mi^2)	0.14
Q_{7-10} Flow (cfs)	0.14	Q_{7-10} Basis	USGS StreamStats
Elevation (ft)	871.52	Slope (ft/ft)	
Watershed No.	7-F	Chapter 93 Class.	WWF, MF
Existing Use	Cold water	Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	ORGANIC ENRICHMENT		
Source(s) of Impairment	INDUSTRIAL POINT SOURCE DISCHARGE		
TMDL Status		Name	

Nearest Downstream Public Water Supply Intake	Wrightsville Water Supply Co.		
PWS Waters	Susquehanna River	Flow at Intake (cfs)	
PWS RMI	29.0 miles	Distance from Outfall (mi)	Approximate 64.0 miles

Changes Since Last Permit Issuance:

Drainage Area
The discharge is to Trib. 08741 to Bermudian Creek at RMI 0.26 mile. A drainage area upstream of the discharge is estimated to be 0.99 mi.^{2}, according to USGS StreamStats available at https://streamstats.usgs.gov/ss/.

Stream Flow
According to StreamStats, the point of first use has a Q_{7-10} of 0.14 cfs and a drainage area of 0.99 mi^2, which results in a Q_{7-10} low flow yield of 0.14 cfs/mi^2. This information is used to obtain a chronic or 30-day (Q_{30-10}), and an acute or 1-day (Q_{1-10}) exposure stream flow for the discharge point as follows (Guidance No. 391-2000-023):

$$Q_{7-10} = 0.14 \text{ cfs}$$
$$\text{Low Flow Yield} = 0.14 \text{ cfs} / 0.99 \text{ mi}^2 = 0.14 \text{ cfs/mi}^2$$
$$Q_{30-10} = 1.36 * 0.14 \text{ cfs} = 0.19 \text{ cfs}$$
$$Q_{1-10} = 0.64 * 0.14 \text{ cfs} = 0.09 \text{ cfs}$$

The resulting Q_{7-10} dilution ratio is: $Q_{stream} / Q_{discharge}$ = 0.14 cfs / [0.217 MGD * (1.547 cfs/MGD)] =0.42:1

Trib. 08741 to Bermudian Creek
25 Pa. Code § 93.9o classifies trib. 08741 to Bermudian Creek as Warm Water and Migratory Fishes (WWF, MF), and existing use cold-water fishes (CWF) surface water. Based on the 2020 Integrated Report, Trib. 08741 to Bermudian Creek, assessment unit IDs 6180, 18609, & 6181, is impaired due to industrial point source discharge-organic enrichment. A TMDL currently does not exist for this stream segment, therefore, no TMDL has been taken into consideration during this review.

Public Water Supply

The nearest downstream public water supply intake is the Wrightsville Water Supply Co. on Susquehanna River in York County, approximately 64.0 miles downstream of this discharge. Given the nature and dilution, the discharge is not expected to impact the water supply.

Treatment Facility Summary				
Treatment Facility Name: Knouse Foods Peach Glen				
WQM Permit No.	**Issuance Date**			
0115201	4/20/2016			
Waste Type	**Degree of Treatment**	**Process Type**	**Disinfection**	**Avg Annual Flow (MGD)**
Industrial	Secondary	Extended Aeration	Ultraviolet	0.217 & 0.005
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
0.217 & 0.005	25.9		Aerobic Digestion	Landfill

Changes Since Last Permit Issuance:

IWTP consists:

Automatic Screen (1), EQ Tank (1), Residual Food Waste Receiving (1), Anaerobic Reactor (1) MBR system (1), discharge (Outfall 001).

Chemical additions / Treatment chemicals: Facility uses caustic (for alkalinity adjustment), alum (for chemical precipitation of phosphorus), urea (for nitrogen adjustment), antifoam (for decrease foaming), citric acid (for membrane cleaning), magnesium hydroxide (for pH adjustment), and sodium hypochlorite on-site.

Domestic WWTP consists:

Basket screen/EQ Tank (1), Aeration Tank (1), Clarifier (1), Effluent Tank (1), UV disinfection systems (2), Sludge holding (1), discharge (Outfall # 002).

Chemical additions / Treatment Chemicals: Facility uses antifoam (to decrease foaming), and soda ash (for alkalinity adjustment).

Compliance History	
Summary of DMRs:	DMRs reported last 12 months from February 1, 2021 to January 31, 2022 are summarized in the Table below (Pages 6 thru 12).
Summary of Inspections:	2/9/2022: Mr. Bettinger, DEP WQS, conducted compliance evaluation inspection. There were recommendations such as implement cleaning and calibration schedule for in-situ aeration tank probes, make appropriate corrections to the June 2021 DMR based on the provided table, and provide update via email when the facility's backup generator is installed. 1/7/2021: Mr. Bettinger, DEP WQS, conducted an administrative inspection to follow up on a self-reported incident at Knouse Foods Peach Glen during the COVID-19 restrictions. There were no violations noted during inspection. 10/8/2020: Mr. Bettinger, DEP WQET, conducted an inspection to follow up on a power failure at Knouse Foods Peach Glen during the COVID-19 restrictions. There were violations noted during inspection such as the facility diverted industrial wastewater to ponds 1A and 1B during a power failure, an unauthorized & unpermitted discharge of industrial wastes to waters of the Commonwealth (P.L. 1987, No. 394, Sec 301: Clean Streams Law). 11/21/2019: Mr. Benham, DEP WQS, conducted an inspection to follow up on a reported discoloration and growth in the UNT of Bermudian Creek. The field tests results were within permit limits. 10/16/2019: Mr. Benham, DEP WQS, conducted a follow up inspection. The field tests results were within permit limits. 10/2/2019: Mr. Benham, DEP WQS, conducted inspection to follow up on a reported discharge of industrial wastewater to Pond 1A due to an emergency cleaning of train #2 of the MBR tanks at Knouse Foods Peach Glen. There were violations noted during inspection such as failure to properly operate and maintain all facilities and treatment systems in violation of permit part B, Section I.D, and discharge of industrial waste to unpermitted storage devices (Ponds 1A, 1B, & 3) which are waters of the Commonwealth in violation of the Clean Streams Law, Sections 301 & 307. 4/15/2019: Mr. Benham, DEP WQS, conducted inspection to follow up on a reported discharge of industrial wastewater to the Commonwealth. There was a violation noted during inspection: discharge of industrial waste to the waters of the Commonwealth in violation of the Clean Streams Law, Sections 301 & 307. 12/21/2018: Mr. Benham, DEP WQS, conducted inspection to follow up on a reported discharge of industrial wastewater to the Commonwealth. There was a violation noted during inspection, i.e., discharge of industrial waste to the waters of the Commonwealth in violation of the Clean Streams Law, Sections 301 & 307. The field tests results were within permit limits. The parameters of Color and Osmotic Pressure are "Monitor and Report" only until November of 2020, at which time, effluent limits come into effect. During June 2018, Knouse was able to meet the 2020 limitations. 4/16/2018: Mr. Bowen, DEP WQS, conducted compliance evaluation inspection. There were no violations noted during inspection. The field test results were within limits. 7/26/2017: Mr. Victor Landis, Environmental Group Manager-Operations, site visit conducted to observe construction of the new Industrial Wastewater Treatment Plant (WWTP) to replace existing spray fields. There were no violations noted during site visit.
Other Comments:	There are open violations associated with the permittee or the facility on 3/25/2021 due to failure to comply with UST system periodic equipment testing requirements.

Other Comments:

Compliance History

DMR Data for Outfall 001 (from February 1, 2021 to January 31, 2022)

Parameter	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21
Flow (MGD) Average Monthly	0.12905	0.113698	0.136809	0.140049	0.136469	0.105846	0.155661	0.121014	0.100553	0.108784	0.124567	0.108278
Flow (MGD) Daily Maximum	0.14969	0.176822	0.195085	0.183382	0.205778	0.168216	0.227214	0.197318	0.143326	0.163305	0.195624	0.175041
pH (S.U.) Minimum	8.03	8.04	7.8	7.87	7.99	8.14	7.8	7.71	7.97	7.73	7.85	7.75
pH (S.U.) Instantaneous Maximum	8.55	8.5	8.39	8.27	8.49	8.53	8.15	8.13	8.36	8.2	8.23	8.0
DO (mg/L) Minimum	5.87	5.73	6.09	5.81	5.7	5.35	7.19	5.74	6.5	6.1	6.13	6.29
Color (Pt-Co Units) Average Monthly	20	26	26	34	62	34	25	24	21	20	18	15
Color (Pt-Co Units) Daily Maximum	25	30	30	40	70	40	30	25	25	25	20	15
Color (Pt-Co Units) Instantaneous Maximum	25	30	30	40	70	40	30	25	25	25	20	15
BOD5 (lbs/day) Average Monthly	< 2.7	< 3.9	< 3.2	< 3.2	< 3.3	< 2.4	< 3.6	< 2.5	< 2.2	< 2.8	< 2.6	< 2.9
BOD5 (lbs/day) Daily Maximum	3.3	8.8	< 3.6	< 3.6	< 4.1	< 2.9	4.5	< 3.6	< 2.9	< 3.0	< 3.1	< 3.8
BOD5 (mg/L) Average Monthly	< 2.5	< 3.9	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.4	< 2.8
BOD5 (mg/L) Daily Maximum	2.7	9.7	< 2.4	< 2.4	< 2.4	2.5	2.5	2.5	< 2.4	< 2.4	2.4	< 3.0
TSS (lbs/day) Average Monthly	2.4	7.3	3.9	4.2	4.9	6.8	7.8	6.8	2.3	1.8	3.1	3.6
TSS (lbs/day) Daily Maximum	4.2	28.2	7.6	6.8	12.7	15.3	16.5	10.5	3.6	2.5	4.4	7.6
TSS (mg/L) Average Monthly	2.3	8.2	2.8	3.0	3.9	7.3	5.4	7.8	2.5	1.6	2.8	3.3
TSS (mg/L) Daily Maximum	4.0	31.0	5.0	5.0	12.0	17.0	13.0	18.0	3.0	2.0	4.0	6.0
Total Dissolved Solids (lbs/day) Average Monthly	1682	1596	1894	2146	3096	1569	1802	1482	1315	1692	1449	1391

Total Dissolved Solids (lbs/day) Daily Maximum	1725	2193	2255	2410	4199	2017	2212	2415	1683	1833	1726	1723
Total Dissolved Solids (mg/L) Average Monthly	1566.0	1488.0	1431.0	1602.0	2258.0	1547.0	1194.0	1409.0	1460.0	1464.0	1328.0	1335.0
Total Dissolved Solids (mg/L) Daily Maximum	1770.0	1565.0	1546.0	1646.0	2868.0	1674.0	1240.0	1606.0	1516.0	1524.0	1398.0	1368.0
Osmotic Pressure (mOs/kg) Average Monthly	53	53	50	50	61	50	42	43	47	50	44	44
Osmotic Pressure (mOs/kg) Daily Maximum	54	55	51	52	72	53	44	44	49	51	46	45
Oil and Grease (lbs/day) Average Monthly	< 5.5	< 4.8	< 6.0	< 6.4	< 6.8	< 5.1	< 6.3	< 5.9	< 4.6	< 5.9	< 11.3	< 5.2
Oil and Grease (mg/L) Average Monthly	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 8.8	< 5.3
Nitrate-Nitrite (mg/L) Average Monthly	< 0.6	< 0.8	< 0.4	< 0.4	< 1.6	< 0.8	< 1.3	< 1.46	1.72	< 2.0	< 0.82	< 0.40
Nitrate-Nitrite (lbs) Total Monthly	< 22	< 24	< 15	< 16	< 63	< 26	< 52	< 50	< 59	< 47	< 29	< 11
Total Nitrogen (lbs/day) Average Monthly	< 7.9	< 7.6	< 1.6	< 1.2	3.0	2.8	< 2.4	< 2.0	1.7	< 2.9	< 1.6	< 1.3
Total Nitrogen (lbs/day) Daily Maximum	28.0	22.1	< 2.0	< 2.0	5.0	6.0	5.6	4.8	3.4	10.1	2.3	< 1.9
Total Nitrogen (mg/L) Average Monthly	< 7.1	< 9.7	< 1.3	< 0.9	2.2	2.9	< 1.9	< 1.7	1.9	< 2.3	< 1.3	< 1.3
Total Nitrogen (mg/L) Daily Maximum	27.0	28.6	< 1.3	< 1.3	4.0	6.7	4.4	3.2	3.0	7.4	1.9	< 1.3
Total Nitrogen (lbs) Effluent Net Total Monthly	< 245.3	< 236.3	< 49.3	< 38.5	89	85.3	< 75.8	< 58.5	52.5	< 86.1	< 49.6	< 37.1
Total Nitrogen (lbs) Total Monthly	245.3	< 236.3	< 49.3	< 38.5	89	85.3	< 75.8	< 58.5	52.5	< 86.1	< 49.6	< 37.1
Total Nitrogen (lbs) Effluent Net Total Annual					< 00							
Total Nitrogen (lbs) Total Annual					< 1006							
Ammonia (lbs/day) Average Monthly	< 5.2	< 4.9	< 0.2	< 0.1	< 0.1	< 0.4	< 0.3	< 0.3	< 0.09	< 0.7	< 0.1	< 0.1

Ammonia (lbs/day) Daily Maximum	20.7	17.3	0.4	< 0.2	< 0.2	1.4	1.2	1.2	< 0.1	4.9	< 0.2	< 0.1
Ammonia (mg/L) Average Monthly	< 4.7	< 6.5	< 0.1	< 0.1	< 0.1	< 0.4	< 0.3	< 0.2	< 0.1	< 0.6	< 0.1	< 0.1
Ammonia (mg/L) Daily Maximum	20.0	21.0	0.29	< 0.1	< 0.1	1.5	1.2	0.82	< 0.1	3.6	< 0.1	< 0.1
Ammonia (lbs) Total Monthly	162.5	< 152.1	< 5.7	< 4.0	< 4.1	< 12.4	< 10.8	< 8.4	< 2.8	< 21.9	< 3.7	< 2.9
Ammonia (lbs) Total Annual					< 80							
TKN (mg/L) Average Monthly	< 5.7	< 9	< 0.5	< 0.63	1.14	< 1.44	< 0.78	< 0.66	< 0.52	< 0.92	< 0.5	< 0.5
TKN (lbs) Total Monthly	< 197	< 222	< 19	< 25	47	< 43	< 32	< 0.8	< 15	< 34	< 19	< 14
Total Phosphorus (lbs/day) Average Monthly	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.09	< 0.1	< 0.1	< 0.1
Total Phosphorus (lbs/day) Daily Maximum	< 0.1	< 0.1	0.2	0.2	0.2	0.2	< 0.2	0.4	< 0.1	< 0.1	< 0.2	< 0.1
Total Phosphorus (mg/L) Average Monthly	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Phosphorus (mg/L) Daily Maximum	< 0.1	< 0.1	0.15	0.16	0.15	0.2	< 0.1	0.42	< 0.1	< 0.1	< 0.1	< 0.1
Total Phosphorus (lbs) Effluent Net Total Monthly	< 3.4	< 3.1	< 4.0	< 4.3	< 4.5	< 3.6	< 4.3	< 4.4	< 2.8	< 3.5	< 3.7	< 2.9
Total Phosphorus (lbs) Total Monthly	< 3.4	< 3.1	< 4.0	< 4.3	< 4.5	< 3.6	< 4.3	< 4.4	< 2.8	< 3.5	< 3.7	< 2.9
Total Phosphorus (lbs) Effluent Net Total Annual					< -2							
Total Phosphorus (lbs) Total Annual					< 42							
Total Aluminum (lbs/day) Average Monthly	0.400	0.400	0.500	0.700	1.082	1.464	0.600	0.600	0.500	0.600	0.400	0.300
Total Aluminum (lbs/day) Daily Maximum	0.500	0.600	0.700	0.800	1.557	1.749	0.800	0.700	0.600	0.700	0.500	0.600
Total Aluminum (mg/L) Average Monthly	0.398	0.380	0.450	0.518	0.792	1.488	0.505	0.518	0.555	0.478	0.344	0.313

Total Aluminum (mg/L) Daily Maximum	0.440	0.450	0.550	0.610	0.950	1.900	0.670	0.590	0.680	0.520	0.390	0.410
Total Copper (lbs/day) Average Monthly	0.03	0.04	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.040	0.04	0.03
Total Copper (lbs/day) Daily Maximum	0.04	0.06	0.04	0.03	0.05	0.05	0.04	0.04	0.03	0.06	0.05	0.04
Total Copper (mg/L) Average Monthly	0.026	0.04	0.028	0.018	0.016	0.032	0.025	0.024	0.025	0.032	0.03	0.027
Total Copper (mg/L) Daily Maximum	0.034	0.051	0.036	0.023	0.029	0.041	0.031	0.025	0.028	0.046	0.036	0.031
Dissolved Iron (lbs/day) Average Monthly	0.100	0.090	0.100	0.100	0.100	0.080	0.090	0.100	0.080	0.100	0.100	0.100
Dissolved Iron (lbs/day) Daily Maximum	0.100	0.100	0.200	0.200	0.200	0.100	0.100	0.100	0.100	0.200	0.200	0.100
Dissolved Iron (mg/L) Average Monthly	0.100	0.092	0.100	0.110	0.110	0.080	0.070	0.092	0.090	0.120	0.100	0.110
Dissolved Iron (mg/L) Daily Maximum	0.110	0.110	0.120	0.170	0.130	0.080	0.080	0.110	0.090	0.130	0.110	0.110
Total Iron (lbs/day) Average Monthly	0.100	0.100	0.010	0.200	0.200	0.100	0.090	0.100	0.090	0.100	0.100	0.100
Total Iron (lbs/day) Daily Maximum	0.100	0.100	0.010	0.300	0.200	0.200	0.100	0.200	0.100	0.200	0.200	0.200
Total Iron (mg/L) Average Monthly	0.100	0.108	0.093	0.120	0.122	0.116	0.073	0.116	0.098	0.125	0.102	0.115
Total Iron (mg/L) Daily Maximum	0.120	0.180	0.110	0.220	0.150	0.140	0.100	0.140	0.110	0.150	0.110	0.130
Total Lead (lbs/day) Average Monthly	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0009	< 0.001	< 0.001	< 0.001
Total Lead (lbs/day) Daily Maximum	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.002	< 0.001
Total Lead (mg/L) Average Monthly	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Lead (mg/L) Daily Maximum	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Manganese (lbs/day) Average Monthly	0.02	0.02	< 0.008	< 0.01	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02
Total Manganese (lbs/day) Daily Maximum	0.07	0.04	0.01	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.08	0.04
Total Manganese (mg/L) Average Monthly	0.022	0.022	< 0.007	< 0.012	0.019	0.022	0.015	0.021	0.021	0.018	0.021	0.024

Total Manganese (mg/L) Daily Maximum	0.065	0.078	0.009	0.019	0.025	0.026	0.018	0.038	0.029	0.023	0.046	0.033
Total Zinc (lbs/day) Average Monthly	0.006	< 0.005	< 0.006	0.007	0.009	0.010	0.007	0.009	0.005	0.007	0.007	0.005
Total Zinc (lbs/day) Daily Maximum	0.008	< 0.007	< 0.007	0.010	0.010	0.010	0.008	0.020	0.006	0.010	0.008	0.007
Total Zinc (mg/L) Average Monthly	0.0060	< 0.0060	< 0.0050	0.0060	0.0060	0.0100	0.0050	0.0070	0.0060	0.0060	0.0050	0.0060
Total Zinc (mg/L) Daily Maximum	0.0080	0.0080	< 0.0050	0.0080	0.0090	0.0140	0.0050	0.0110	0.0060	0.0070	0.0050	0.0070

DMR Data for Outfall 002 (from February 1, 2021 to January 31, 2022)

Parameter	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21
Flow (MGD) Average Monthly	0.00255	0.00177	0.00196	0.00168	0.00221	0.00177	0.00239	0.00191	0.00165	0.00216	0.00249	0.00224
Flow (MGD) Daily Maximum	0.00355	0.00353	0.00357	0.00354	0.00354	0.00281	0.00351	0.00352	0.00355	0.00518	0.00394	0.00442
pH (S.U.) Minimum	6.86	7.22	7.01	6.78	7.16	7.2	6.87	7.22	6.94	6.94	6.94	7.08
pH (S.U.) Instantaneous Maximum	7.89	7.73	7.73	7.98	7.77	7.78	7.76	8.03	7.74	7.41	7.66	7.7
DO (mg/L) Minimum	5.87	5.73	6.09	5.4	5.7	5.35	7.19	5.74	6.08	6.1	6.13	6.29
CBOD5 (mg/L) Average Monthly	< 2.0	< 2.0	< 4.0	6.0	< 2.0	< 2.0	< 5.0	< 5.0	2.0	< 2.0	14.0	9.0
TSS (mg/L) Average Monthly	4.0	5.5	8.5	2.0	4.0	8.0	13.0	12.0	3.5	9.0	63.0	19.0
Fecal Coliform (CFU/100 ml) Geometric Mean	< 1	< 1	< 1	< 2	2	< 1	< 1	< 1	< 1	< 1	4	< 1
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	< 1	< 1	< 1	3.0	5	1	< 1	< 1	< 1	< 1	5	< 1
UV Transmittance (%) Minimum	1.7	2.1	1.9	2.7	2.5	2.8	2.7	2.5	2.3	2.2	2.2	1.7
UV Transmittance (%) Average Monthly	2.9	3.5	4.3	4.7	4.9	4.5	4.4	3.9	3.6	3.6	3.2	2.5
Nitrate-Nitrite (mg/L) Average Monthly	92	93	87	76	86	109	103	< 97.4	108	102	77	82
Nitrate-Nitrite (lbs) Total Monthly	67	56	59	46	< 63.3	71	74	< 65.3	64	81	65	55

Total Nitrogen (mg/L) Average Monthly	92	93	87	75.75	86	109	102.71	97	108	102	78.7	82
Total Nitrogen (lbs) Effluent Net Total Monthly	67	56	59	46	63	71	74	65	64	81	66	55
Total Nitrogen (lbs) Total Monthly	67	56	59	46	63	71	74	65	64	81	66	55
Total Nitrogen (lbs) Effluent Net Total Annual					< 00							
Total Nitrogen (lbs) Total Annual					< 769							
Ammonia (mg/L) Average Monthly	< 0.1	< 0.1	< 0.11	< 0.1	< 0.1	< 0.1	< 0.41	< 0.14	< 0.1	< 0.1	< 0.28	< 0.11
Ammonia (lbs) Total Monthly	< 0.07	< 0.06	< 0.07	< 0.06	< 0.07	< 0.07	< 0.3	< 0.09	< 0.06	< 0.1	< 0.2	< 0.07
Ammonia (lbs) Total Annual					< 1							
TKN (mg/L) Average Monthly	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	< 0.5	< 0.5	< 1.9	< 0.5
TKN (lbs) Total Monthly	< 0.4	< 0.3	< 0.3	< 0.3	< 0.4	< 0.3	< 0.5	< 0.3	< 0.3	< 0.4	< 2	< 0.3
Total Phosphorus (mg/L) Average Monthly	12	11.9	11.2	12	12	12.2	13	14	14	14	12	9.8
Total Phosphorus (lbs) Effluent Net Total Monthly	9	7	7	7	9	8	9	10	8	11	10	7
Total Phosphorus (lbs) Total Monthly	9	7	7	7.0	9	8	9	10	8	11	10	7
Total Phosphorus (lbs) Effluent Net Total Annual					-2							
Total Phosphorus (lbs) Total Annual					99							

DMR Data for Outfall 004 (from February 1, 2021 to January 31, 2022)

Parameter	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21
pH (S.U.) Other Stormwater Daily Maximum		8.1										
DO (mg/L) Other Stormwater Daily Maximum		8.37										

CBOD5 (mg/L) Other Stormwater Daily Maximum		< 4										
TSS (mg/L) Other Stormwater Daily Maximum		4										

DMR Data for Outfall 007 (from February 1, 2021 to January 31, 2022)

Parameter	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21
pH (S.U.) Other Stormwater Daily Maximum		7.8										
DO (mg/L) Other Stormwater Daily Maximum		6.67										
CBOD5 (mg/L) Other Stormwater Daily Maximum		4.8										
TSS (mg/L) Other Stormwater Daily Maximum		4										

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.217
Latitude 40º 1' 4.00" **Longitude** -77º 13' 18.00"
Wastewater Description: IW Process Effluent without ELG

Technology-Based Limitations

Technology-based (BAT) effluent limits for IW discharge as follows:

Parameter	Monthly Avg. (mg/L)	Daily Max. (mg/L)	IMAX. (mg/L)	
pH	6-9 S.U. at all times			
D.O.	5.0 Minimum			25 Pa. Code 93.7
Total Suspended Solids	10	20	25	40 CFR 125.3
BOD_5	10	20	25	WQM 7.0, version 1.1
NH_3-N (May 1- Oct 31)	2.0	4.0	5.0	WQM 7.0, version 1.1
NH_3-N (Nov 1 – Arp 30)	6.0	12	15.0	WQM 7.0, version 1.1
Total Nitrogen	12.0	24.0	30.0	TBEL
Total Phosphorus	0.5	1.0	1.25	TBEL
Oil and Grease	----	15.0	30.0	25 Pa. Code 95.2(2) (iii)
Color (Pt-Co Units)	91	182	228	25 Pa Code 93.7(a)
Dissolved Iron	0.363	0.566	0.908	TMS, Version 1.3
Total Aluminum	0.582	0.908	1.455	TMS, Version 1.3
Total Zinc	0.092	0.138	0.23	TMS, Version 1.3

Water Quality-Based Limitations

Carbonaceous Biochemical Oxygen Demand ($CBOD_5$):
The attached computer printout of the WQM 7.0 stream model (version 1.1) indicates that a monthly average limit of 25.0 mg/L, or secondary treatment, is adequate to protect the water quality of the stream, (this factsheet, page 25).

The U.S. EPA promulgated federal Effluent Limitation Guidelines (ELGs) for BOD_5 for fruit processing wastewater; however, the ELGs were written for “existing dischargers” and “new source” fruit processors. Knouse Foods is an existing source, but new discharger; therefore, the ELGs are not applicable and a technology analysis, using the BCT standard for conventional pollutants, is required for BOD_5 per 40 CFR § 125.3.

A Technology Based Effluent Limitation (TBEL) analysis was conducted for BOD_5. The results of that analysis, found in page 61 of this factsheet, show that BOD_5 effluent concentrations can consistently be obtained with anaerobic treatment technology paired with an aerobic membrane bioreactor system using ultrafiltration (UF) membranes. Based on the result of the analysis an average monthly and maximum daily limit of 10.0 mg/L and 20.0 mg/L, respectively, with a weekly 24-hour composite sample type. An instantaneous maximum limit of 25.0 mg/L is also recommended based on the industrial multiplier of 2.5 found in the Technical Guidance for the Development and Specification of Effluent Limitations and other Permit Conditions in NPDES Permits (Doc. No. 362-0400-001, 10/97). Mass limits are calculated as follows:

Average monthly mass limit: 10.0 mg/L x 0.217 MGD x 8.34 = 18.1 lbs/day
Average weekly mass limit: 20.0 mg/L x 0.217 MGD x 8.34 = 36.2 lbs/day

Recent DMRs and inspection reports show that the facility has been consistently achieving these limits.

Ammonia (NH_3-N):
NH_3N calculations are based on the Department’s Implementation Guidance of Section 93.7 Ammonia Criteria, dated 11/4/97 (ID No. 391-2000-013). The following data is necessary to determine the in-stream NH_3-N criteria used in the attached WQM 7.0 computer model of the stream:

* Discharge pH = 7.0 (Default)
* Discharge Temperature = 20°C (Default)
* Stream pH = 7.0 (Default)
* Stream Temperature = 20ºC (Default)
* Background NH_3-N = 0 mg/L (Default)

The model input data and results are attached. The printout of the WQM 7.0 model (version 1.1) indicates that at a discharge of 0.217 MGD, limits of 2.95 mg/l as monthly average and 5.9 mg/l as IMAX limit during summer are to protect water quality standards. However, the existing permit limits of 2.0 mg/l as monthly average, 4.0 mg/l as daily maximum, and 5.0 mg/l as instantaneous maximum NH_3-N are more stringent and will remain in the proposed permit. The winter effluent limit will be set at three-times the summer limits. Recent DMRs and inspection reports indicate that the facility has been consistently achieving these limits. Mass limits are calculated as follows:

Summer average monthly mass limit: 2.0 mg/L x 0.217 MGD x 8.34 = 3.6 lbs/day
Summer daily maximum mass limit: 4.0 mg/L x 0.217 MGD x 8.34 = 7.2 lbs/day
Winter average monthly mass limit: 6.0 mg/L x 0.217 MGD x 8.34 = 10.9 lbs/day
Winter daily maximum mass limit: 12.0 mg/L x 0.217 MGD x 8.34 = 21.7 lbs/day

Color:
The existing permit Color limit of 91 (Pt-Co Units) average monthly, 182 (Pt-Co Units) daily minimum, and 228 (Pt-Co Units) IMAX will remain in the proposed permit.

pH:
25 Pa. Code § 95.2(1) requires effluent pH limits of 6.0 to 9.0 S.U. at all times in effluent.

Dissolved Oxygen (D.O.):
A minimum D.O. of 5.0 mg/L is required per 25 Pa. Code § 93.7. It is recommended that this limit be maintained in the proposed permit to ensure the protection of water quality standards. This approach is consistent with DEP's current Standard Operating Procedure (SOP) No. BPNPSM-PMT-033 and has been applied to other point source dischargers throughout the state.

Total Suspended Solids (TSS):
The existing technology-based limits of 10.0 mg/L average monthly, 20.0 mg/L daily maximum, and 25.0 mg/L (IMAX) will remain in the proposed permit. Recent DMRs and inspection reports show that the facility has been consistently achieving these limits. Mass limits are calculated as follows:

Average monthly mass limit: 10.0 mg/L x 0.217 MGD x 8.34 = 18.1 lbs/day
Daily maximum mass limit: 20.0 mg/L x 0.217 MGD x 8.34 = 36.2 lbs/day

Oil and Grease:
An Oil and Grease limit of 15.0 mg/L daily average and 30.0 mg/L instantaneous maximum is required for industrial wastewaters per 25 Pa. Code § 95.2(2)(iii). These limits will remain in the proposed permit with a sample frequency of quarterly. Recent DMRs and inspection reports show that the facility has been consistently achieving these limits. During the next permit renewal cycle, the need for oil & grease monitoring in the permit will be re-evaluated. Mass limits are calculated as follows:

Average daily mass limit: 15.0 mg/L x 0.217 MGD x 8.34 = 27.1 lbs/day

Total Residual Chlorine (TRC):
The facility history of outfall 001 had no issues in regard to the presence of TRC in the effluent. Therefore, no monitoring of TRC is necessary.

Osmotic Pressure:
As per 25 Pa Code 93.7, the in-stream Osmotic Pressure (OP) Maximum is 50 milliosmoles per kg (mOsm/kg). Prior to dilution by the receiving tributary to Bermudian Creek, Osmotic Pressure as measured at Outfall No. 001 (Peach Glen Fruit Processing Facility, NPDES Renewal, p. 28) has a long-term average of 50 mOsm/kg, a Maximum Average Monthly Value of 69 mOsm/kg, and a Min/Max Daily Value of 127 mOsm/kg, all statistically significant given the 52 analyses. From this perspective, a monitor and report approach will replace the previous Osmotic pressure limits of 59 mOsm/kg average monthly, 92 mOsm/kg maximum daily, and instantaneous maximum limit of 147 mOsm/kg calculated by 2.5 multiplier of the amount of average monthly. The rationale is that the reported statistically significant long-term average of 50 mOsm/kg at the outfall prior to dilution does not exceed the in-stream regulatory OP Maximum.

Toxics:
The following input data were used for Toxic Management Spreadsheet (TMS) Analysis:

- Discharge pH = 8.37 (Application)
- Stream pH = 7.0 (Default)
- Discharge Hardness = 62.0 mg/l (Application)
- Stream Hardness = 100 mg/l (Default)

This data was analyzed based on the guidelines found in DEP's Water Quality Toxics Management Strategy (Document No. 361-0100-003) and DEP's SOP No. BPNPSM-PMT-033. Spreadsheet results are attached to this fact sheet. The Toxics Management Spreadsheet uses the following logic:

a. Establish average monthly and IMAX limits in the draft permit where the maximum reported concentration exceeds 50% of the WQBEL.
b. For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.
c. For conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 10%-50% of the WQBEL.

DEP's Toxics Management spreadsheet was utilized to perform a reasonable potential analysis and develop water quality effluent limits for toxic pollutants. The analysis shows that all existing limits for toxic pollutants that are included in the permit are still protective of water quality, except for Total Selenium, Lead and Copper. Therefore, the limits or monitoring and reporting requirements for Total Selenium, Lead and Coper are necessary additions to the proposed permit.

Dissolved Iron:
The TMS analysis results indicated Dissolved Iron limit of 0.424 mg/l (424 µg/l) average monthly. However, the existing permit has Dissolved Iron limit of 0.363 mg/l average monthly, 0.566 mg/l daily maximum, and 0.908 mg/l IMAX which are more stringent. Due to anti-backsliding requirements, these limits will remain in the proposed permit. Mass limits are calculated as follows:

Average monthly mass limit: 0.363 mg/L x 0.217 MGD x 8.34 = 0.657 lbs/day
Daily maximum mass limit: 0.566 mg/L x 0.217 MGD x 8.34 = 1.024 lbs/day

Total Aluminum:
The TMS analysis results indicated Total Aluminum limit of 0.750 mg/l (750 µg/l) average monthly. However, the existing permit has Total Aluminum limit of 0.582 mg/l average monthly, 0.908 mg/l daily maximum, and 1.455 mg/l IMAX which are more stringent. Due to anti-backsliding requirements, these limits will remain in the proposed permit. Mass limits are calculated as follows:

Average monthly mass limit: 0.582 mg/L x 0.217 MGD x 8.34 = 1.053 lbs/day
Daily maximum mass limit: 0.908 mg/L x 0.217 MGD x 8.34 = 1.643 lbs/day

Total Manganese:
The TMS analysis results indicated Total Manganese limit of report average quarterly and will be in the proposed permit based on the fact that DEP protects for all water uses, not just the critical uses stated in 25 Pa. Code § 93.7. During the next permit renewal cycle, the need for manganese monitoring in the permit will be re-evaluated.

Total Iron:
The TMS analysis results indicated Total Iron limit of report average monthly. However, the existing permit has Total Iron limit of 1.815 mg/l average monthly, 2.832 mg/l daily maximum, and 4.538 mg/l IMAX will remain in the proposed permit with a sample frequency of quarterly, due to anti-backsliding requirements. During the next permit renewal cycle, the need for total iron monitoring in the permit will be re-evaluated. Mass limits are calculated as follows:

Average monthly mass limit: 1.815 mg/L x 0.217 MGD x 8.34 = 3.285 lbs/day
Daily maximum mass limit: 2.832 mg/L x 0.217 MGD x 8.34 = 5.125 lbs/day

Total Zinc:
The existing permit has Total Zinc limit of 0.0929 mg/l average monthly, 0.1450 mg/l daily maximum, and 0.2322 mg/l IMAX. However, the TMS analysis results indicated Total Zinc limit of 0.092 mg/L average monthly which is slightly more stringent and will be in the proposed permit. Using the multiplier of 1.5 yields a daily maximum limit (0.092 x 1.5) 0.138 mg/l and the multiplier of 2.5 yields an IMAX limit (0.092 x 2.5) 0.23 mg/l. Mass limits are calculated as follows:

Average monthly mass limit: 0.092 mg/L x 0.217 MGD x 8.34 = 0.166 lbs/day
Daily maximum mass limit: 0.138 mg/L x 0.217 MGD x 8.34 = 0.250 lbs/day

Total Copper:
Based on the TMS model results, a Total Copper limit of 10.1 ug/L average monthly, 14.7 ug/L daily maximum, and 14.7 ug/L IMAX are recommended and will be in the proposed permit. Using the multiplier of 1.5 yields a daily maximum limit (10.1 x 1.5) 15.2 ug/l and the multiplier of 2.5 yields an IMAX limit (10.1 x 2.5) 25.2 ug/l. Mass average monthly of 0.018 lbs/day and daily maximum of 0.0275 (0.028) lbs/day are also in the proposed permit.

However, the facility requests a delay for total copper to compliance schedule of same timeframe as proposed for newly imposed temperature effluent limitations, (Knouse's draft comments dated 1/31/2022). The Department agrees the monitor & report requirements will be added to proposed permit from Permit effective date through Startup of New or Upgraded Facilities, and compliance from Startup of New or Upgraded Facilities through Permit Expiration Date.

Total Lead:
Based on the TMS model results, a Total Lead limit of 3.02 ug/L average monthly, 4.71 ug/L daily maximum, and 7.54 ug/L IMAX are recommended and will be in the proposed permit. Mass average monthly of 0.005 lbs/day and daily maximum of 0.009 lbs/day are also in the proposed permit with a sample frequency of quarterly.

Total Selenium:
Based on the TMS model results, a Total Selenium limit of 7.05 ug/L average monthly, 11.0 ug/L daily maximum, and 17.6 ug/L IMAX are recommended and will be added in the proposed permit. Mass average monthly of 0.013 lbs/day and daily maximum of 0.02 lbs/day are also add in the proposed permit.

However, the facility requests a delay for total selenium to compliance schedule of same timeframe as proposed for newly imposed temperature effluent limitations, (Knouse's draft comments dated 1/31/2022). The Department agrees the monitor & report requirements will be added to proposed permit from Permit effective date through Startup of New or Upgraded Facilities, and compliance from Startup of New or Upgraded Facilities through Permit Expiration Date.

Total Dissolved Solids (TDS):
Total Dissolved Solids and its major constituents including Bromide, Chloride, and Sulfate have become statewide pollutants of concern and threats to DEP's mission to prevent violations of water quality standards. The requirement to monitor these pollutants is necessary under the following DEP Central Office directive:

For point source discharges and upon issuance or reissuance of an individual NPDES permit:

- *Where the concentration of TDS in the discharge exceeds 1,000 mg/L, or the net TDS load from a discharge exceeds 20,000 lbs/day, and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for TDS, sulfate, chloride, and bromide. Discharges of 0.1 MGD or less should monitor and report for TDS, sulfate, chloride, and bromide if the concentration of TDS in the discharge exceeds 5,000 mg/L.*
- *Where the concentration of bromide in a discharge exceeds 1 mg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for bromide. Discharges of 0.1 MGD or less should monitor and report for bromide if the concentration of bromide in the discharge exceeds 10 mg/L.*

The maximum daily TDS discharge reported in the application is 1,750 mg/l, Chloride reported is 150 mg/l, Bromide reported is < 0.5 mg/l and Sulfate reported is 140 mg/l. The monitoring for TDS, Chloride, Bromide, and Sulfate are not required per Toxic Management Spreadsheet Analysis Table. Therefore, no monitoring requirements are necessary.

Total Nitrogen (TN):
Based on Technology Based Effluent Limitation (TBEL) analysis (*Reference pages # 61 of this factsheet*), the existing permit an average monthly TN concentration of 8.0 mg/L, 16.0 mg/l daily maximum, and 20.0 mg/l IMAX will remain in the proposed permit. Mass average monthly of 26.7 lbs/day, and daily maximum of 53.4 lbs/day are also in the proposed permit.

Total Phosphorus (TP):
Based on Technology Based Effluent Limitation (TBEL) analysis (*Reference pages # 61 of this factsheet*), the existing permit average monthly TP concentration of 0.5 mg/L, 1.0 mg/l daily maximum, and 1.25 mg/l IMAX will remain in the proposed permit. Mass average monthly of 1.7 lbs/day, and daily maximum of 3.3 lbs/day are also in the proposed permit.

Chesapeake Bay Strategy (Total Nitrogen & Total Phosphorus):
Total Nitrogen (TN) and Total Phosphorus (TP) contribute to the water quality impairment of the Chesapeake Bay. In an effort to restore the water quality within the Chesapeake Bay, the U.S. EPA created a TMDL for the Bay for TN and TP. Prior to the creation of this TMDL, Pennsylvania, in an effort to meet water quality requirements in Maryland, created the Chesapeake Bay Tributary Strategy, which was subsequently updated as the Pennsylvania Watershed Implementation Plan. The original Bay strategy created a nutrient credit trading program for TN and TP and allocated loading to existing dischargers at the time of development. The strategy also required that any new dischargers after the allocation of TN and TP loading be required to meet a net zero nutrient discharge. Since Knouse Foods is pursuing a stream discharge and the plan does not allow for allocation of nutrient loading to facilities that currently use irrigation, Knouse Foods must purchase credits to offset their nutrient discharge into Bermudian Creek and eventually the Chesapeake Bay. However, a technology assessment, using the BAT standard for non-conventional pollutants, was conducted for TN and TP in order to determine whether TBELs could be established for the Knouse Foods discharge.

This facility is classified as a non-significant discharger, however, TN series (ammonia-nitrogen, nitrate-nitrite, TKN) and TP monitoring were included into the last permit and will remain in the proposed permit, and Zero (0) for cap load for TN & TP will remain in the proposed permit.

Temperature:

The discharge is to a stream segment that has a stream designation of warm water fishes, and existing cold-water fishes. For this permit renewal, DEP's evaluation of the monthly or semi-monthly effluent temperature for wasteload allocations (WLAs) are derived from DEP's Thermal Discharge Limit (TDL) worksheet and is summarized in the table below.

Average Temperature													
Months	**2019 °F**			**2020 °F**			**2021 °F**			**Ambient Stream Temperature (°F) (Site-specific data)**	**Recommended WLAs under each aquatic life use(s)**		**Most Stringent**
	At outfall 001	**Up**	**Down**	**At outfall 001**	**Up**	**Down**	**At outfall 001**	**Up**	**Down**		**Warm Water Fishes (°F)**	**Cold Water Fishes (°F)**	
Jan 1-31	77.2	39.2	40.1	77.3	39.8	42.5	76.2	35.8	49.1	40	**42.3**	**42.3**	**42.3**
Feb 1-29	75.4	38.5	40.0	78.5	39.3	43.7	75.4	33.2	45.3	40	**42.5**	**42.5**	**42.5**
Mar 1-31	78.6	40.9	42.1	79.7	44.4	48.7	79.3	43.7	46.3	45	**48.9**	**48.9**	**48.9**
Apr 1-15	84.5	47.6	48.4	82.4	47.9	46.6	80.1	48.5	52.4	49	**63.6**	**53.9**	**53.9**
Apr 16-30	84.1	51.5	52.3	82.3	47.6	49.8	78.8	49.2	53.4	52	**81.3**	**56.9**	**56.9**
May 1-15	87.0	54.6	55.3	85.0	50.1	51.7	84.3	51.8	56.3	55	**83.1**	**58.1**	**58.1**
May 16-31	88.1	56.7	57.1	88.3	56.4	61.7	84.5	56.2	60.5	59	**99.6**	**62.1**	**62.1**
Jun 1-15	No data	No data	No data	88.0	61.5	67.6	87.8	61.1	68.1	63	**101.3**	**65.3**	**65.3**
Jun 16-30	No data	No data	No data	87.0	62.7	67.7	87.8	61.9	68.6	67	**105.3**	**69.3**	**69.3**
Jul 1-31	No data	No data	No data	91.0	67.7	78.0	88.9	68.7	77.9	71	**98.3**	**72.7**	**72.7**
Aug 1-15	90.9	65.1	69.4	88.5	70.9	79.2	86.3	67.2	77.1	71	**96.3**	**72.6**	**72.6**
Aug 16-31	89.4	64.6	71.0	89.2	68.0	81.2	90.0	69.6	79.2	70	**96.9**	**71.6**	**71.6**
Sep 1-15	90.0	63.4	72.5	91.2	65.5	80.5	89.0	63.9	69.9	66	**92.3**	**67.5**	**67.5**
Sep 16-30	89.0	57.0	72.4	88.4	56.2	77.5	86.8	62.2	66.6	63	**84.9**	**64.5**	**64.5**
Oct 1-15	80.3	56.7	63.1	85.8	54.8	73.5	88.5	61.2	66.9	62	**77.0**	**63.5**	**63.5**
Oct 16-31	84.1	52.9	60.5	86.6	53.5	74.6	85.7	56.3	64.9	57	**70.5**	**58.5**	**58.5**
Nov 1-15	81.4	41.7	50.1	84.4	48.6	64.9	81.9	49.0	56.8	49	**64.0**	**50.7**	**50.7**
Nov 16-30	81.3	41.8	48.7	82.6	44.1	60.5	80.3	44.9	51.5	44	**54.0**	**45.7**	**45.7**
Dec 1-31	78.0	39.8	43.3	77.7	38.1	50.0	79.6	44.2	50.7	40	**44.0**	**42.0**	**42.0**

Although the facility reported monthly temperatures at outfall 001, upstream, & downstream (for years 2019 except June & July; 2020; and 2021), data is very limited. Therefore, DEP used the ambient stream temperature (site-specific data) which either the default value or the highest upstream temperature that facility collected in the time period rounded up to the next degree in the table above to run the thermal model for warm & cold fishes for this review, and recommended WLAs under cold water fishes for temperature permit limits requirements due it is more stringent.

A review of the past years DMRs show that facility temperatures at discharge point were higher than the new temperature limits. Therefore, the facility is subject to the temperature limits requirements, and the facility will need to develop a plan to achieve the new temperature limits requirements 3 years after the effective date of the permit.

From DEP's Guidance 362-0400-001, Table 6-4, for process wastewater with discharge flows greater than 100,000 gpd, a sample type of immersion stabilization (I-S) and a monitoring frequency of 1/day should be used. These monitoring requirements will be included in the proposed permit. DEP will use five years of data in the next renewal.

Facility:	**Knouse Foods-Peach Glen Fruit**
Permit Number:	PA0262072
Stream Name:	Unnamed Tributary to Bermudian Creek
Analyst/Engineer:	H. Le
Stream Q7-10 (cfs):	0.14

	Facility Flows				**Stream Flows**			
	Intake (Stream) (MGD)	Intake (External) (MGD)	Consumptive Loss (MGD)	Discharge Flow (MGD)	PMF	Upstream Stream Flow (cfs)	Adjusted Stream Flow (cfs)	Downstream Stream Flow (cfs)
Jan 1-31	0	0.217	0	0.217	1.00	0.45	0.45	0.78
Feb 1-29	0	0.217	0	0.217	1.00	0.49	0.49	0.83
Mar 1-31	0	0.217	0	0.217	1.00	0.98	0.98	1.32
Apr 1-15	0	0.217	0	0.217	1.00	1.30	1.30	1.64
Apr 16-30	0	0.217	0	0.217	1.00	1.30	1.30	1.64
May 1-15	0	0.217	0	0.217	1.00	0.71	0.71	1.05
May 16-31	0	0.217	0	0.217	1.00	0.71	0.71	1.05
Jun 1-15	0	0.217	0	0.217	1.00	0.42	0.42	0.76
Jun 16-30	0	0.217	0	0.217	1.00	0.42	0.42	0.76
Jul 1-31	0	0.217	0	0.217	1.00	0.24	0.24	0.57
Aug 1-15	0	0.217	0	0.217	1.00	0.20	0.20	0.53
Aug 16-31	0	0.217	0	0.217	1.00	0.20	0.20	0.53
Sep 1-15	0	0.217	0	0.217	1.00	0.15	0.15	0.49
Sep 16-30	0	0.217	0	0.217	1.00	0.15	0.15	0.49
Oct 1-15	0	0.217	0	0.217	1.00	0.17	0.17	0.50
Oct 16-31	0	0.217	0	0.217	1.00	0.17	0.17	0.50
Nov 1-15	0	0.217	0	0.217	1.00	0.22	0.22	0.56
Nov 16-30	0	0.217	0	0.217	1.00	0.22	0.22	0.56
Dec 1-31	0	0.217	0	0.217	1.00	0.34	0.34	0.67

Please forward all comments to Tom Starosta at 717-787-4317, tstarosta@state.pa.us.

Version 2.0 -- 07/01/2005 Reference: Implementation Guidance for Temperature Criteria, DEP-ID: 391-2000-017

NOTE: The user can only edit fields that are blue.

NOTE: MGD x 1.547 = cfs.

Facility: **Knouse Foods-Peach Glen Fruit**
Permit Number: PA0262072
Stream: Unnamed Tributary to Bermudian Creek

	WWF Ambient Stream Temperature (ºF) (Default)	Ambient Stream Temperature (ºF) (Site-specific data)	Target Maximum Stream Temp.[1] (ºF)	**WWF** Daily WLA[2] (Million BTUs/day)	**WWF** Daily WLA[3] (ºF)	at Discharge Flow (MGD)	**PMF**
Jan 1-31	35	40	41	N/A -- Case 2	42.3	0.217	1.00
Feb 1-29	35	40	41	N/A -- Case 2	42.5	0.217	1.00
Mar 1-31	40	45	46	N/A -- Case 2	48.9	0.217	1.00
Apr 1-15	47	49	52	N/A -- Case 2	63.6	0.217	1.00
Apr 16-30	53	52	58	N/A -- Case 2	81.3	0.217	1.00
May 1-15	58	55	64	N/A -- Case 2	83.1	0.217	1.00
May 16-31	62	59	72	N/A -- Case 2	99.6	0.217	1.00
Jun 1-15	67	63	80	N/A -- Case 2	101.3	0.217	1.00
Jun 16-30	71	67	84	N/A -- Case 2	105.3	0.217	1.00
Jul 1-31	75	71	87	N/A -- Case 2	98.3	0.217	1.00
Aug 1-15	74	71	87	N/A -- Case 2	96.3	0.217	1.00
Aug 16-31	74	70	87	N/A -- Case 2	96.9	0.217	1.00
Sep 1-15	71	66	84	N/A -- Case 2	92.3	0.217	1.00
Sep 16-30	65	63	78	N/A -- Case 2	84.9	0.217	1.00
Oct 1-15	60	62	72	N/A -- Case 2	77.0	0.217	1.00
Oct 16-31	54	57	66	N/A -- Case 2	70.5	0.217	1.00
Nov 1-15	48	49	58	N/A -- Case 2	64.0	0.217	1.00
Nov 16-30	42	44	50	N/A -- Case 2	54.0	0.217	1.00
Dec 1-31	37	40	42	N/A -- Case 2	44.0	0.217	1.00

[1] This is the maximum of the WWF WQ criterion or the ambient temperature. The ambient temperature may be either the design (median) temperature for WWF, or the ambient stream temperature based on site-specific data entered by the user. A minimum of 1ºF above ambient stream temperature is allocated.
[2] The WLA expressed in Million BTUs/day is valid for Case 1 scenarios, and disabled for Case 2 scenarios.
[3] The WLA expressed in ºF is valid only if the limit is tied to a daily discharge flow limit (may be used for Case 1 or Case 2). WLAs greater than 110ºF are displayed as 110ºF.

Facility: **Knouse Foods-Peach Glen Fruit**
Permit Number: PA0262072
Stream: Unnamed Tributary to Bermudian Creek

	CWF Ambient Stream Temperature (ºF) (Default)	Ambient Stream Temperature (ºF) (Site-specific data)	Target Maximum Stream Temp.[1] (ºF)	CWF Daily WLA[2] (Million BTUs/day)	CWF Daily WLA[3] (ºF)	at Discharge Flow (MGD)	PMF
Jan 1-31	34	40	41	N/A -- Case 2	42.3	0.217	1.00
Feb 1-29	35	40	41	N/A -- Case 2	42.5	0.217	1.00
Mar 1-31	39	45	46	N/A -- Case 2	48.9	0.217	1.00
Apr 1-15	46	49	50	N/A -- Case 2	53.9	0.217	1.00
Apr 16-30	52	52	53	N/A -- Case 2	56.9	0.217	1.00
May 1-15	55	55	56	N/A -- Case 2	58.1	0.217	1.00
May 16-31	59	59	60	N/A -- Case 2	62.1	0.217	1.00
Jun 1-15	63	63	64	N/A -- Case 2	65.3	0.217	1.00
Jun 16-30	67	67	68	N/A -- Case 2	69.3	0.217	1.00
Jul 1-31	71	71	72	N/A -- Case 2	72.7	0.217	1.00
Aug 1-15	70	71	72	N/A -- Case 2	72.6	0.217	1.00
Aug 16-31	70	70	71	N/A -- Case 2	71.6	0.217	1.00
Sep 1-15	66	66	67	N/A -- Case 2	67.5	0.217	1.00
Sep 16-30	60	63	64	N/A -- Case 2	64.5	0.217	1.00
Oct 1-15	55	62	63	N/A -- Case 2	63.5	0.217	1.00
Oct 16-31	51	57	58	N/A -- Case 2	58.5	0.217	1.00
Nov 1-15	46	49	50	N/A -- Case 2	50.7	0.217	1.00
Nov 16-30	40	44	45	N/A -- Case 2	45.7	0.217	1.00
Dec 1-31	35	40	41	N/A -- Case 2	42.0	0.217	1.00

[1] This is the maximum of the CWF WQ criterion or the ambient temperature. The ambient temperature may be either the design (median) temperature for CWF, or the ambient stream temperature based on site-specific data entered by the user. A minimum of 1ºF above ambient stream temperature is allocated.

[2] The WLA expressed in Million BTUs/day is valid for Case 1 scenarios, and disabled for Case 2 scenarios.

[3] The WLA expressed in ºF is valid only if the limit is tied to a daily discharge flow limit (may be used for Case 1 or Case 2). WLAs greater than 110ºF are displayed as 110ºF.

WQM 7.0 Data outfall 001:

D.O. Goal: 5.0 mg/L

Node 1: Outfall 001 on Trib. 08741 to Bermudian Creek (08741)
- Elevation: 871.52 ft (USGS National Map Viewer)
- Drainage Area: 0.99 mi^2 (USGS PA StreamStats)
- River Mile Index: 0.26 (PA DEP eMapPA)
- Low Flow Yield: 0.14 cfs/mi^2
- Discharge Flow: 0.217MGD

Node 2: Just before confluence with Bermudian Creek
- Elevation: 852 ft (USGS National Map Viewer)
- Drainage Area: 1.14 mi^2 (USGS PA StreamStats)
- River Mile Index: 0.001 (PA DEP eMapPA)
- Low Flow Yield: 0.14 cfs/mi^2
- Discharge Flow: 0.000 MGD

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.99	square miles
BSLOPD	Mean basin slope measured in degrees	5.0115	degrees
ROCKDEP	Depth to rock	5	feet
URBAN	Percentage of basin with urban development	8.0965	percent

Low-Flow Statistics Parameters [99.9 Percent (0.989 square miles) Low Flow Region 1]

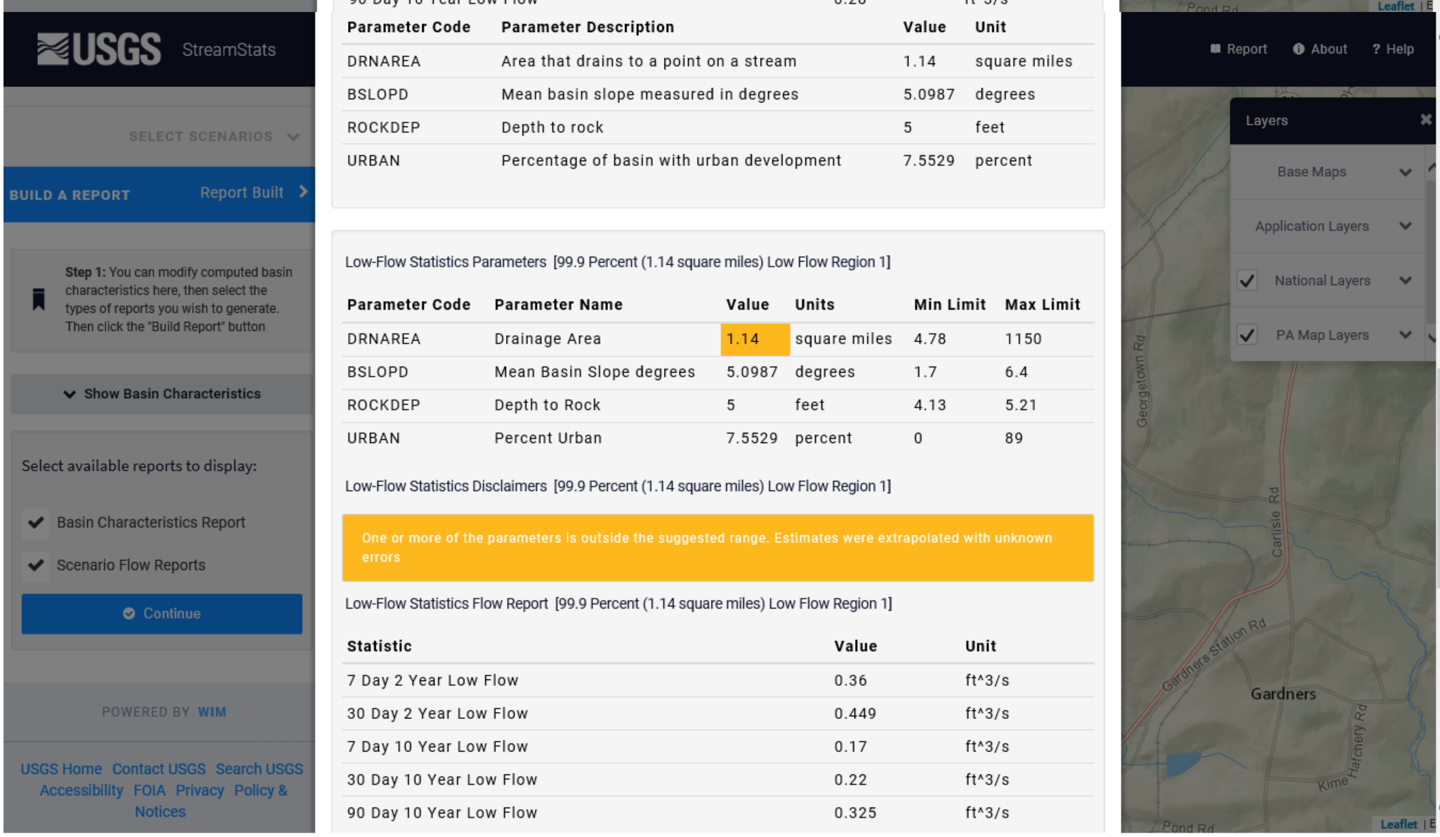
Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.99	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	5.0115	degrees	1.7	6.4
ROCKDEP	Depth to Rock	5	feet	4.13	5.21
URBAN	Percent Urban	8.0965	percent	0	89

Low-Flow Statistics Disclaimers [99.9 Percent (0.989 square miles) Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [99.9 Percent (0.989 square miles) Low Flow Region 1]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.308	ft^3/s
30 Day 2 Year Low Flow	0.387	ft^3/s
7 Day 10 Year Low Flow	0.144	ft^3/s
30 Day 10 Year Low Flow	0.188	ft^3/s
90 Day 10 Year Low Flow	0.28	ft^3/s



Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.14	square miles
BSLOPD	Mean basin slope measured in degrees	5.0987	degrees
ROCKDEP	Depth to rock	5	feet
URBAN	Percentage of basin with urban development	7.5529	percent

Low-Flow Statistics Parameters [99.9 Percent (1.14 square miles) Low Flow Region 1]

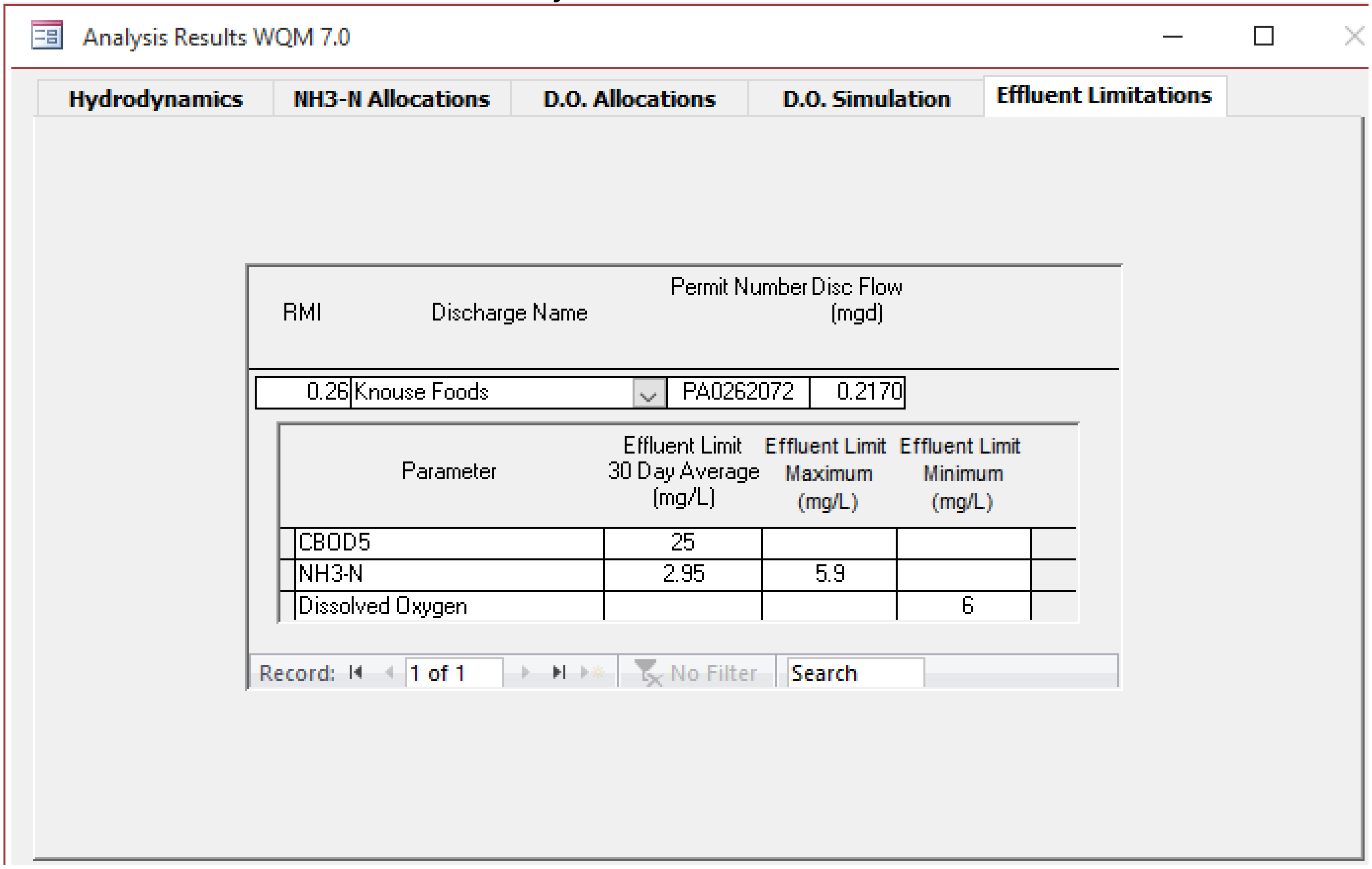
Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.14	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	5.0987	degrees	1.7	6.4
ROCKDEP	Depth to Rock	5	feet	4.13	5.21
URBAN	Percent Urban	7.5529	percent	0	89

Low-Flow Statistics Disclaimers [99.9 Percent (1.14 square miles) Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [99.9 Percent (1.14 square miles) Low Flow Region 1]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.36	ft^3/s
30 Day 2 Year Low Flow	0.449	ft^3/s
7 Day 10 Year Low Flow	0.17	ft^3/s
30 Day 10 Year Low Flow	0.22	ft^3/s
90 Day 10 Year Low Flow	0.325	ft^3/s



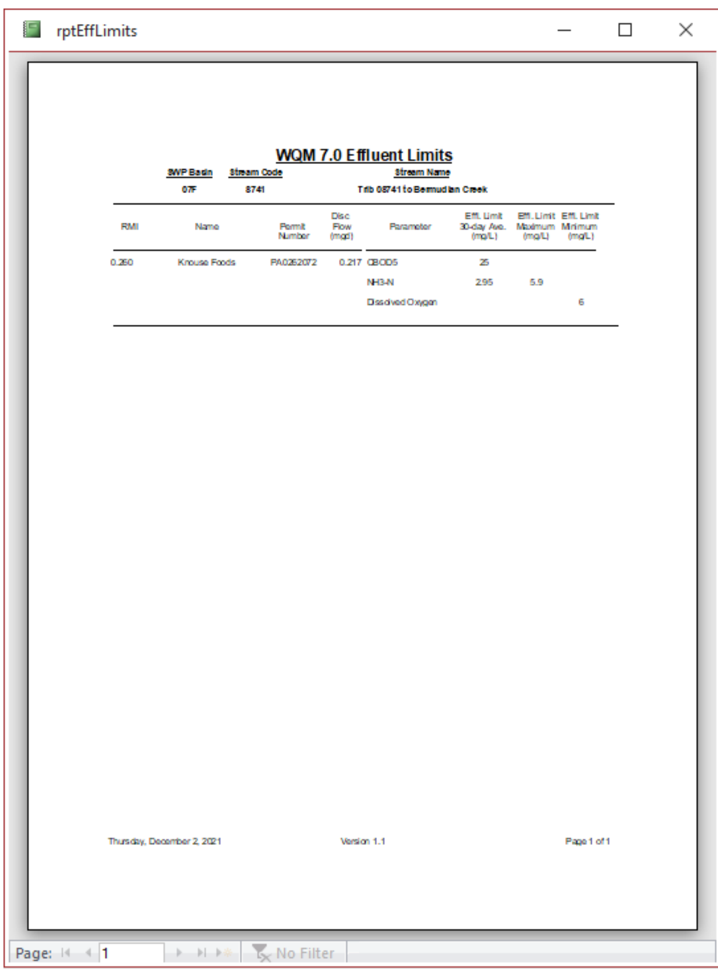
Analysis Results WQM 7.0

Hydrodynamics | NH3-N Allocations | D.O. Allocations | D.O. Simulation | Effluent Limitations

RMI	Discharge Name	Permit Number	Disc Flow (mgd)
0.26	Knouse Foods	PA0262072	0.2170

Parameter	Effluent Limit 30 Day Average (mg/L)	Effluent Limit Maximum (mg/L)	Effluent Limit Minimum (mg/L)
CBOD5	25		
NH3-N	2.95	5.9	
Dissolved Oxygen			6

Record: 1 of 1 No Filter Search



rptEffLimits

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
0.260	Knouse Foods	PA0262072	0.217	CBOD5	25		
				NH3-N	2.95	5.9	
				Dissolved Oxygen			6

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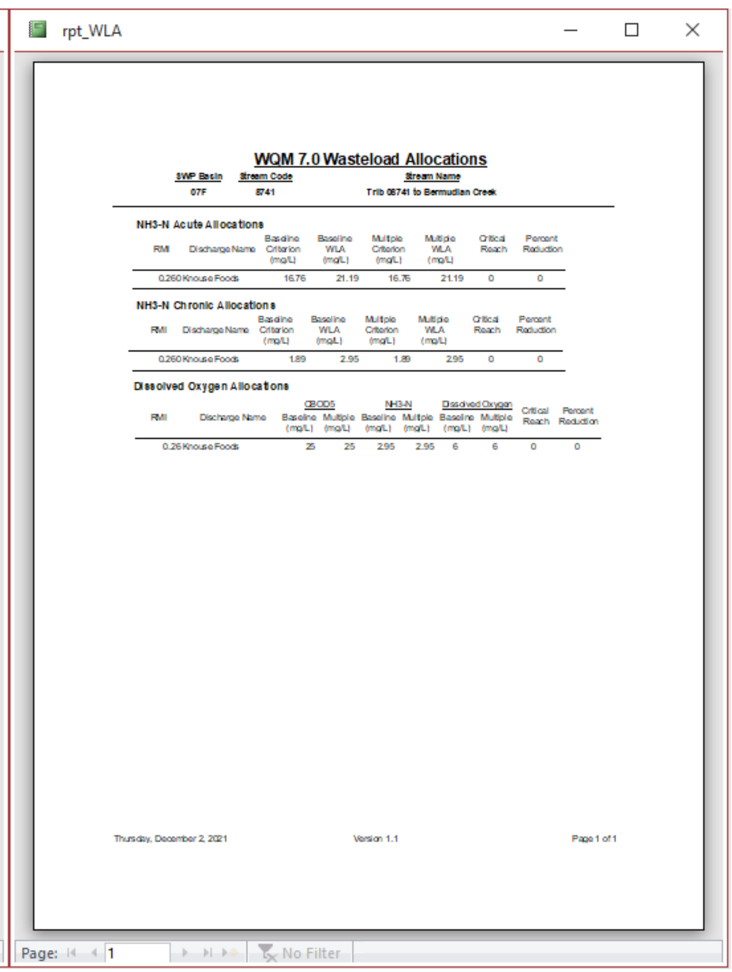
Page: 1 No Filter



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WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
0.260	Knouse Foods	16.76	21.19	16.76	21.19	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
0.260	Knouse Foods	1.89	2.95	1.89	2.95	0	0

Dissolved Oxygen Allocations

		CBOD5		NH3-N		Dissolved Oxygen			
RMI	Discharge Name	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Critical Reach	Percent Reduction
0.26	Knouse Foods	25	25	2.95	2.95	6	6	0	0

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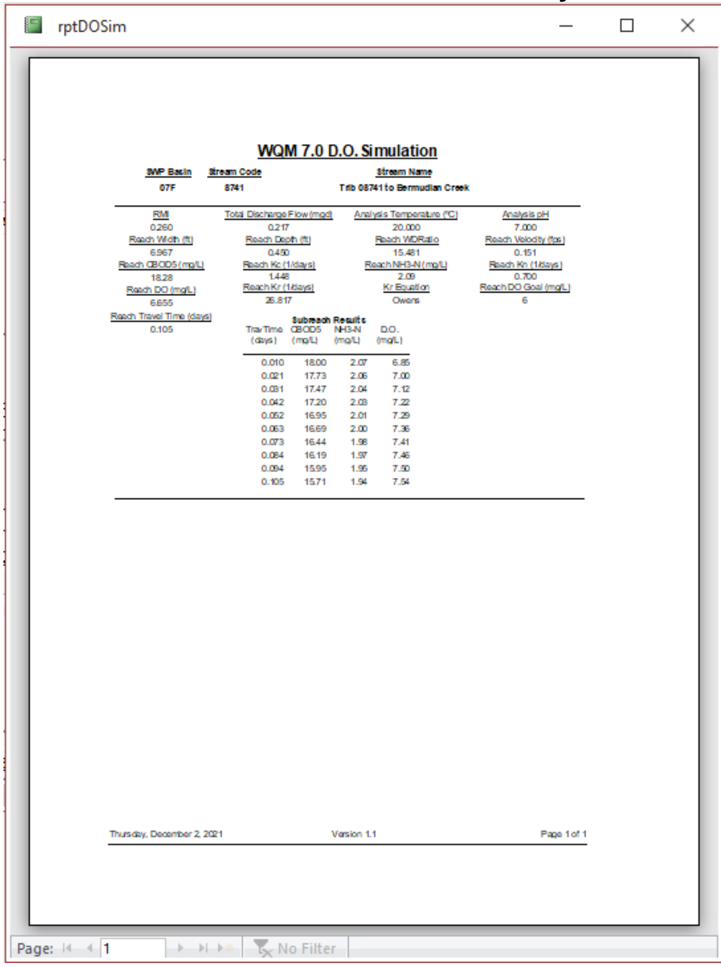

rptDOSim

WQM 7.0 D.O. Simulation

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
0.260	0.217	20.000	7.000
Reach Width (ft)	Reach Depth (ft)	Reach WDRatio	Reach Velocity (fps)
6.967	0.450	15.481	0.151
Reach CBOD5 (mg/L)	Reach Kc (1/days)	Reach NH3-N (mg/L)	Reach Kn (1/days)
18.28	1.448	2.09	0.700
Reach DO (mg/L)	Reach Kr (1/days)	Kr Equation	Reach DO Goal (mg/L)
6.655	26.817	Owens	6
Reach Travel Time (days)			
0.105			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.010	18.00	2.07	6.85
0.021	17.73	2.06	7.00
0.031	17.47	2.04	7.12
0.042	17.20	2.03	7.22
0.052	16.95	2.01	7.29
0.063	16.69	2.00	7.36
0.073	16.44	1.98	7.41
0.084	16.19	1.97	7.46
0.094	15.95	1.96	7.50
0.105	15.71	1.94	7.54

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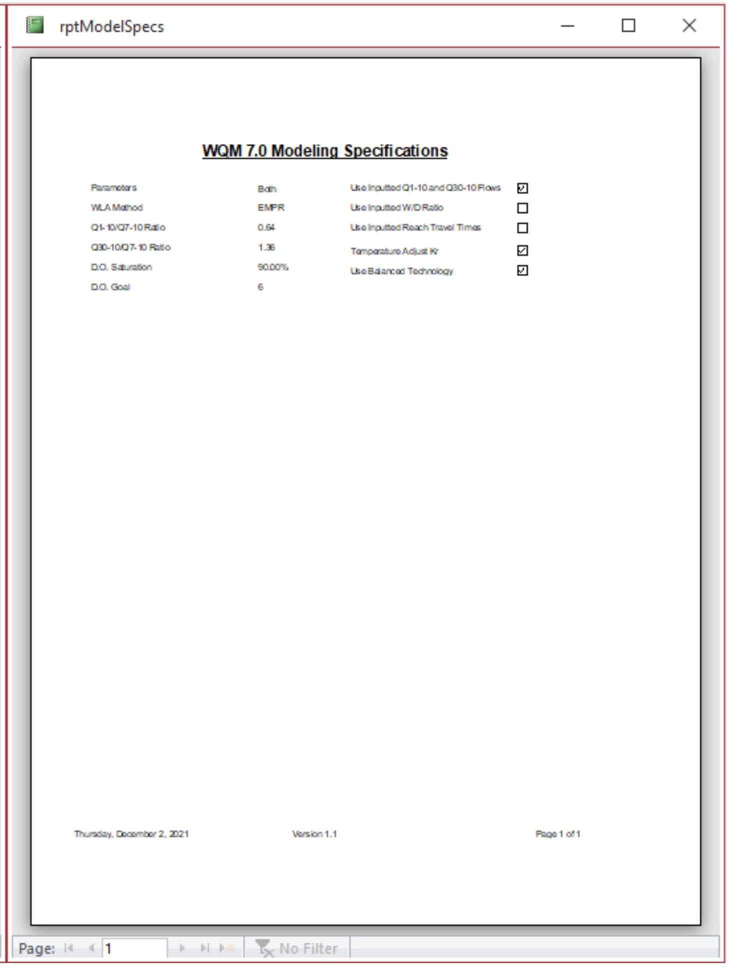

rptModelSpecs

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	6		

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rptHydro

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
0.260	0.14	0.00	0.14	.3357	0.01427	.45	6.97	15.48	0.15	0.105	20.00	7.00
Q1-10 Flow												
0.260	0.09	0.00	0.09	.3357	0.01427	NA	NA	NA	0.14	0.111	20.00	7.00
Q30-10 Flow												
0.260	0.19	0.00	0.19	.3357	0.01427	NA	NA	NA	0.16	0.099	20.00	7.00

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rptGeneral

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07F	8741	Trib 08741 to Bermudian Creek	0.260	871.52	0.99	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Knouse Foods	PA0262072	0.2170	0.2170	0.2170	0.000	20.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

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rptGeneral

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07F	8741	Trib 08741 to Bermudian Creek	0.001	852.00	1.14	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Knouse Foods	PA0262072	0.0000	0.0000	0.0000	0.000	20.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

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Development of Effluent Limitations

Outfall No. 002 **Design Flow (MGD)** 0.005
Latitude 40º 1' 4.00" **Longitude** -77º 13' 18.00"
Wastewater Description: Sewage Effluent

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Parameter	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Comments: TRC is not applicable to discharge.

Water Quality-Based Limitations

Carbonaceous Biochemical Oxygen Demand ($CBOD_5$):
The attached computer printout of the WQM 7.0 stream model (version 1.1) indicates that a monthly average limit of 25.0 mg/L, or secondary treatment, is adequate to protect the water quality of the stream. However, the existing limits of 25.0 mg/L monthly average (AML), and 50.0 mg/L instantaneous maximum will remain in the proposed permit as per guidance document 391-2000-014. Recent DMRs and inspection reports show that the facility has been consistently achieving these limits.

Ammonia (NH_3-N):
NH_3-N calculations were first based on the Department's Implementation Guidance of Section 93.7 Ammonia Criteria, dated 11/4/97 (ID No. 391-2000-013). The following data is necessary to determine the in-stream NH_3N criteria used in the attached computer model of the stream:

*	Discharge pH	7.0	(Default per 391-2000-007)
*	Discharge Temperature	20°C	(Default per 391-2000-007)
*	Stream pH	7.0	(Default per 391-2000-006)
*	Stream Temperature	20°C	(Default per 391-2000-003)
*	Background NH_3-N	0 mg/L	(Assumed)

Regarding NH_3-N limits, the attached computer printout of the WQM 7.0 stream model (version 1.1) indicates that a limit of 25.0 mg/L as a monthly average (AML) and 50.0 mg/L instantaneous maximum (IMAX) are necessary to protect the aquatic life from toxicity effects at the point of discharge. However, the existing ammonia limits of 25.0 mg/L average monthly and 50.0 mg/L instantaneous maximum limit will remain in the proposed permit. The winter effluent report will remain in the proposed permit. Recent DMRs and inspection reports show that the facility has been consistently achieving these limits.

Dissolved Oxygen (D.O.):
A minimum D.O. of 5.0 mg/L is required per 25 Pa. Code § 93.7. It is recommended that this limit be maintained in the proposed permit to ensure the protection of water quality standards. This approach is consistent with DEP's current Standard Operating Procedure (SOP) No. BPNPSM-PMT-033 and has been applied to other point source dischargers throughout the state.

pH:
The effluent discharge pH should remain above 6.0 and below 9.0 standard units according to 25 Pa Code § 95.2(1).

Fecal Coliform:
The recent coliform guidance in 25 Pa. Code § 92a.47.(a)(4) requires a summer technology limit of 200/100 ml as a geometric mean and an instantaneous maximum not greater than 1,000/100ml and 25 Pa. Code § 92a.47.(a)(5) requires a winter limit of 2,000/100ml as a geometric mean and an instantaneous maximum not greater than 10,000/100ml.

E. Coli:
As recommended by DEP's SOP No. BPNPSM-PMT-033, a routine monitoring for E. Coli will be included in the proposed permit under 25 Pa Code §92a.61. This requirement applies to all sewage dischargers greater than 0.002 MGD in their new and reissued permits. A monitoring frequency of 1/year will be included in the permit to be consistent with the recommendation from this SOP.

UV:
The facility will utilize an ultraviolet unit for disinfection. A daily monitoring requirement for UV transmittance (%) changed to UV in intensity (mW/cm^2) report will be in the proposed permit.

Chesapeake Bay Strategy (Total Nitrogen (TN) & Total Phosphorus (TP)):
According to the Department's June 27, 2013 Watershed Implementation Plan Phase II Supplemental Document for the Chesapeake Bay TMDL, new Phase 5 facilities (defined as $0.002 < X < 0.200$ MGD) are required to meet a net zero discharge of total nitrogen and phosphorus. Therefore, Knouse Foods Peach Glen is required to purchase credits for the sewage discharge.

This facility being categorized as a non-significant discharger, however, TN series (ammonia-nitrogen, nitrate-nitrite, TKN) and TP monitoring were included into the last permit and will remain in the proposed permit, and Zero (0) for cap load for TN & TP will remain in the proposed permit.

Additionally, offsets of 25 lbs/year/EDU for TN and 3 lbs/year/EDU for TP will be applied for Outfall 002. These offsets, which have been placed in the permit, are based on DEP guidance for the connection of dwellings served by wildcat sewers to the public sewer system. Based on the design flow of 0.005 MGD and the Department's assumption of 262.5 gpd per EDU, the following calculations result:

5,000 gpd / (262.5 gpd/EDU) = 19.0 EDU
TN: (25 lbs/year/EDU) * (19 EDU) = 475.0 lbs/year
TP: (3 lbs/year/EDU) * (19 EDU) = 57.0 lbs/year

WQM 7.0 Data outfall 002:

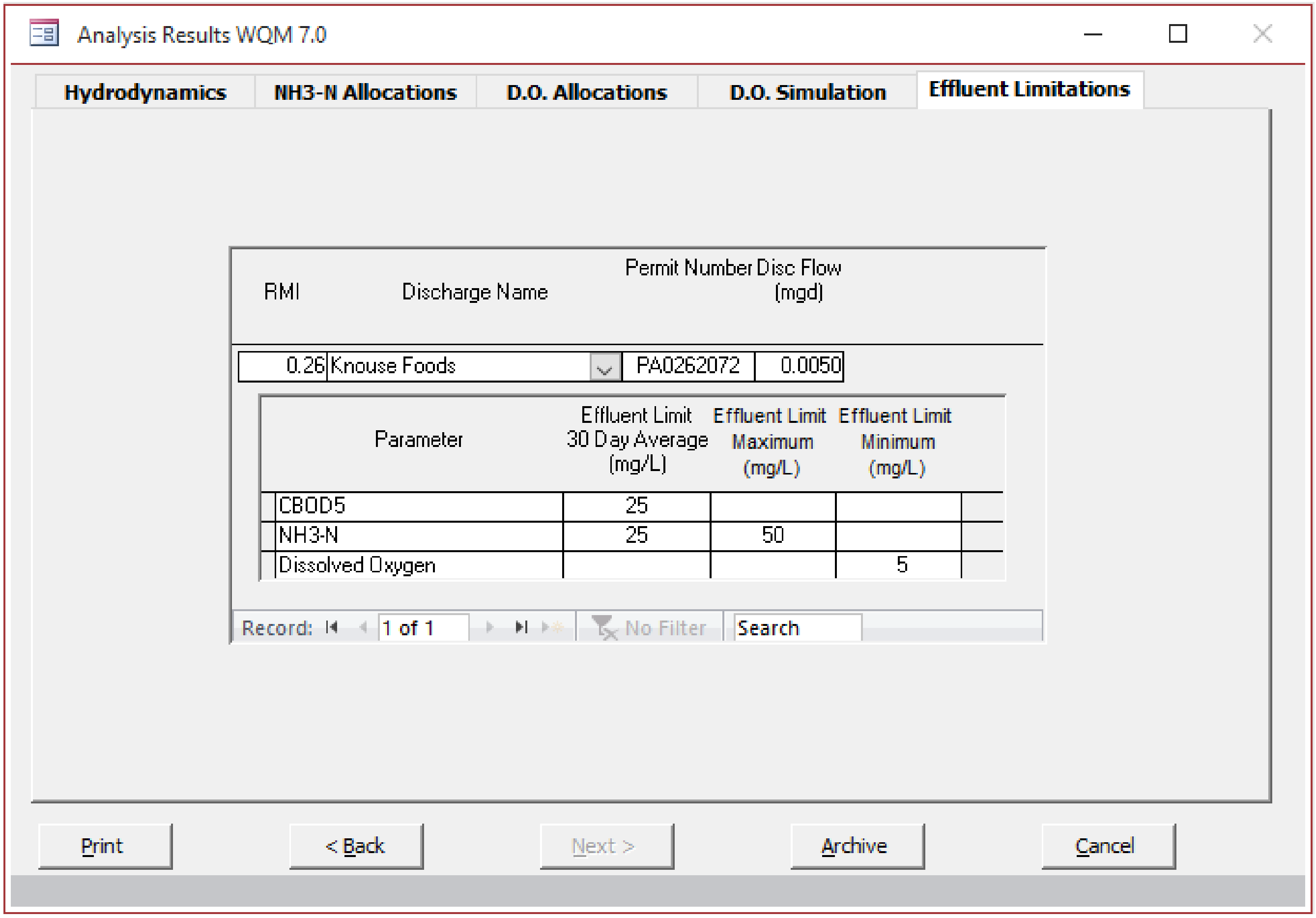
D.O. Goal: 5.0 mg/L

Node 1: Outfall 001 on Trib. 08741 to Bermudian Creek (08741)

Elevation:	871.52 ft (USGS National Map Viewer)
Drainage Area:	0.99 mi^2 (USGS PA StreamStats)
River Mile Index:	0.26 (PA DEP eMapPA)
Low Flow Yield:	0.14 cfs/mi^2
Discharge Flow:	0.005 MGD

Node 2: Just before confluence with Bermudian Creek

Elevation:	852 ft (USGS National Map Viewer)
Drainage Area:	1.14 mi^2 (USGS PA StreamStats)
River Mile Index:	0.001 (PA DEP eMapPA)
Low Flow Yield:	0.14 cfs/mi^2
Discharge Flow:	0.000 MGD



RMI	Discharge Name	Permit Number	Disc Flow (mgd)
0.26	Knouse Foods	PA0262072	0.0050

Parameter	Effluent Limit 30 Day Average (mg/L)	Effluent Limit Maximum (mg/L)	Effluent Limit Minimum (mg/L)
CBOD5	25		
NH3-N	25	50	
Dissolved Oxygen			5

rptEffLimits

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
0.260	Knouse Foods	PA0262072	0.005	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			5

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rpt_WLA

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
0.260	Knouse Foods	16.76	50	16.76	50	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
0.260	Knouse Foods	1.89	25	1.89	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
0.26	Knouse Foods	25	25	25	25	5	5	0	0

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rptDOSim

WQM 7.0 D.O. Simulation

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Total Discharge Flow (mgd)	Analysis Temperature (ºC)	Analysis pH
0.260	0.005	20.000	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
5.037	0.371	13.575	0.078
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
3.22	0.563	1.32	0.700
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
8.072	24.654	Owens	6
Reach Travel Time (days)			
0.202			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.020	3.18	1.30	8.24
0.040	3.14	1.28	8.24
0.061	3.11	1.27	8.24
0.081	3.07	1.25	8.24
0.101	3.04	1.23	8.24
0.121	3.00	1.21	8.24
0.141	2.97	1.20	8.24
0.162	2.94	1.18	8.24
0.182	2.90	1.16	8.24
0.202	2.87	1.15	8.24

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rptModelSpecs

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	6		

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rptHydro

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07F	8741	Trib 08741 to Bermudian Creek

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (ºC)	Analysis pH
Q7-10 Flow												
0.260	0.14	0.00	0.14	.0077	0.01427	.371	5.04	13.58	0.08	0.202	20.00	7.00
Q1-10 Flow												
0.260	0.09	0.00	0.09	.0077	0.01427	NA	NA	NA	0.06	0.255	20.00	7.00
Q30-10 Flow												
0.260	0.19	0.00	0.19	.0077	0.01427	NA	NA	NA	0.09	0.172	20.00	7.00

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rptGeneral

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07F	8741	Trib 08741 to Bermudian Creek	0.260	871.52	0.99	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (ºC)	Tributary pH	Stream Temp (ºC)	Stream pH
Q7-10	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (ºC)	Disc pH
Knouse Foods	PA0262072	0.0050	0.0050	0.0050	0.000	20.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

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rptGeneral

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07F	8741	Trib 08741 to Bermudian Creek	0.001	852.00	1.14	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Knouse Foods	PA0262072	0.0000	0.0000	0.0000	0.000	20.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

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Development of Effluent Limitations

Outfall No. 003 **Design Flow (MGD)** 0
Latitude 40º 1' 5.23" **Longitude** -77º 13' 59.65"
Wastewater Description: Stormwater

Outfall No. 004 **Design Flow (MGD)** 0
Latitude 40º 1' 9.33" **Longitude** -77º 13' 52.16"
Wastewater Description: Stormwater

Outfall No. 005 **Design Flow (MGD)** 0
Latitude 40º 1' 10.86" **Longitude** -77º 13' 49.37"
Wastewater Description: Stormwater

Outfall No. 006 **Design Flow (MGD)** 0
Latitude 40º 1' 13.84" **Longitude** -77º 13' 40.88"
Wastewater Description: Stormwater

Outfall No. 007 **Design Flow (MGD)** 0
Latitude 40º 1' 15.13" **Longitude** -77º 13' 40.04"
Wastewater Description: Stormwater

Outfall No. 008 **Design Flow (MGD)** 0
Latitude 40º 1' 13.59" **Longitude** -77º 13' 30.57"
Wastewater Description: Stormwater

Technology-Based Limitations

Knouse Foods included six stormwater outfalls within their November 2020 NPDES application. Table below indicates the information that was provided:

Outfall No.	Drainage Area (ft^2)	Latitude	Longitude	% Impervious	Area Description
003	338,558.71	40º 01' 5.229"	77º 13' 59.651"	60	Concreted, paved, and grassy areas with a PennDOT, Township roadway around Controlled Atmosphere storage building. Experiences high traffic at various times throughout the year.
004	320,182.93	40º 01' 9.325"	77º 13' 52.155"	85	Concreted, paved, and grassy areas around Cold Storage # 2 / warehouse building. Experiences high traffic at various times throughout the year.
005	226,087.41	40º 01' 10.860"	77º 13' 49.367"	90	Concreted, paved, and grassy areas around warehouse with shipping docks and parking area.
006	1,506,636	40º 01' 13.836"	77º 13' 40.884"	20	Concreted, paved, and grassy areas behind main production building. Supplies and finished product loading and unloaded with single dock door.
007	985,553.22	40º 01' 15.132"	77º 13' 40.039"	50	Paved high traffic areas in front of main office and production building. Raw and finished product loading and unloading with single dock door. Residential, agricultural areas.
008	327,387.99	40º 01' 13.587"	77º 13' 30.568"	25	Grassy and wooded areas with high travel paved and gravel parking area around fleet building.

Outfall 004 and Outfall 007 are considered representative of the facility.

Parameter	Minimum Measuring Frequency	Sample Type (mg/l)	Daily Maximum mg/L
pH (S.U.)	1 / year	Grab	Report
Dissolved Oxygen	1 / year	Grab	Report
$CBOD_5$	1 / year	Grab	Report
Total Suspended Solids	1 / year	Grab	Report

Mass Loading Limitation

All mass loading effluent limitations recommended in the draft permit are concentration-based, calculated using a formula: design flow (MGD) x concentration limit (mg/l) x conversion factor of 8.34.

Anti-Degradation

The effluent limits for this discharge have been developed to ensure that existing instream water uses and the level of water quality necessary to protect the existing uses are maintained and protected. No High Quality Waters are impacted by this discharge. No Exceptional Value Waters are impacted by this discharge.

303(d) Listed Streams

The discharge is located on a stream segment that is designated on the 303(d) list as impaired. There is a recreational impairment for industrial point source – organic enrichment. The permit includes a limit for fecal coliform at outfall 002.

Class A Wild Trout Fisheries

No Class A Wild Trout Fisheries are impacted by this discharge.

Anti-Backsliding

Pursuant to 40 CFR § 122.44(l)(1), all proposed permit requirements addressed in this fact sheet are at least as stringent as the requirements implemented in the existing NPDES permit unless any exceptions are addressed by DEP in this fact sheet.

Existing Effluent Limitations and Monitoring Requirements

Outfall # 001 - IW Process Effluent without ELG

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
D.O.	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
BOD_5	18.1	36.2	XXX	10.0	20.0	25.0	1/week	24-Hr Composite
TSS	18.1	36.2	XXX	10.0	20.0	25.0	1/week	24-Hr Composite
Oil and Grease	27.1	XXX	XXX	15.0	XXX	30.0	1/week	Grab
Ammonia May 1 - Oct 31	3.6	7.2	XXX	2.0	4.0	5.0	2/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	10.9	21.7	XXX	6.0	12.0	15.0	2/week	24-Hr Composite
Total Nitrogen	21.7	43.4	XXX	12.0	24.0	30.0	2/week	24-Hr Composite
Total Aluminum	1.053	1.643	XXX	0.582	0.908	1.455	1/week	24-Hr Composite
Total Zinc	0.168	0.262	XXX	0.0929	0.1450	0.2322	1/week	24-Hr Composite
Total Iron	3.285	5.125	XXX	1.815	2.832	4.538	1/week	24-Hr Composite
Total Copper	Report	Report	XXX	Report	Report	Report	1/week	24-Hr Composite
Total Lead	Report	Report	XXX	Report	Report	Report	1/week	24-Hr Composite
Total Manganese	Report	Report	XXX	Report	Report	Report	1/week	24-Hr Composite
Color (Pt-Co Units)	XXX	XXX	XXX	91	182	228	1/week	Grab
Total Dissolved Solids	3,620	7,239	XXX	2,000	4,000	XXX	1/week	24-Hr Composite

Outfall # 001 cont.: The period from November 1, 2020 through April 30, 2021

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Osmotic Pressure (mOs/kg)	XXX	XXX	XXX	59	92	147	1/week	24-Hr Composite
Total Phosphorus	0.9	1.8	XXX	0.5	1.0	1.25	2/week	24-Hr Composite
Iron, Dissolved	0.657	1.024	XXX	0.363	0.566	0.908	1/week	24-Hr Composite

Outfall 001 Chesapeake Bay,

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation

Existing Effluent Limitations and Monitoring Requirements

Outfall 002 - Sewage Effluent.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
D.O.	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
UV Transmittance (%)	XXX	XXX	Report	Report	XXX	XXX	1/day	Recorded
$CBOD_5$	XXX	XXX	XXX	25.0	XXX	50.0	2/month	24-Hr Composite
TSS	XXX	XXX	XXX	30.0	XXX	60.0	2/month	24-Hr Composite
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	2/month	Grab
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	2/month	Grab
Ammonia May 1 - Oct 31	XXX	XXX	XXX	25.0	XXX	50.0	2/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite

<u>Outfall 002</u>, Chesapeake Bay.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Net Total Phosphorus	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation

Existing Effluent Limitations and Monitoring Requirements

Outfall 004 - Stormwater.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
pH (S.U.)	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
D.O.	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
$CBOD_5$	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
TSS	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab

Existing Effluent Limitations and Monitoring Requirements

Outfall 007 - Stormwater

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
pH (S.U.)	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
D.O.	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
$CBOD_5$	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
TSS	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
D.O.	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
Color (Pt-Co Units)	XXX	XXX	XXX	91	182	228	1/week	Grab
BOD_5	18.1	36.2	XXX	10.0	20.0	25.0	1/week	24-Hr Composite
TSS	18.1	36.2	XXX	10.0	20.0	25.0	1/week	24-Hr Composite
Osmotic Pressure (mOs/kg)	XXX	XXX	XXX	Report	Report	XXX	1/week	24-Hr Composite
Oil and Grease	XXX	27.1	XXX	XXX	15.0	30.0	1/quarter	Grab
Total Nitrogen	21.7	43.4	XXX	12.0	24.0	30.0	2/week	24-Hr Composite
Ammonia May 1 - Oct 31	3.6	7.2	XXX	2.0	4.0	5.0	2/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	10.9	21.7	XXX	6.0	12.0	15.0	2/week	24-Hr Composite
Total Phosphorus	0.9	1.8	XXX	0.5	1.0	1.25	2/week	24-Hr Composite
Total Aluminum	1.053	1.643	XXX	0.582	0.908	1.455	1/week	24-Hr Composite
Dissolved Iron	0.657	1.024	XXX	0.363	0.566	0.908	1/week	24-Hr Composite
Total Zinc	0.166	0.250	XXX	0.092	0.138	0.23	1/week	24-Hr Composite
Total Iron	3.285 Avg Qrtly	5.125	XXX	1.815 Avg Qrtly	2.832	4.538	1/quarter	24-Hr Composite

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Total Lead (ug/L)	0.005 Avg Qrtly	0.009	XXX	3.02 Avg Qrtly	4.71	7.54	1/quarter	24-Hr Composite
Total Manganese (ug/L)	Report Avg Qrtly	Report	XXX	Report Avg Qrtly	Report	XXX	1/quarter	24-Hr Composite

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through Startup of Final Period.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Temperature (ºF) Downstream Monitoring	XXX	XXX	XXX	Report	XXX	XXX	1/day	I-S
Temperature (ºF) Upstream Monitoring	XXX	XXX	XXX	Report	XXX	XXX	1/day	I-S
Temperature (ºF)	XXX	XXX	XXX	Report	XXX	XXX	1/day	I-S
Total Copper (ug/L)	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite
Total Selenium (ug/L)	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Startup of Final Period through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Temperature (ºF) Jan 1 - 31	XXX	XXX	XXX	42.3	XXX	XXX	1/day	I-S
Temperature (ºF) Feb 1 - 28	XXX	XXX	XXX	42.5	XXX	XXX	1/day	I-S
Temperature (ºF) Mar 1 - 31	XXX	XXX	XXX	48.9	XXX	XXX	1/day	I-S
Temperature (ºF) Apr 1 - 15	XXX	XXX	XXX	53.9	XXX	XXX	1/day	I-S
Temperature (ºF) Apr 16 - 30	XXX	XXX	XXX	56.9	XXX	XXX	1/day	I-S
Temperature (ºF) May 1 - 15	XXX	XXX	XXX	58.1	XXX	XXX	1/day	I-S
Temperature (ºF) May 16 - 31	XXX	XXX	XXX	62.1	XXX	XXX	1/day	I-S
Temperature (ºF) Jun 1 - 15	XXX	XXX	XXX	65.3	XXX	XXX	1/day	I-S
Temperature (ºF) Jun 16 - 30	XXX	XXX	XXX	69.3	XXX	XXX	1/day	I-S
Temperature (ºF) Jul 1 - 31	XXX	XXX	XXX	72.7	XXX	XXX	1/day	I-S
Temperature (ºF) Aug 1 - 15	XXX	XXX	XXX	72.6	XXX	XXX	1/day	I-S
Temperature (ºF) Aug 16 - 31	XXX	XXX	XXX	71.6	XXX	XXX	1/day	I-S
Temperature (ºF) Sep 1 - 15	XXX	XXX	XXX	67.5	XXX	XXX	1/day	I-S
Temperature (ºF) Sep 16 - 30	XXX	XXX	XXX	64.5	XXX	XXX	1/day	I-S
Temperature (ºF) Oct 1 - 15	XXX	XXX	XXX	63.5	XXX	XXX	1/day	I-S
Temperature (ºF) Oct 16 - 31	XXX	XXX	XXX	58.5	XXX	XXX	1/day	I-S

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Temperature (ºF) Nov 1 - 15	XXX	XXX	XXX	50.7	XXX	XXX	1/day	I-S
Temperature (ºF) Nov 16 - 30	XXX	XXX	XXX	45.7	XXX	XXX	1/day	I-S
Temperature (ºF) Dec 1 - 31	XXX	XXX	XXX	42.0	XXX	XXX	1/day	I-S
Temperature (ºF) Downstream Monitoring	XXX	XXX	XXX	Report	XXX	XXX	1/day	I-S
Temperature (ºF) Upstream Monitoring	XXX	XXX	XXX	Report	XXX	XXX	1/day	I-S
Total Copper (ug/L)	0.018	0.028	XXX	10.1	15.2	25.2	1/week	24-Hr Composite
Total Selenium (ug/L)	0.013	0.02	XXX	7.05	11.0	17.6	1/week	24-Hr Composite

Outfall 001, Chesapeake Bay, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the “NPDES Permit Writer’s Manual” (362-0400-001), SOPs and/or BPJ.

Outfall 002, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
D.O.	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
UV Intensity (mW/cm^2)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded
$CBOD_5$	XXX	XXX	XXX	25.0	XXX	50.0	2/month	24-Hr Composite
TSS	XXX	XXX	XXX	30.0	XXX	60.0	2/month	24-Hr Composite
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	2/month	Grab
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	2/month	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/year	Grab
Ammonia May 1 - Oct 31	XXX	XXX	XXX	25.0	XXX	50.0	2/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite

Outfall 002, Chesapeake Bay Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Average Monthly	Maximum	Instant. Maximum		
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen(3)	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus(3)	Report	0	XXX	XXX	XXX	XXX	1/month	Calculation

Note:
(3) The permittee is authorized to use 475 lbs/year as Total Nitrogen (TN) offsets and 57 lbs/year as Total Phosphorus (TP) offsets toward compliance with the Annual Net TN and TP mass load limitations (Cap Loads). These offsets may be applied throughout the Compliance Year or during the Truing Period.

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 004, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
pH (S.U.)	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
D.O.	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
$CBOD_5$	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
TSS	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001), SOPs and/or BPJ.

Outfall 007, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
pH (S.U.)	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
D.O.	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
$CBOD_5$	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab
TSS	XXX	XXX	XXX	XXX	Report	XXX	1/year	Grab

Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment)
☒	Toxics Management Spreadsheet (see Attachment)
☐	TRC Model Spreadsheet (see Attachment)
☒	Temperature Model Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☒	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☐	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☒	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☒	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 391-2000-022, 3/1999.
☐	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☒	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☐	Other:

KNOUSE FOODS

Hilary Le

PA Dept. of Environmental Protection

909 Elmerton Avenue

Harrisburg, PA 17110

Knouse Foods Cooperative Inc. NPDES Permit

No. PA0262072 Draft Renewal Comments

January 31, 2022

Dear Hilary,

Knouse Foods conducted a permit review of NPDES Permit No. PA0262072 Draft with the following comments.

The unresolved violation(s) from page 5 of the fact sheet have been addressed with documentation forwarded to the Department.

PERMIT

Page 2 & 3 – Part A, 1A, Outfall 001,

Oil and Grease – A review of facility past years DMRs show results were non-detect. Knouse requests that Oil and Grease be removed from the permit. If the Department does not agree that oil and grease should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.

Total Copper – Limits have been added for total copper. A review of facility past years DMRs show that reported results evaluated with newly proposed effluent limitations would cause an exceedance in all limitations. Knouse requests a delayed compliance schedule of same timeframe as proposing for newly imposed temperature effluent limitations.

The instantaneous maximum limit is the same as the daily maximum limit in the proposed permit. We believe this is in error, as well as the max discharge concentration that was used to calculate the limits in the TMS. Using a max discharge concentration of 46 ug/l (the max from the data provided in the fact sheet page 9), the limits from the TMS are calculated to be:

Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units
Total Copper	0.018	0.028	10.1	15.7	25.2	µg/L

MUSSELMAN'S • LUCKY LEAF • APPLE TIME • SPEAS FARM • LINCOLN

800 Peach Glen-Idaville Road | Peach Glen, PA 17375-0001 | Phone (717) 677-8181 | Fax (717) 677-7069

We request the limits shown above to be in the proposed permit.

Total Iron - The results of the reasonable potential analysis resulted in no reasonable potential for total iron to exceed the WQBEL; therefore, Knouse requests that total iron be removed from the permit. If the Department does not agree that total iron should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.

Total Lead – A review of facility past years DMRs show reported results were non-detect. Knouse requests that total lead be removed from the permit. Lead is not a parameter of concern for this food processing wastewater. If the Department does not agree that total lead should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.

Total Manganese – DEP Response 3.0(I) to February 10, 2014 Comments of previous issued Knouse Foods, Peach Glen permit regards effluent limitations for manganese were:

"Effluent limitations for manganese will remain in the permit based on the fact that DEP protects for all water uses, not just the critical uses stated in 25 Pa Code 93.7. During the next permit renewal cycle, the need for manganese monitoring in the permit will be re-evaluated."

The results of the reasonable potential analysis resulted in no reasonable potential for total manganese to exceed the WQBEL; therefore, Knouse requests that total manganese be removed from the permit. If the Department does not agree that total manganese should be removed from the Permit, Knouse requests a reduction in sample frequency to quarterly.

Total Selenium – Limits have been added for total selenium. Total selenium was not a parameter of previous issued Knouse Foods, Peach Glen permit, so there has been no facility past years DMRs reported results to evaluate ability to be compliant with newly proposed effluent limitations. Knouse requests a delayed compliance schedule of same timeframe as proposing for newly imposed temperature effluent limitations.

Page 5 & 6 – Part A, 1C, Outfall 001,

Temperature – The Department notes that review of the past years DMRs show that facility temperatures at discharge point were higher than the new temperature limits. Review of facility temperature data for Periods Jan 1 to Apr 15 and Oct 1 to Dec 31, the three-year average upstream temperatures exceeded CWF Ambient Default Temperatures and 6 of the 19 periods of the year exceeded the CWF Maximum Stream Temperatures utilized to generate the daily waste load allocations. Knouse requests further site-specific review for average monthly temperature effluent limitations and clarification of outfall location.

Page 8 - Part A, 1E, Outfall 002,

Ultraviolet light transmittance – DEP Response 4.0(B) to February 10, 2014 Comments of previous issued Knouse Foods, Peach Glen permit regards use of ultraviolet disinfection unit:

"Per the discussion at the March 6, 2014 meeting , a requirement for the daily measurement of transmittance from the ultraviolet unit has been placed in the permit. Please confirm prior to issuance of the final permit if capabilities will exist to measure UV intensity or dosage instead of transmittance."

Facility past year DMRs have been reported as measure of UV intensity (mW/cm^2). Knouse requests that the report parameter be changed from transmittance (%) to intensity (mW/cm^2).

Page 9 - Part A, 1F, Outfall 002,

Cap Load Offsets –

"(3) The permittee is authorized to use 475lbs/year as Total Nitrogen (TN) Offsets and 57 lbs/year as Total Phosphorus (TP) Offsets toward compliance with the Annual net TN and TP mass load limitations (Cap Loads) for Outfall 002, in accordance with Part C of this permit. These Offsets may be applied throughout the Compliance Year or during the Turing Period. The application of offsets must be reported to DEP as described in Part C."

Foot note 3 of previous permit provided 475lbs/year Total Nitrogen (TN) and 57lbs/year Total Phosphorus (TP) has been removed. DEP Response 4.0(D) to February 10, 2014 Comments of previous issued Knouse Foods, Peach Glen permit regards Cap Load offsets provided the guidance for issuing of the offsets as follows:

"The issue of assigning TN and TP Cap Loads of "0" was discussed with representatives at DEP's Central Office and the determination was made that the Cap Loads must remain as they are, except for the allowance of offsets of 25 lbs/year/EDU for TN and 3 lbs/year/EDU for TP. These offsets, which have been placed in the permit, are based on DEP guidance for the connection of dwellings served by wildcat sewers to the public sewer system. It should also be noted that delivery ratios exist in the permit for help with reconciling Cap Load exceedances."

Knouse requests these Cap Load Offsets be reinstated.

Page 27 - Part C, II

Schedule of Compliance – Knouse requests the following be granted for compliance with final effluent limitations:

1.	Submit WQM permit application	Effective date of permit + 18 months
2.	End construction	WQM approval + 24 months
3.	Compliance with effluent limitations	WQM approval + 30 months

Knouse would suggest lessening the proposed time to submittal of WQM believing that evaluation for systems required can be completed within 18 months; however, requests construction and final compliance be based upon WQM approval which is Department dependent. Implementation of construction couldn't commence until WQM approval.

Page 30 – Part C, V,A

Stormwater outfall descriptions – Knouse requests to revise the descriptions as follows:

003- Concreted, paved, and grassy areas with a PennDOT, Township roadway around Controlled Atmosphere storage building. Experiences high traffic at various times throughout the year.

004- Concreted, paved, and grassy areas around Cold Storage #2/warehouse building. Experiences high traffic at various times throughout the year.

005- Concreted, paved, and grassy areas around warehouse with shipping docks and parking area.

006- Concreted, paved, and grassy areas behind main production building. Supplies and finished product loading and unloaded with single dock door.

007- Paved high traffic areas in front of main offices and production buildings. Raw and finished product loading and unloading with single dock door. Residential, agricultural areas.

008- Grassy and wooded areas with high travel paved and gravel parking area around fleet building.

FACT SHEET

Knouse requests that facility contact on page 1 be changed to Tony Bretzman. Charlie Bennett will be retiring.

Knouse requests that the fact sheet be revised to correct the following inaccuracies:

1) Page 2 – Summary of Review Total Selenium Mass average monthly and daily maximum limits incorrect to proposed values of permit.
2) Page 13 - Technology-Based Limitations table to be removed/revised (appears to be a duplicate of outfall 002 table on page 25 of the fact sheet); add TSS, O&G, etc. Revise the Technology-Based Limitations and Water Quality-Based Limitations sections to include the TBELs and WBELs in the appropriate sections.
3) Page 15 – Total Iron limit from TMS shows report with no concentration and mass values which carries to this portion of fact sheet.
4) Page 15 – Total Zinc: Fact sheet discusses using a multiplier of 1.5 for an "average weekly limit" of 0.138 mg/l. Calculation should be completed using "Daily Maximum".
5) Page 15 – Total Selenium – Mass average monthly and daily maximum values incorrect to proposed values of permit.
6) Page 17 - Remove non-contact cooling water reference; change to process wastewater.
7) Page 17 – Provide comment regards "DEP will use five years of data in the next renewal"
8) Page 26 – UV Reported in intensity (mW/cm^2) and not transmittance (%) [confirm]
9) Page 31 - Revise stormwater outfall descriptions (also page 31 in the permit) to the below:

   003- Concreted, paved, and grassy areas with a PennDOT, Township roadway around Controlled Atmosphere storage building. Experiences high traffic at various times throughout the year.

   004- Concreted, paved, and grassy areas around Cold Storage #2/warehouse building. Experiences high traffic at various times throughout the year.

   005- Concreted, paved, and grassy areas around warehouse with shipping docks and parking area.

   006- Concreted, paved, and grassy areas behind main production building. Supplies and finished product loading and unloaded with single dock door.

007- Paved high traffic areas in front of main offices and production buildings. Raw and finished product loading and unloading with single dock door. Residential, agricultural areas.

008- Grassy and wooded areas with high travel paved and gravel parking area around fleet building.

Sincerely,

Anthony Bretzman

Anthony Bretzman

Manager of Environmental Affairs

CC:

Maria Bebenek- DEP

Dan Martin- DEP

Victor Landis- DEP

R. Woerner- Knouse Foods

Mark Applewhite- Knouse Foods

Debbie Hoyes- Arcadis

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Discharge Information

Instructions | Discharge | Stream

Facility: **Knouse Foods Cooperative, Inc.** NPDES Permit No.: **PA0262072** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description:

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.217	62	8.37						

Group	Discharge Pollutant	Units		Max Discharge Conc	Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod	Chem Transl
					0 if left blank		*0.5 if left blank*		*0 if left blank*			*1 if left blank*	
Group 1	Total Dissolved Solids (PWS)	mg/L		1750									
	Chloride (PWS)	mg/L		150									
	Bromide	mg/L	<	0.5									
	Sulfate (PWS)	mg/L		140									
	Fluoride (PWS)	mg/L	<	0.2									
Group 2	Total Aluminum	µg/L		880									
	Total Antimony	µg/L											
	Total Arsenic	µg/L											
	Total Barium	µg/L											
	Total Beryllium	µg/L											
	Total Boron	µg/L											
	Total Cadmium	µg/L											
	Total Chromium (III)	µg/L											
	Hexavalent Chromium	µg/L											
	Total Cobalt	µg/L											
	Total Copper	µg/L		47									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L											
	Dissolved Iron	µg/L		390									
	Total Iron	µg/L		380									
	Total Lead	µg/L	<	5									
	Total Manganese	µg/L		296									
	Total Mercury	µg/L											
	Total Nickel	µg/L		5									
	Total Phenols (Phenolics) (PWS)	µg/L											
	Total Selenium	µg/L	<	10									
	Total Silver	µg/L											
	Total Thallium	µg/L											
	Total Zinc	µg/L		150									
	Total Molybdenum	µg/L											
	Acrolein	µg/L	<										
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<										
	Benzene	µg/L	<										
	Bromoform	µg/L	<										

Group 3	Carbon Tetrachloride	µg/L	<										
	Chlorobenzene	µg/L											
	Chlorodibromomethane	µg/L	<										
	Chloroethane	µg/L	<										
	2-Chloroethyl Vinyl Ether	µg/L	<										
	Chloroform	µg/L	<										
	Dichlorobromomethane	µg/L	<										
	1,1-Dichloroethane	µg/L	<										
	1,2-Dichloroethane	µg/L	<										
	1,1-Dichloroethylene	µg/L	<										
	1,2-Dichloropropane	µg/L	<										
	1,3-Dichloropropylene	µg/L	<										
	1,4-Dioxane	µg/L	<										
	Ethylbenzene	µg/L	<										
	Methyl Bromide	µg/L	<										
	Methyl Chloride	µg/L	<										
	Methylene Chloride	µg/L	<										
	1,1,2,2-Tetrachloroethane	µg/L	<										
	Tetrachloroethylene	µg/L	<										
	Toluene	µg/L	<										
	1,2-trans-Dichloroethylene	µg/L	<										
	1,1,1-Trichloroethane	µg/L	<										
	1,1,2-Trichloroethane	µg/L	<										
	Trichloroethylene	µg/L	<										
	Vinyl Chloride	µg/L	<										
Group 4	2-Chlorophenol	µg/L	<										
	2,4-Dichlorophenol	µg/L	<										
	2,4-Dimethylphenol	µg/L	<										
	4,6-Dinitro-o-Cresol	µg/L	<										
	2,4-Dinitrophenol	µg/L	<										
	2-Nitrophenol	µg/L	<										
	4-Nitrophenol	µg/L	<										
	p-Chloro-m-Cresol	µg/L	<										
	Pentachlorophenol	µg/L	<										
	Phenol	µg/L	<										
	2,4,6-Trichlorophenol	µg/L	<										
Group 5	Acenaphthene	µg/L	<										
	Acenaphthylene	µg/L	<										
	Anthracene	µg/L	<										
	Benzidine	µg/L	<										
	Benzo(a)Anthracene	µg/L	<										
	Benzo(a)Pyrene	µg/L	<										
	3,4-Benzofluoranthene	µg/L	<										
	Benzo(ghi)Perylene	µg/L	<										
	Benzo(k)Fluoranthene	µg/L	<										
	Bis(2-Chloroethoxy)Methane	µg/L	<										
	Bis(2-Chloroethyl)Ether	µg/L	<										
	Bis(2-Chloroisopropyl)Ether	µg/L	<										
	Bis(2-Ethylhexyl)Phthalate	µg/L	<										
	4-Bromophenyl Phenyl Ether	µg/L	<										
	Butyl Benzyl Phthalate	µg/L	<										
	2-Chloronaphthalene	µg/L	<										
	4-Chlorophenyl Phenyl Ether	µg/L	<										
	Chrysene	µg/L	<										
	Dibenzo(a,h)Anthrancene	µg/L	<										
	1,2-Dichlorobenzene	µg/L	<										
	1,3-Dichlorobenzene	µg/L	<										
	1,4-Dichlorobenzene	µg/L	<										
	3,3-Dichlorobenzidine	µg/L	<										
	Diethyl Phthalate	µg/L	<										
	Dimethyl Phthalate	µg/L	<										
	Di-n-Butyl Phthalate	µg/L	<										
	2,4-Dinitrotoluene	µg/L	<										

	2,6-Dinitrotoluene	µg/L	<	
	Di-n-Octyl Phthalate	µg/L	<	
	1,2-Diphenylhydrazine	µg/L	<	
	Fluoranthene	µg/L	<	
	Fluorene	µg/L	<	
	Hexachlorobenzene	µg/L	<	
	Hexachlorobutadiene	µg/L	<	
	Hexachlorocyclopentadiene	µg/L	<	
	Hexachloroethane	µg/L	<	
	Indeno(1,2,3-cd)Pyrene	µg/L	<	
	Isophorone	µg/L	<	
	Naphthalene	µg/L	<	
	Nitrobenzene	µg/L	<	
	n-Nitrosodimethylamine	µg/L	<	
	n-Nitrosodi-n-Propylamine	µg/L	<	
	n-Nitrosodiphenylamine	µg/L	<	
	Phenanthrene	µg/L	<	
	Pyrene	µg/L	<	
	1,2,4-Trichlorobenzene	µg/L	<	
Group 6	Aldrin	µg/L	<	
	alpha-BHC	µg/L	<	
	beta-BHC	µg/L	<	
	gamma-BHC	µg/L	<	
	delta BHC	µg/L	<	
	Chlordane	µg/L	<	
	4,4-DDT	µg/L	<	
	4,4-DDE	µg/L	<	
	4,4-DDD	µg/L	<	
	Dieldrin	µg/L	<	
	alpha-Endosulfan	µg/L	<	
	beta-Endosulfan	µg/L	<	
	Endosulfan Sulfate	µg/L	<	
	Endrin	µg/L	<	
	Endrin Aldehyde	µg/L	<	
	Heptachlor	µg/L	<	
	Heptachlor Epoxide	µg/L	<	
	PCB-1016	µg/L	<	
	PCB-1221	µg/L	<	
	PCB-1232	µg/L	<	
	PCB-1242	µg/L	<	
	PCB-1248	µg/L	<	
	PCB-1254	µg/L	<	
	PCB-1260	µg/L	<	
	PCBs, Total	µg/L	<	
	Toxaphene	µg/L	<	
	2,3,7,8-TCDD	ng/L	<	
Group 7	Gross Alpha	pCi/L		
	Total Beta	pCi/L	<	
	Radium 226/228	pCi/L	<	
	Total Strontium	µg/L	<	
	Total Uranium	µg/L	<	
	Osmotic Pressure	mOs/kg		127

pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Stream / Surface Water Information

Knouse Foods Cooperative, Inc., NPDES Permit No. PA0262072, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Trib 08741 to Bermudian Creek**

No. Reaches to Model: **1**

- (●) Statewide Criteria
- ( ) Great Lakes Criteria
- ( ) ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	008741	0.26	871.52	0.99			Yes
End of Reach 1	008741	0.001	852	1.14			Yes

$Q_{7\text{-}10}$

Location	RMI	LFY (cfs/mi^2)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	0.26	0.14										100	7		
End of Reach 1	0.001	0.14													

Q_h

Location	RMI	LFY (cfs/mi^2)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	0.26														
End of Reach 1	0.001														

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Toxics Management Spreadsheet
Version 1.3, March 2021

Model Results

Knouse Foods Cooperative, Inc., NPDES Permit No. PA0262072, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | ◉ All ○ Inputs ○ Results ○ Limits

☐ *Hydrodynamics*

☑ *Wasteload Allocations*

☑ *AFC* CCT (min): 0.157 PMF: 1 Analysis Hardness (mg/l): 73.104 Analysis pH: 7.49

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	1,060	
Total Copper	0	0		0	10.004	10.4	14.7	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	45.843	54.8	77.4	Chem Translator of 0.837 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	359.220	360	509	Chem Translator of 0.998 applied
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Zinc	0	0		0	89.862	91.9	130	Chem Translator of 0.978 applied
Osmotic Pressure	0	0		0	50	50.0	70.6	

☑ *CFC* CCT (min): 0.157 PMF: 1 Analysis Hardness (mg/l): 73.104 Analysis pH: 7.49

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	6.852	7.14	10.1	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	

Total Iron	0	0		0	1,500	1,500	2,119	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	1.786	2.14	3.02	Chem Translator of 0.837 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	39.898	40.0	56.5	Chem Translator of 0.997 applied
Total Selenium	0	0		0	4.600	4.99	7.05	Chem Translator of 0.922 applied
Total Zinc	0	0		0	90.597	91.9	130	Chem Translator of 0.986 applied
Osmotic Pressure	0	0		0	N/A	N/A	N/A	

☑ ***THH*** CCT (min): 0.157 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Fluoride (PWS)	0	0		0	2,000	2,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	300	300	424	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	1,000	1,000	1,413	
Total Nickel	0	0		0	610	610	862	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	
Osmotic Pressure	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): 0.514 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	
Osmotic Pressure	0	0		0	N/A	N/A	N/A	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

Pollutants	Mass Limits AML (lbs/day)	Mass Limits MDL (lbs/day)	Concentration Limits AML	Concentration Limits MDL	Concentration Limits IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Aluminum	1.36	1.92	750	1,060	1,060	µg/L	750	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Copper	0.018	0.027	10.1	14.7	14.7	µg/L	10.1	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Dissolved Iron	0.77	1.2	424	661	1,060	µg/L	424	THH	Discharge Conc ≥ 50% WQBEL (RP)
Total Iron	Report	Report	Report	Report	Report	µg/L	2,119	CFC	Discharge Conc > 10% WQBEL (no RP)
Total Lead	0.005	0.009	3.02	4.71	7.54	µg/L	3.02	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Manganese	Report	Report	Report	Report	Report	µg/L	1,413	THH	Discharge Conc > 10% WQBEL (no RP)
Total Selenium	0.013	0.02	7.05	11.0	17.6	µg/L	7.05	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	0.17	0.23	91.9	130	130	µg/L	91.9	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Osmotic Pressure	XXX	XXX	50.0	70.6	70.6	mOs/kg	50.0	AFC	Discharge Conc ≥ 50% WQBEL (RP)

☑ ***Other Pollutants without Limits or Monitoring***

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., <= Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Fluoride (PWS)	N/A	N/A	Discharge Conc < TQL
Total Nickel	56.5	µg/L	Discharge Conc ≤ 10% WQBEL

TECHNOLOGY BASED EFFLUENT LIMITATION ANALYSIS

From Fact Sheet March 20, 2014 Incorporated for Reference

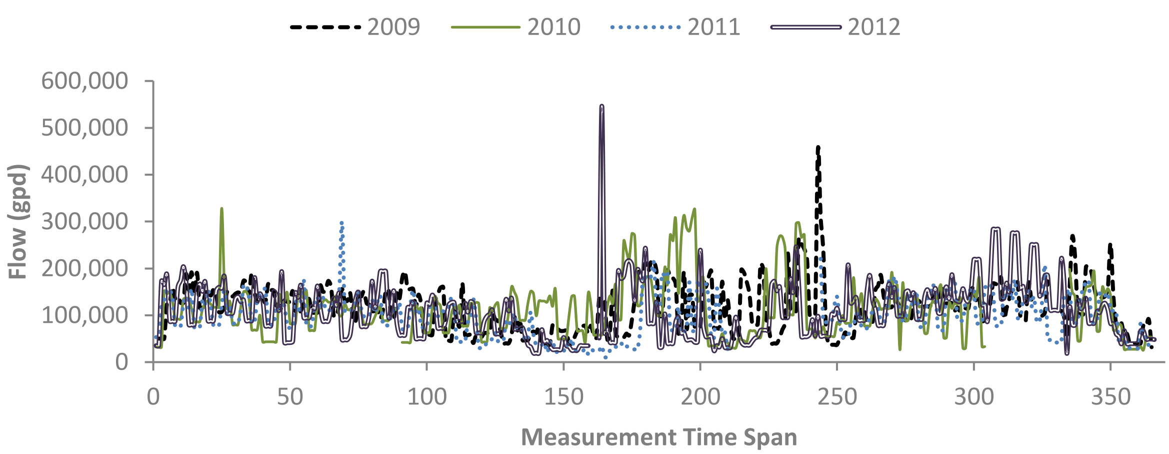
Introduction – Knouse Foods Peach Glen

The Knouse Foods Cooperative, Inc. (Knouse Foods) operates a fruit processing facility known as the Peach Glen Facility in Tyrone and Huntington Township, Adams County. The facility processes mostly apples, peaches and cherries with minor processing in apricots, blackberries, blueberries, cherries, raisins and rhubarb. The Peach Glen Facility mainly produces apple juice and pie fillings.

Sampling data for the existing sprayfield indicates that additional pollutants are present for which ELGs were not developed. The following pollutants are not covered by the current ELGs: aluminum, copper, lead, manganese, zinc, total nitrogen and total phosphorus. These pollutants were selected for a technology review because of water quality concerns within the Bermudian Creek, which Knouse Foods has proposed to discharge to. According to 40 CFR § 125.3, the NPDES permit application review must incorporate a technology assessment to determine Technology Based Effluent Limits or TBELs. For toxic parameters, the Best Available Technology Economically Achievable (BAT) technology standard must be met. The regulations also require selection of the most stringent limit; therefore, the TBELs developed based on Best Professional Judgment (BPJ) must be compared to Water Quality Based Effluent Limits (WQBELs) with selection of the most stringent limit. Although WQBELs are compared to TBELs, the TBELs are developed based on the performance of available technology without consideration to water quality.

According to Module 3 of the Knouse Foods NPDES permit application, the facility generates a long term average of 0.135 MGD and a maximum daily of 0.405 MGD from the production of fruit drink and canned fruit products. The figure below shows the wastewater flow applied to the sprayfields at Peach Glen from 2009 through 2012.

Figure 1. Wastewater flow pumped to sprayfields at Peach Glen



The Food & Beverage industry consumes high volumes of water, sometimes seasonally, as shown in Figure 1 on the previous page, and typically generates high organic strength wastewater.[1] The high constituent loadings from pollutants, such as BOD, COD and TSS, increase the cost of treatment and can cause load shocks to existing wastewater treatment systems.[1] The Peach Glen Facility does experience high BOD and COD loadings to the existing system, along with increased seasonal wastewater flows.

[1] McAdams, Neil, and Christian Cabral. "Treating Food & Beverage Wastewater." *Water & Wastes Digest.* April 30, 2009. www.wwdmag.com (accessed August 14, 2013).

The presence of organics, as measured by COD, and nutrients, like Total Nitrogen (TN) and Total Phosphorus (TP), along with metals, like copper and zinc, and the seasonal wastewater flow variations require a technology that combines biological and physical treatment. The wastewater characteristics and subsequent treatment needs narrows the technologies the Department reviewed in developing TBELs. Additionally, the Department's experience with other food processors was used in narrowing the technology review field to aerobic, anaerobic and physical (e.g. cloth filter) treatment. Other sources for identification of pertinent technology included the original ELG development documentation from the U.S. EPA.

In 1974 and 1975, the EPA developed ELGs for existing and new source fruit and vegetable processor. In the 1974 and 1975 EPA ELG Development Documents, Best Practicable Control Technology Currently Available (BPT) was identified as preliminary screening followed by primary settling and secondary biological treatment.[2,3] Also, EPA considered preliminary screening followed by primary and secondary treatment with advanced treatment (e.g. sand filtration) as Best Available Technology Economically Achievable (BAT).[2,3]

Food Processing Wastewater Technology Analysis

The Department conducted a technology review in order to determine TBELs for the Knouse Foods Peach Glen proposed discharge. The technology selected represents the Department's BPJ BAT determination for Knouse Foods Peach Glen's treatment system based on a review of currently available engineering information, industry and government literature, Department files and analysis of available data using the Department's PENTOXSD and TOXCONC models. The technology evaluation was conducted by review of pertinent textbooks and internet search using general keywords, as well as keyword searches of website libraries, such as that of the U.S. Environmental Protection Agency. The technologies reviewed include: aerobic reactors, anaerobic reactors, membrane bioreactors (MBRs), and sprayfield technology.

Aerobic treatment

Aerobic wastewater treatment technology, such as extended aeration, operates by providing an oxygen rich environment that allows microorganisms to consume organic matter and form CO_2 and water. The aerobic process is typically employed for domestic sewage and more dilute industrial wastewater streams in terms of BOD concentrations. Although aerobic technology was reviewed, given the high BOD and COD characteristics of the Knouse Foods Peach Glen wastewater stream, aerobic treatment by itself is not sufficient. The Peach Glen plant needs to treat the wastewater stream to reduce the BOD and COD concentrations prior to the use of an aerobic process. Based on technology employed at a food processing plant in York County, anaerobic digestion, as the first stage of biological treatment, does lower many of the wastewater constituent concentrations to a level comparable to that of high strength domestic sewage.

Since most aerobic treatment technology employs some variation of the aerobic treatment process, the Department limited the review to conventional technologies that could be used following a pretreatment step, such as anaerobic treatment. Those technologies include Sequencing Batch Reactor (SBRs), oxidation ditch and aerated lagoons.

Sequencing Batch Reactor$_{\text{(SBR)}}$

Sequencing Batch Reactors or SBRs, operate through the following phases: Fill, React, Settle, Decant and Idle. SBR systems are sometimes paired with cloth or sand filtration technology that, with the addition of a coagulant, such as alum, is used to reduce TSS and particulate phosphorus concentrations. This technology is often applied to sewage treatment and in some cases to industrial wastewater, but this technology alone would not adequately treat the Knouse Foods discharge because of the high BOD and COD concentrations and reduction of metals concentration. Typical BOD and COD concentrations for high strength sewage are 350.0 mg/L and 800.0 mg/L.[4] Based on the sampling data

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[2] U.S. EPA. *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Apple, Citrus and Potato Processing Segment of the Canned and Preserved Fruit and Vegetables Point Source Category.* Government Report, Washington, D.C.: U.S. Government Printing Office, 1974.

[3] U.S. EPA. *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Fruits, Vegetables and Specialties Segment of the Canned and Preserved Fruits and Vegetables Point Source Category.* Government Report, Washington, D.C.: U.S. EPA Effluent Guidelines Division - Office of Water and Hazardous Material, 1975.

[4] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 186

submitted from January 1, 2009 to December 31, 2012, the Knouse Foods wastewater applied to the sprayfield, after aeration, contained BOD and COD concentration ranges from 170.0 mg/L to 4093.0 mg/L and 1440.0 mg/L to 6430.0 mg/L, respectively. Based on a site visit in June of 2013, Department representatives learned that the pilot plants currently being tested had experienced influent COD concentrations as high as 15,000 mg/L.[5] In order to make SBR technology practical to treat the industrial wastewater from the Peach Glen Facility, anaerobic treatment would be required to initially reduce the BOD loadings to comparable levels of domestic sewage. However, the SBR technology would still require an additional add-on system to reduce metals concentrations, such as copper. Also, multiple basins would be required to handle the seasonal flow the Peach Glen Facility experiences.

Oxidation Ditch

Oxidation ditch systems consist of a channel or multiple channels within a basin that is oval in shape. Aerators within the channels provide circulation and aeration, which allow the organisms within the wastewater to remove organics. The oxidation ditch uses long solids retention times to remove biodegradable organics.[6] Effluent from the oxidation ditch requires secondary clarifiers to further settle the wastewater. Manufacturers offer various designs for nutrient removal; however, an anaerobic system can be added prior to the oxidation ditch to enhance biological phosphorus removal.[6] The oxidation ditch technology is reliable, energy efficient and produces less sludge than other biological treatment processes.[6] The overall process does require greater land area than the SBR technology and requires greater operator attention to maintain nitrogen removal capabilities.[7,8] As with the SBR technology, anaerobic treatment would still be required to bring the influent BOD concentrations down and a physical barrier would be necessary to ensure the removal of metals.

Aerated Lagoons

Aerated lagoons are commonly used to treat municipal and industrial wastewater and operate by providing aeration through mechanical mixers or diffused aeration.[9] Knouse Foods currently operates aerated lagoons prior to irrigating the wastewater and for the land application the lagoon systems are suitable. The aerated lagoon systems work well for treating low to medium strength wastewater, but are land intensive.[9] Aerated lagoons are more commonly subject to surface ice formation in winter and reduced rates of biological activity during the cold weather.[9] Although Knouse Foods currently has aerated lagoons, the lagoons are not lined and, based on previous studies, do leak into the Bermudian Creek. The available literature indicates that alone, aerated lagoons are not well suited for treating the Knouse Foods Peach Glen wastewater for stream discharge.

Anaerobic treatment

The anaerobic treatment process operates by breaking down organic and inorganic matter without oxygen and has several advantages compared to aerobic systems including: less energy required, less sludge production, less nutrients required and smaller reactor volume.[10,11] Generally anaerobic treatment systems operate using one of the following processes: anaerobic filter reactor, anaerobic contact process, fluidized-bed reactor, upflow anaerobic sludge blanket and expanded granular sludge bed.[11] The various system designs have "resulted in reactor SRT [Solids Retention Time] becoming independent of HRT [Hydraulic Retention Time], thus allowing for operation at short HRT (6h to 1 week) and higher

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[5] COD value stated by Knouse Foods Representatives and noted by Department staff during a site visit on June 13, 2013.
[6] U.S. EPA. *Wastewater Technology Fact Sheet Oxidation Ditches.* Washington, D.C.: U.S. EPA Office of Water, 2000.
[7] U.S. EPA. *Wastewater Technology Fact Sheet Sequencing Batch Reactors.* Washington, D.C.: U.S. EPA Office of Water, 1999.
[8] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 798
[9] U.S. EPA. *Wastewater Technology Fact Sheet Aerated, Partial Mix Lagoons.* Washington, D.C.: U.S. EPA Municipal Technology Branch, 2002.

[10] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 984
[11] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 494-496

organic loading rates (4 to 40 kg COD/m^3 reactor/d)."[11] This reduces the reactor volume and the treatment plant footprint.[12]

Based on a review of treatment system manufacturer information, anaerobic pretreatment systems paired with aerobic systems and MBRs appears to be common for treatment of the Food & Beverage industry wastewater. The available engineering literature suggests a variety of advantages with the anaerobic treatment process for this type of wastewater including a "high COD conversion efficiency to methane with minimal biomass production."[13] For example, since 1988 Hanover Foods in York County has operated an anaerobic pretreatment system to reduce the COD loading within the wastewater stream prior to sending it to aerated lagoons for further treatment.

One manufacturer's anaerobic treatment system, treating apple process wastewater, produced the following effluent concentrations:

Table 1. Anaerobic Treatment of Apple Processing Wastewater[14]

Sample Source	COD (mg/L)	BOD (mg/L)	SS (mg/L)
Raw Wastewater	3,994	2,441	2,573
Anaerobic Effluent	174	87	54

The same manufacturer installed the same anaerobic treatment system at a potato chip manufacturer in Ohio with influent BOD concentrations that range from 3,000 to 5,000 mg/L.[15] According to the manufacturer's website, the system has consistently reduced the BOD concentrations to below 300 mg/L.[15] The Department reviewed several anaerobic treatment technologies, including: Upflow Anaerobic Sludge Blanket Reactor (UASB process), Upflow Packed-Bed Attached Growth Reactor, Upflow Attached Growth Anaerobic Expanded Bed Reactor (AEBR), Attached Growth Anaerobic Fluidized-Bed Reactor (FBR), and Covered Anaerobic Lagoon Process. However, the Upflow Packed-Bed Attached Growth Reactor was eliminated because it is more suited to wastewaters with low suspended solids concentrations.[16] The AEBR process was also eliminated because most installations of the system have been for domestic wastewater and not industrial wastewater.

Upflow Anaerobic Sludge Blanket Reactor$_{(UASB)}$

The UASB system operates by directing wastewater flow to the bottom of the reactor, where it is uniformly distributed, and can then flow upward through granules where sludge has formed.[17,18] The microorganisms within the sludge blanket consume the waste within the wastewater. This type of treatment "is very successful with high carbohydrate or sugar wastewaters."[17] It can take several months to develop the granulated sludge and the design velocities must be controlled, which could require equalization prior to anaerobic treatment.[17] The main advantages to the UASB process are the ability to handle high loadings and relatively low detention times and there are "more than 500 full-scale facilities in operation."[19]

Attached Growth Anaerobic Fluidized-Bed Reactor$_{(FBR)}$

[12] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 998

[13] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 994

[14] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 502, Table 7.20

[15] ADI. *ADI-BVF Reactor to Treat Snack Foods Wastewater.* 2013. www.adi.ca (accessed August 22, 2013).

[16] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 1019

[17] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 1006

[18] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 497

[19] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 1012

The FBR system uses high velocities to expand the sand as the wastewater flows upward through the react and effluent is recycled to provide the necessary upflow velocity and wastewater strength.[18] In the FBR system the sand acts as the bed material to allow microbial growth to occur. In some facilities, "[a]ctivated carbon has been used in many anaerobic FBRs for treating industrial and hazardous waste streams."[20] This has several advantages over sand, such as maintaining higher biomass concentrations because of the porous structure of GAC.[20] The use of GAC over sand can add a greater capital and maintenance cost to the system. The FBR system does have minimal solids capture and can take up to six months to establish the necessary bacteria.[20]

Covered Anaerobic Lagoon Process

The covered anaerobic lagoon system is designed to promote anaerobic conditions using deep lagoons or tanks. Typically anaerobic lagoon systems are lined with a synthetic or concrete liner and have a depth from 8 to 20 feet.[21] These systems are typically used for pretreatment of high strength industrial wastewaters or to allow preliminary sedimentation of municipal wastewater.[21] Several wastewater technology companies manufacture proprietary anaerobic lagoon systems that contain a floating geomembrane cover and separate zones within the lagoon or tank. The main advantage of a covered lagoon system is the ability to handle a wide range of waste characteristics.[22] In general, the advantages of lagoon systems include lower energy requirements, lower biomass, which reduces sludge associated cost, and lower capital cost to construct the facility.[21]

Membrane Bioreactor$_{(MBR)}$

The MBR system was selected for review based on engineering literature, manufacturer information and the characteristics of the Knouse Foods wastewater. The recommended Water Quality Based Effluent Limitations (WQBELs) for toxics, such as copper and zinc, require technology that can meet stringent concentrations. Sand filtration and cloth filtration were eliminated from consideration based on the need for chemical treatment (e.g. coagulants, polymers) and the inability to reach low level metals concentrations. The MBR system was also reviewed based on current pilot plant technology at the Peach Glen Facility.

MBR systems function by using either microfiltration or ultrafiltration membranes that provide a physical barrier to many wastewater constituents. The MBR system can be immersed in the activated sludge reactor or on the exterior of the reactor. When the MBR system is immersed in the reactor the membranes use hollow tubes bundled together and connected to a manifold. The water is pulled through the membrane into the hollow tube and out a manifold connected to the membrane cartridge. This process separates the solids and water, leaving the solids within the reactor. Air scour is used to reduce build up on the exterior of the membranes.

Exterior membranes function by pumping the activated sludge from the bioreactor through the membranes, which retains the solids inside the hollow tubes and water passes to the outside. The membranes are backwashed periodically to remove solids, with the solids returned to the bioreactor.

Industrial MBR systems have been installed to handle nitrogen removal, as well as complex organics from pharmaceutical manufacturing and are "proven to be optimal for treatment of many industrial wastewaters when treatment efficiency is an important consideration."[23] For example, a former Nestle plant in New Milford, Connecticut installed a MBR system to treat food processing wastewater and achieved "over 90 percent total nitrogen removal in the treatment of wastewater with maximum nitrogen and COD concentrations exceeding respectively, 800 and 12,000 mg/L.[23]

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[20] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 1021-1022
[21] U.S. EPA. *Wastewater Technology Fact Sheet Anaerobic Lagoons.* Washington, D.C.: U.S. EPA Municipal Technology Branch, 2002.
[22] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page1024
[23] Sutton, Paul M. "Membrane Bioreactors for Industrial Wastewater Treatment: Applicability and Selection of Optimal System Configuration." *Water Environment Federation.* 2006. www.wef.org (accessed June 6, 2013).

The MBR systems produce higher effluent quality than conventional biological treatment with a reduced footprint.[24] Also, MBR systems operate at higher SRT, which results in lower sludge production.[24] However, capital and operational cost are higher than conventional systems.[24]

Sprayfield Technology

Sprayfield technology was evaluated extensively prior to Knouse Foods submission of the NPDES permit application; however, the Peach Glen site currently operates two sprayfields that are in violation of Department regulations because they cannot handle the volume of wastewater sprayed. Knouse Foods and their consulting engineers and geologist evaluated additional spray sites adjacent to the property. The various sites known as Hilltop No. 1, 2 and 3 were determined to be unsuitable for spray application or could not handle the spray volume needed due to soil or groundwater conditions. Additional land surrounding the Peach Glen site is not available for spray application.

Best Available Technology Analysis for Knouse Foods

The Department's review of the available technology to treat the Knouse Foods Peach Glen food processing wastewater based on the requirements of 40 CFR § 125.3(d)(3)(i)-(v) confirms that the best available technology is anaerobic treatment paired with aerobic treatment and a membrane bioreactor system. Department consideration of each individual requirement of 40 CFR § 125.3(d)(3) is discussed below and on the subsequent pages.

(i) AGE OF EQUIPMENT AND FACILITIES INVOLVED

The current wastewater treatment system is not capable to treat the wastewater generated at Knouse Foods Peach Glen. The existing sprayfield soils have been degraded due to years of over application, which is partially related to year-round operation, as opposed to seasonal operation.

The year-round operation is based on the equipment investment Knouse Foods has made at the processing plant, such as a climate controlled building to preserve fruit and peach processing equipment. The climate controlled building allows Knouse Foods to adjust temperature and nitrogen content to preserve apples and other fruit longer, which also allows the company to retain employees on a year round basis, as opposed to seasonal operation. Knouse Foods also invested in a new peach processing line, which operates separately from the cherry and apple processing lines. Although Knouse Foods has stated that the new peach processing line has reduced water use within the facility, the year round operation that the climate controlled building allows ensures that wastewater generation occurs during periods when spray application is limited, such as winter. Irrigation during the winter is limited due to the freezing of soils. Additionally, previous Department evaluations of the existing unlined impoundments shows wastewater leaks from these impoundments into Bermudian Creek.

The inability to effectively irrigate or treat the food processing wastewater can create shutdown periods at the Peach Glen Facility. Shutdown periods can occur because of excess wastewater within the aeration basins, as a result of being unable to irrigate sprayfields due to extended periods of precipitation or frozen soils. Therefore, since Knouse Foods has invested in keeping the Peach Glen Facility operable on a year round basis, effective wastewater treatment is necessary.

(ii) PROCESS EMPLOYED AND PROCESS CHANGES

The fruit processes employed at the Peach Glen site were considered for any impacts that may occur due to installation of a new treatment plant. The processing of various fruits into final products requires the use of water to bottle or can final products, clean processing lines, chill fruit, such as cherries, for processing, and deliver apples from unloading areas to processing lines. The generation of wastewater can be reduced, but not eliminated within the fruit processing plant. Since the facility cannot adequately handle wastewater generated, which can lead to plant shutdown periods, construction and operation of a wastewater treatment facility with a stream discharge would allow continuous operation because treatment plants are typically designed with redundancy in the system. This is

[24] U.S. EPA. *Wastewater Management Fact Sheet Membrane Bioreactors.* U.S. EPA, 2007.

in contrast to the existing spray irrigation system, which cannot be operated during periods of precipitation, sustained winds over 10 mph or frozen ground conditions.

The weather and climate limitations require spray irrigation sites to provide a minimum of 90 days of wastewater storage. In the event that weather prevents Knouse Foods from irrigating and therefore reducing the water level within their impoundments, then the facility must either shut down or Knouse Foods must truck wastewater to another facility with additional capacity. A similar situation occurred at Knouse Foods Biglerville plant in the spring of 2011. Therefore, a wastewater treatment plant that is well operated would allow Knouse Foods to continually operate and meet peak flow requirements unencumbered by weather or climate related events.

(iii) ENGINEERING ASPECTS OF THE APPLICATION OF VARIOUS TYPES OF CONTROL TECHNIQUES

The application of an anaerobic treatment unit paired with aerobic treatment and a membrane bioreactor system requires the construction of several treatment units, as well as the operation and maintenance of the systems themselves. Additional treatment units, such as flow equalization basins and disinfection are also necessary for treatment and operation of a new treatment plant.

A flow equalization basin is often recommended in wastewater treatment because of the ability to reduce a surge of wastewater flow to the treatment. Most likely the Peach Glen Facility would require an equalization basin because of the change in food processing wastewater, which leads to fluctuation of wastewater flow. Basin construction would require concrete or steel, plus piping. Prior to entering an equalization basin, wastewater treatment may begin with a screening device to reduce large solids from entering the basin and requiring more frequent cleaning.

The construction of an anaerobic treatment unit, depending on the proprietary unit selected, requires the construction of a concrete or steel container. For example, Knouse Foods is currently piloting an ADI BVF anaerobic treatment system at the Peach Glen Facility. The ADI BVF units can either be an in-ground concrete basin or an above-ground tank. These units use a mixer or mixers, depending on the setup, as well as a floating geomembrane cover. Operation of the anaerobic treatment units are relatively simple and yield low amounts of sludge, which reduce sludge wasting requirements.

Aerobic treatment can be constructed as a separate treatment unit or in some proprietary design units, paired with membrane bioreactor (MBR) systems. As with an anaerobic system, depending on the design, a concrete or steel basin is required. Fine or coarse bubble diffusers would most likely deliver the necessary air into the treatment unit. The use of fine or coarse bubble diffusers would require the diffusers, piping, blowers, motors and a control system. If an aerobic system shared a basin or tank with an MBR system, then an additional common wall would be needed.

The MBR system requires proprietary membranes, either microfiltration or ultrafiltration membranes for the Knouse Foods application. These types of membranes operate at lower transmembrane pressures than reverse osmosis membrane, which reduces energy requirements.[25] The membrane units commonly operate as hollow tube units, which requires a vacuum pump system to pull the wastewater from the outside of the membrane to the inside. The MBR system acts as both a bioreactor and clarifier in one unit, with the membrane providing an ultimate barrier to many wastewater constituents.[25,26]

MBR systems require more frequent operator attention; however, the systems have proven optimal for treatment of industrial wastewater.[23] A return activated sludge system is also needed to remove the filtered material back into the aerobic system or to waste sludge to the anaerobic treatment unit.

Based on the characteristics of the Peach Glen food processing wastewater, chemical addition may be needed throughout the treatment process. For example, adjustment of pH may be needed prior to treatment in the

[25] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 694-695
[26] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 854

anaerobic unit. The addition of nutrients may also be required following the anaerobic treatment stage to ensure the biological activity can process the wastewater. Chemical addition in the MBR system would be required to clean the membranes and prevent biofouling.

Sludge storage is also required for any wasted sludge from the system, which would require dewatering and pumping systems. The dewatering system may also require the use of a settling aid. Also, given the operational complexity of the system, a central control system would be required.

(iv) COST OF ACHIEVING EFFLUENT REDUCTION

The cost of achieving effluent reductions was considered in the BAT analysis. Based on the Knouse Foods NPDES application, a maximum flow of 0.405 MGD was used to estimate treatment plant requirements and subsequently produce a range of cost for the treatment. Some cost data was not available; therefore, best estimates were made based on comparison to municipal treatment cost or available case studies. However, estimation of the MBR system requires testing to develop precise data, which is used to determine the specific technology and therefore makes cost estimation in terms of capital and operating costs difficult.[27] Estimation of capital and operation cost was performed based on available engineering text, EPA and industry literature. The capital cost was developed based on the maximum design flow in the NPDES application. Operation and maintenance cost were developed based on the average design flow provided in the NPDES application.

The MBR cost estimates available provide a range of capital cost; however, some information is several years old and may not adequately reflect cost due to inflation. Industrial wastewater characteristics can be highly variable in terms of the constituent concentrations. The highly variable nature requires pilot testing to determine certain wastewater characteristics for both design and subsequently for cost determination. Therefore, the values used to estimate a cost range for the MBR systems are based on industrial wastewater applications in general, but do not take into account the specific constituent levels experienced at the Knouse Foods Peach Glen.

Eckenfelder et al. provides capital and operating cost for membrane separation technologies for wastewater treatment within the *Fourth Edition of Industrial Water Quality*; however, the cost data cited is approximately 19 years old. Based on the values provided for capital cost, the UF membrane technology for a maximum discharge of 0.405 MGD would range from $60,000.00 to $740,000.00 and the annual operating cost would range from $27,000.00 to $144,000.00. The value of $60,000.00 for capital cost may be unreasonably low for this size facility with the potential wastewater characteristics. An evaluation of MBR systems for water reclamation for the City of San Diego, conducted by Adham et al., combined the estimated capital and operating cost for a MBR system for facilities ranging from 0.2 to 1.0 MGD.[28]

“It should be noted that anaerobic digestion systems often pay for themselves through the combination of reduced costs for biosolids disposal (owing to reduction in biosolids volume through the digestion process), the potential marketing of Class A biosolids product, and the recovery of usable biogas”[29]

(v) NON-WATER QUALITY ENVIRONMENTAL IMPACTS (INCLUDING ENERGY REQUIREMENTS)

Non-water quality environmental impacts were considered during the BAT anaylsis. Energy requirements were considered and this played a key factor in the recommendation of anaerobic treatment. Anaerobic treatment generates methane gas during the treatment process and the methane can be used to re-heat the treatment unit

[27] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 681

[28] Adham, Ph.D., Samer, James F. DeCarolis, and William Pearce. *Optimization of Various MBR Systems for Water Reclamation - Phase III.* Denver: U.S. Department of the Interior - Bureau of Reclamation, 2004. See Appendix A

[29] U.S. EPA. *Biosolids Technology Fact Sheet Multi-Stage Anaerobic Digestion.* Washington, D.C.: U.S. EPA Office of Water, 2006.

or in some cases generate electricity; however, for the Knouse Foods system it is not known whether electricity generation is feasible. [Note electricity is less with anaerobic and MBR systems]

Best Professional Judgment Determination

The Knouse Foods Peach Glen site in Adams County processes apples, peaches and other fresh and frozen fruits into a variety of products, including apple juice and pie fillings. The existing aeration lagoon system with spray irrigation cannot adequately treat the volume of wastewater generated by the facility. The system was originally designed for seasonal operation; however, Knouse Foods has made investment into the site to allow year round fruit processing. Knouse Foods is unable to continue operating the existing system because of a lack of available land for spray irrigation and the migration of wastewater out of the unlined aeration lagoons into Bermudian Creek. Knouse Foods and their consulting engineers, as well as the Department extensively reviewed spray irrigation, but determined that it is not feasible both environmentally and economically. Knouse Foods has submitted a NPDES application for discharge of treated food processing wastewater to a UNT to Bermudian Creek at the Peach Glen site, with a maximum discharge rate of 0.400 MGD and a long term average of 0.130 MGD. Knouse Foods included proposed design alternatives within the NPDES application, which include anaerobic-aerobic treatment paired with a MBR system, as well as aerobic treatment paired with a MBR system.

The Department has conducted a review of the available engineering literature and manufacturer information in order to determine the best available technology achievable for the Peach Glen site. Based on the Department's review of available information, the BPJ BAT recommends anaerobic treatment paired with aerobic and MBR treatment. This recommendation agrees with the Knouse Foods proposed Alternative 2 within the NPDES application. The recommended technology is used as a basis for determining effluent technology limits, which can effectively and reliably reduce constituent concentrations, such as BOD, TSS and nutrients, as well as metals.

Effluent Limits

The technology was assessed for treatment of individual parameters within the food processing wastewater to determine technology based effluent limits or TBELs. The parameters, aluminum, copper, lead, manganese, zinc, and iron were identified as toxic parameters and total nitrogen and total phosphorus, were identified as non-conventional. Both toxics and non-conventional pollutants can be evaluated based on the BAT level of control.

The available literature contained very limited or no data for toxic parameters. In addition, appropriately definitive technology limits cannot be determined due to the limited, partial-year data obtained from the pilot studies. It is recommended that technology limits be reassessed prior to the next permit renewal. The reassessment of aluminum, copper, lead, manganese, zinc, and iron is recommended because the existing technology will not adequately treat the food processing wastewater for stream discharge and sampling data from the current treatment system is not considered applicable for determining final technology effluent limits for stream discharge from an anaerobic-aerobic-MBR system. The selection of MBR technology provides a physical barrier through the use of ultrafiltration or UF membranes, which limit the passage of wastewater constituents. It is anticipated that the UF membrane pore size operating in an activated sludge environment will reduce the toxic pollutant concentrations.

Aluminum$_{(Al)}$

The spray irrigation data from Peach Glen, for the period from January 1, 2009 to December 31, 2012 or a total of 17 data points shows that aluminum is present in the aeration lagoon effluent at an average concentration of 1.305 mg/L. The median and maximum concentrations from the same data set are 1.130 mg/L and 2.8 mg/L, respectively.

Data pertaining to effluent aluminum concentrations from anaerobic-aerobic-MBR systems was not located within the available information. Some aluminum may be sequestered within the biomass of the anaerobic and aerobic systems. However, reduction of aluminum is expected because of the UF membranes employed in the MBR system and potential for minor sequestration within the biological treatment systems.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in aluminum with the median concentration decreasing from 1.130 mg/L to 0.2 mg/L. At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for aluminum should be performed prior to the next permit renewal.

Copper$_{(Cu)}$

The copper concentrations within the spray irrigation data from Peach Glen, for the period from January 1, 2009 to December 31, 2012 or a total of 15 data points averages 0.0413 mg/L post aeration lagoon. The median and maximum concentrations for the data set are 0.050 mg/L and 0.072 mg/L, respectively.

The Marathon Ashland Petroluem site in Kentucky, using an MBR system, was able to reduce copper from 0.0356 mg/L down to 0.011 mg/L.[30] The effluent copper results from the Marathon Ashland Petroleum site are comparable to reverse osmosis and carbon adsorption.[31] Additional information on anaerobic-aerobic-MBR systems and metals removal was not located during this review. Therefore, consistent effluent copper concentrations could not be established for the MBR system.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in copper with the median concentration decreasing from 0.050 mg/L to 0.001 mg/L (all pilot sample concentrations were non-detect, with a reporting limit of 0.001 mg/L). At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for copper should be performed prior to the next permit renewal.

Lead$_{(Pb)}$

The lead concentrations within the spray irrigation data, post aeration lagoon, from January 1, 2009 to December 31, 2012 or a total of 15 data points averages 0.080 mg/L. The median and maximum concentrations for the data set are 0.100 mg/L. The laboratory testing results indicated that the reporting limit was changed in April of 2011 from 0.100 mg/L to 0.05 mg/L for the test method EPA 200.7.

As with copper, the MBR system at the Marathon Ashland Petroleum site in Kentucky, reduced lead from 0.0043 mg/L down to <0.001 mg/L, which is consistent with reverse osmosis and carbon adsorption treatment.[30,31] However, consistent effluent lead concentration data was not obtained during this review and the Marathon site data could not be validated as reproducible with other MBR systems.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in lead with the median concentration decreasing from 0.1 mg/L to 0.001 mg/L (all pilot sample concentrations were non-detect, with a reporting limit of 0.001 mg/L). At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for lead should be performed prior to the next permit renewal.

Manganese$_{(Mn)}$

Manganese is present in the Peach Glen food processing wastewater post aeration lagoon treatment. The concentration from January 1, 2009 to December 31, 2012 or a total of 46 data points averages 0.212 mg/L. The median and maximum concentrations for the data set are 0.200 mg/L and 0.480 mg/L, respectively.

Consistent effluent manganese data from an anaerobic-aerobic-MBR system was not available during this review. As with other metal constituents in the Knouse Foods processing wastewater, it is anticipated that the physical barrier provided by the UF membranes, as well as minor sequestration within the biomass of the system, will reduce manganese levels.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in manganese with the median concentration decreasing from 0.200 mg/L to 0.001 mg/L. At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for manganese should be performed prior to the next permit renewal.

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[30] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 699

[31] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 1384

Zinc$_{(Zn)}$

Based on the spray irrigation sample results, from January 1, 2009 to December 31, 2012 or a total of 15 data points, zinc is present within the post aeration lagoon effluent at an average concentration of 0.3973 mg/L. The median and maximum concentrations for the data set are 0.380 mg/L and 0.640 mg/L, respectively.

The Kentucky Marathon Ashland Petroleum MBR system was able to reduce zinc from 0.504 mg/L down to 0.035 mg/L.[30] Effluent data pertaining to zinc removal efficiencies was not located during this review; therefore, the Marathon MBR system performance cannot be evaluated as reproducible with other MBR systems.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in zinc with the median concentration decreasing from 0.380 mg/L to 0.001 mg/L. At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for zinc should be performed prior to the next permit renewal.

Iron$_{(Fe)}$

Iron is present in the Peach Glen food processing wastewater post aeration lagoon treatment. The sprayfield effluent data submitted by Knouse Foods from January 1, 2009 to December 31, 2012 produces an arithmetic mean total iron concentration of 5.0065 mg/L and a median value of 4.7500 mg/L. The arithmetic mean and median concentrations for dissolved iron are 2.4713 mg/L and 2.5000 mg/L, respectively.

Consistent effluent iron data from an anaerobic-aerobic-MBR system was not available during this review. As with other metal constituents in the Knouse Foods processing wastewater, it is anticipated that the physical barrier provided by the UF membranes, as well as minor sequestration within the biomass of the system, will reduce iron levels.

The results from the anaerobic-aerobic-MBR pilot treatment system reveal a significant decrease in total iron with the median concentration decreasing from 4.750 mg/L to 0.5 mg/L. Pilot test data for dissolved iron were unavailable. At this time, an appropriately definitive technology limit cannot be determined due to the limited, partial-year data available from the pilot studies. However, a complete TBEL analysis for iron should be performed prior to the next permit renewal.

Total Nitrogen$_{(TN)}$

The data submitted by Knouse Foods, as part of the spray irrigation monitoring, from January 1, 2009 to December 31, 2012 or 15 total data points, results in an average and median TN concentration of 12.6 mg/L and 10.3 mg/L, respectively. The maximum TN concentration from the data set is 26.0 mg/L. These concentrations reflect the effluent from aeration basins prior to spray application. Influent values were not available during this review. By comparison typical TN concentrations of untreated domestic sewage are as follows: 20.0 mg/L for low strength, 40.0 mg/L for medium strength, and 70.0 mg/L for high strength.[32] As part of the Knouse Foods Peach Glen NPDES application, submitted on June 4, 2013, treatment plant schematics were provided for the alternatives being evaluated.

The treatment plant alternatives, currently being piloted at the Peach Glen Facility, show that additional sources of nitrogen are necessary for biological treatment and would be added to the system in the form of urea. The low TN concentration and need for additional nitrogen for biological treatment, suggests that Knouse Foods could produce a low TN concentration. Alternative No. 2, which uses a combination of anaerobic and aerobic treatment, would most likely result in an effluent from the anaerobic treatment system that is consistent with that of low strength domestic sewage. The aerobic treatment process in both alternatives is paired with a MBR system, which uses UF membranes. Case studies show low effluent concentrations for ammonia (<0.21 mg/L), nitrates (2.8 mg/L) and total kjehldahl nitrogen (1.9 mg/L) can be achieved with MBR systems treating domestic sewage (nitrite data was unavailable in the case studies).[24] Metcalf and Eddy reported that typical performance of MBR systems treating domestic sewage result in effluent TN concentrations of <10.0 mg/L; however, pilot studies have shown that for domestic sewage TN concentrations from an

[32] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 186

MBR system range from 7.0 to 10.0 mg/L.[33] Eckenfelder et al. state that "[s]ince most existing MBRs operate at high SRTs, effluent ammonia concentrations are quite low, but effluent TN values for domestic sewage are around 8.0 mg/L."[34] The U.S. EPA has documented MBR systems used for biological nutrient removal can achieve effluent TN concentrations of 4.0 mg/L.[35] EPA also documented that in some well operated MBR systems, TN concentrations as low as <3.0 mg/L were consistently achieved.[36]

The selection of anaerobic treatment technology is recommended as part of the BPJ BAT decision and because the technology can produce wastewater effluent consistent with domestic sewage, a TBEL for TN is recommended. Since the Peach Glen wastewater TN concentrations are consistent with low strength domestic sewage and Knouse Foods can control additional nitrogen added, and based on the engineering text MBR case studies, a TN limit of 8.0 mg/L as an average monthly limit is recommended. The average monthly limit is within the range of effluent TN concentrations for MBR systems and can be consistently achieved in a well operated treatment plant. A maximum daily and instantaneous maximum limit of 16.0 mg/L and 20.0 mg/L is recommended based on the industrial multipliers of 2.0 and 2.5, respectively.[37]

Total Phosphorus$_{(TP)}$

Total phosphorus is present in the Knouse Foods processing wastewater as indicated by the spray irrigation data submitted from January 1, 2009 to December 31, 2012. Based on spray irrigation data, a total of 15 data points, TP concentrations from the existing aeration lagoons is present at an average concentration of 4.3 mg/L with a median concentration of 4.0 mg/L. The maximum TP concentration from the dataset is 11.0 mg/L. For comparison, low and medium strength untreated domestic sewage typically has a concentration of approximately 4.0 mg/L and 7.0 mg/L, respectively.[32] High strength untreated domestic sewage has a TP concentration of approximately 12.0 mg/L.[32] Total phosphorus concentrations, as with other food processing constituents can vary by food type processed, which supports the need for pilot testing of treatment technology at each site. However, tomato canneries provide similar TP concentrations to that experienced at Knouse Foods Peach Glen. For example, tomato cannery wastewater with basic treatment consisting of screening, aeration and sedimentation produces TP effluent concentrations during the off season, which is defined as November through June, ranging from 0.3 to 3.9 mg/L.[38] During the peak season, which is defined as July through September, TP effluent concentrations range from 1.5 to 7.4 mg/L without aeration.[38] The available examples suggest the Peach Glen food processing wastewater TP concentration is consistent with other food processors and comparable to low to medium strength untreated domestic sewage. As part of the Knouse Foods Peach Glen NPDES application, submitted on June 4, 2013, treatment plant schematics were provided for the alternatives being evaluated.

The treatment plant alternatives, currently being piloted at the Peach Glen Facility, show that additional sources of phosphorus are necessary for biological treatment and would be added to the system in the form of phosphoric acid or H_3PO_4. The TP concentration and need for additional phosphorus for biological treatment, suggests that Knouse Foods could produce a low TP concentration because of control over additional phosphorus. Alternative No. 2, which uses a combination of anaerobic and aerobic treatment, would most likely result in an effluent from the anaerobic treatment system that is consistent with that of low strength domestic sewage. The aerobic treatment process in both alternatives is paired with a MBR system, which uses UF membranes. The anaerobic treatment process would most likely result in

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[33] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 858-859 and 1128

[34] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 385

[35] U.S. EPA. *Emerging Technologies for Wastewater Treatment and In-Plant Wet Weather Managemetn.* Washington, D.C.: U.S. EPA Office of Wastewater Management, 2013. Page 3-25

[36] U.S. EPA . *Municipal Nutrient Removal Technologies Reference Document Volume 1 - Technical Report.* Ann Arbor, MI & Fairfax, VA: U.S. EPA Office of Wastewater Management, 2008. Page5-5, Table 5-4

[37] Pennsylvania Department of Environmental Protection. *National Pollution Discharge Elimination System (NPDES) Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits, Document No. 362-0400-001.* Harrisburg: PA DEP Bureau of Water Quality Protection, 1997.

[38] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 189

a phosphorus release by the microorganisms; however, the aerobic phase of the treatment process would result in the microorganism reabsorbing phosphorus in greater amounts via a process commonly referred to as luxury uptake.[39] Beyond the aerobic process, the MBR system offers a physical barrier for removal of particulate phosphorus.

MBR system case studies show that TP concentrations can be reduced to low levels. For example, a MBR treatment system in Cauley Creek, Georgia, treating domestic sewage, consistently produced TP effluent concentrations of <0.5 mg/L without chemical additional and 0.1 mg/L with chemical addition.[24,40] The Traverse City, Michigan POTW produced similar effluent TP concentrations with an average of 0.7 mg/L, while a treatment plant in Calls Creek, Georgia produced an average effluent phosphorus concentration of 0.28 mg/L.[24] Eckenfelder et al. reported that an immersed hollow fiber UF membrane bioreactor system at the Marathon Ashland Petroleum site in Catlettsburg, Kentucky, produced an average TP effluent concentration of <0.10 mg/L prior to discharging to the local municipal treatment system.[41] The U.S. EPA also reported that MBR systems for domestic sewage treatment consistently achieve effluent TP concentrations of <0.5 mg/L.[42]

As previously stated, the BPJ BAT recommendation of anaerobic paired with aerobic can produce effluent characteristics similar to that of domestic sewage. Based on BPJ BAT recommendation, Peach Glen TP spray irrigation data, available engineering literature and Knouse Foods proposed alternatives, a TBEL for TP is recommended. The available literature shows that an effluent TP concentration of 0.5 mg/L can be consistently achieved with MBR systems with or without the use of chemical addition. Therefore, an average monthly limit of 0.5 mg/L is recommended. A maximum daily and instantaneous maximum limit of 1.0 mg/L and 1.25 mg/L is recommended based on the industrial multipliers of 2.0 and 2.5, respectively.[37]

Total Suspended Solids$_{(TSS)}$

Total suspended solids are present in the Knouse Foods food processing wastewater. Based on the spray irrigation data from January 1, 2009 to December 31, 2013, the average TSS concentration is 233.0 mg/L. For the same sample period, the median and maximum concentration is 188.0 mg/L and 1100.0 mg/L, respectively. The TSS concentrations do not represent influent values, but instead values post aeration lagoon. For comparison, untreated domestic sewage TSS concentrations range from 390.0 mg/L for low strength to 720.0 mg/L for medium strength and up to 1230.0 mg/L for high strength.[32] The Peach Glen TSS concentrations is consistent with that experienced at tomato canneries during peak season (July-September), which ranges from 270.0 to 760.0 mg/L.[38] The available examples suggest the Peach Glen food processing wastewater TSS concentration is consistent with other food processors and comparable to low to high strength untreated domestic sewage. The treatment plant alternatives being evaluated by Knouse Foods, as per their NPDES application, consists of the use of the MBR technology recommended in the BPJ BAT determination.

The MBR system provides a physical barrier with the use of a membrane, which means that TSS concentrations can be reduced to low levels. Available MBR case studies show TSS concentrations can be consistently reduced to low levels. For example, the following MBR systems produce the corresponding TSS concentrations: Calls Creek, Georgia - 1.0 mg/L; Cauley Creek, Georgia – 3.2 mg/L; Traverse City, Michigan - <1.0 mg/L.[24] The U.S. EPA found that "[s]ince the MBR acts as a filter and it separates water from the MLSS [Mixed Liquor Suspended Solids], it can achieve TSS less than 1.0 mg/L". Eckenfelder et al. state that the Marathon Ashland Petroleum MBR pretreatment system achieves <7.0 mg/L TSS concentration.[30] Ken's Foods, a food manufacture of salad dressings and marinades, installed an anaerobic MBR system that produces an average effluent TSS concentration of <1.0 mg/L.[43] At a Kraft Foods potato chip facility in Kiev, Ukraine, a recently installed MBR system has been able to consistently produce an effluent TSS concentration

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[39] U.S. EPA . *Municipal Nutrient Removal Technologies Reference Document Volume 1 - Technical Report.* Ann Arbor, MI & Fairfax, VA: U.S. EPA Office of Wastewater Management, 2008.
[40] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009.
[41] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 698-699, Tble 12.12
[42] U.S. EPA . *Municipal Nutrient Removal Technologies Reference Document Volume 1 - Technical Report.* Ann Arbor, MI & Fairfax, VA: U.S. EPA Office of Wastewater Management, 2008. Page 5-5.

[43] McMahon, Jim. "Anaerobic Membrane Bioreactor System Treats High Strength Wastewater." *WaterWorld.* n.d. www.waterworld.com (accessed August 6, 2013).

of <4.0 mg/L.[44] The same manufacturers of the MBR system at the Ukrainian Kraft Foods plant, engineered a similar system for a carrageenan production facility in Cebu City, Philippines, which produced an average effluent TSS concentration of 2.0 mg/L.[45] Other MBR manufacturers and installers provide manufacture case studies and literature that shows that TSS effluent concentrations of <5.0 mg/L can consistently be produced.[46,47,48,49]

Based on the Knouse Food spray irrigation data for Peach Glen, MBR system manufacturer literature and available engineering information, a TBEL for TSS is recommended. An average monthly TSS TBEL of 10 mg/L is recommended for the Peach Glen site. The average monthly limit was set at 10 mg/L because of the variation of TSS effluent concentrations in case studies and lack of extensive pilot plant data. A maximum daily and instantaneous maximum limit of 20 mg/L and 25 mg/L is recommended based on the industrial multipliers of 2.0 and 2.5, respectively.[37]

Biochemical Oxygen Demand$_{(BOD)}$

The Peach Glen wastewater BOD sampling from January 1, 2009 to December 31, 2012, a total of 15 data points, produces an average concentration of 2089.0 mg/L. The median value for the same data set is 1983.0 mg/L with a maximum concentration of 4093.0 mg/L. These concentrations were obtained post aeration lagoon and do not reflect influent concentrations; however, the values provide a useful gauge. Unlike TN, TP and TSS, the MBR system alone will not achieve low effluent BOD concentrations. Anaerobic treatment, as recommended in the technology analysis, is necessary for the aerobic-MBR system to further reduce BOD levels. The anaerobic treatment unit can reduce BOD concentrations down to levels more consistent with that of domestic sewage. According to Eckenfelder et al. “over 850 anaerobic reactors are in operation worldwide. Approximately 75 percent of these treat wastewaters from food and related industries.” Typical BOD concentrations in untreated sewage range from 110.0 mg/L for low strength to 190.0 mg/L for medium strength and up to 350.0 mg/L for high strength.[32] Knouse Foods BOD levels are well above that of domestic sewage and this is consistent with the food processing industry. For comparison, tomato canneries during peak season (July-September) experience BOD concentrations ranging from 460.0 mg/L to 1100.0 mg/L.[38] Table 2. below shows influent and effluent BOD levels common to other food processors.

Table 2. Anaerobic Treatment of Food Processing Wastewater BOD Concentration[50]

Food Processor Type	Raw Wastewater BOD (mg/L)	Anaerobic Effuent BOD (mg/L)
Apple	2,441	87
Bean & Pasta	1,200	528
Brewery	1,407 to 2786	122 to 306
Dairy	1,970 to 20,575	111 to 190
Olive	5,550	786
Potato	1,090 to 5,978	98 to 1,573

[44] ADI. *ADI-BVF Reactor to Treat Snack Foods Wastewater*. 2013. www.adi.ca (accessed August 22, 2013).
[45] ADI. *Complex Wastewater No Match for ADI-MBR*. n.d. www.adi.ca (accessed September 2, 2013).
[46] Kubota. *Kubota MBR Case Study - Brewery*. n.d. www.kubota.co.jp (accessed September 2, 2013).
[47]Siemens. *MBR System Designed to Accommodate Variable Flows Between 0.3 and 3.6 MGD*. n.d. www.water.siemens.com (accessed September 2, 2013).
[48] Treatment Equipment Company. *Comparing MBR and SBR Technology*. n.d. www.treatmentequipment.com (accessed September 2, 2013).
[49] Triveni Engineering & Industries LTD. *Types of Products - Membrane Bio-Reactor* . n.d. www.trivenigroup.com (accessed September 2, 2013).

[50] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition*. New York: McGraw-Hill, 2009. Page 501-502, Table 7.20

The following BOD percent reduction is possible using anaerobic treatment: Brewery >90%; Dairy – 80 to 95%; Potato - >90 %; Sugar Beet - >90%.[51] In 2011, Shearer's Food, Inc., a potato chip and corn tortilla chip manufacturer, started operation of an anaerobic treatment unit for their process wastewater, which contained influent BOD concentrations that ranged from 3,000.0 mg/L to 5,000.0 mg/L.[44] The anaerobic treatment system has consistently produced effluent BOD concentrations of 300.0 mg/L or over a 90% reduction.[44] The pairing of an aerobic-MBR system with the anaerobic can reduce BOD concentrations to very low levels.

The available manufacturer literature shows a range of BOD effluent concentrations are possible with MBR systems. The literature BOD effluent concentrations range from <2.0 mg/L up to 10.0 mg/L.[44,45,46,47,48,49] Eckenfelder et al. reported that the Marathon Ashland Petroleum MBR system received influent BOD concentrations of 775.0 mg/L and produced effluent BOD concentrations of 2.0 mg/L.[30] The U.S. EPA documented that the average BOD concentrations from MBR systems at POTWs in Calls Creek, Georgia and Cauley Creek, Georgia were 1.0 mg/L and 2.0 mg/L, respectively.[24] The U.S. EPA also reported that Traverse City, Michigan POTW reported effluent BOD concentrations of <2.0 mg/L from their MBR system.[24] According to Metcalf & Eddy, the typical effluent BOD concentration from a MBR system is <5.0 mg/L.[52]

Based on the available manufacturer literature and engineering text, as well as the Knouse Foods spray irrigation data, a TBEL for BOD is recommended. An average monthly TBEL of 10 mg/L BOD is recommended. Given the variability of effluent BOD concentrations in the treatment system manufacturer literate and engineering text, and lack of extensive pilot plant data, the technology limit was set towards the upper bound of effluent BOD concentrations. A maximum daily and instantaneous maximum limit of 20 mg/L and 25 mg/L is recommended based on the industrial multipliers of 2.0 and 2.5, respectively.[37]

BEST CONVENTIONAL TECHNOLOGY (BCT) COSTS ANALYSIS

Section 40 CFR § 125.3(d)(2) requires, that for BCT effluent limits established on a case by case basis using BPJ for conventional pollutants, the application of the same factors used for the BAT standard. However, the regulations also require the cost of effluent reductions to be balanced with the effluent reductions. The process for performing a cost analysis for the BCT standard is explained by the U.S. EPA in the July 9, 1986 Federal Register [Best Conventional Pollutant Control Technology; Effluent Limitations Guidelines; Final Rule, 51 Federal Register 24974, p. 24976 (July 9, 1986)]. A BCT Cost Test is a two part test, which requires the candidate technology cost pass the following:

1. The POTW Test requires the cost per pound of conventional pollutant removed by an industrial discharge upgrading from BPT to BCT must be less than the cost per pound of conventional pollutant removed in upgrading a POTW from secondary treatment to advanced secondary treatment. The cost to industry must be less than the POTW benchmark of $0.25 per pound in 1976 dollars for industries with long term data. Knouse Foods Peach Glen does have long term data discharge data to the sprayfields used on site and can be considered as representative of influent data; therefore, the 1976 benchmark is considered valid. Using the Reed Construction Historical Cost Index, the 1976 cost was converted into 2012 dollars as follows:

(Index Year A / Index Year B) X Cost in Year B = Cost in Year A

Index Year A is 2012, and is equal to 194.6

Index Year B is 1976, and is equal to 46.9

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[51] Grant, MScE, P.E., Shannon R., ME, P.E., Shashi Gorur, Ph.D., P.E., James C. Young, Ph.D., P.E., Robert Landine, Ph.D., P.E., Albert C. Cocci, and Ph.D., P.E., Calvert Churn III. "Anaerobic Reactors - A Comparison of anaerobic treatment technologies for industrial wastewater." *ENGETEC*. November/December 2002. www.engetec.info (accessed August 28, 2013).

[52] Tchobanoglous, Ph.D., P.E., George, P.E., Franklin L. Burton, Ph.D., P.E., David H. Stensel, and Metcalf & Eddy. *Wastewater Engineering Treatment and Reuse 4th Edition.* Boston: McGraw-Hill, 2003. Page 858

Cost in Year B is $0.25 or the 1976 benchmark

(194.6 / 46.9) X $0.25 = $1. 037

The Bureau of Labor and Statistics Consumer Price Index Inflation Calculator, found at www.bls.gov, produces a 2012 cost of $1.01, which closely resembles the calculated value based on the Reed Construction Historical Cost Index. Therefore, the adjusted Industry Benchmark of $1.037 is considered valid for use in the cost test. The existing aeration lagoon system with sprayfield application is considered BPT for the purpose of this review. The BCT candidate technology for removal of BOD and TSS is an anaerobic treatment system paired with an aerated MBR system. Cost estimates for the candidate BCT were established using several studies performed by the U.S. Department of Interior, as well as available Department and agency files, engineering text and industry literature. Within the available studies, low and high cost estimates were correlated with flow. Both the cost estimates and flow values were plotted within MS Excel and a low and high linear trendline was established. The capital cost for both low and high values were determined based on a flow value of 0.400 MGD and then averaged to produce a final capital cost. To determine capital cost, the peak design flow of 0.400 MGD was used and to determine operation and maintenance (O&M) cost, the annual average design flow of 0.130 MGD was used. Based on the simple regression analysis, the estimated capital cost for an MBR system to treat a peak design flow of 0.400 MGD is $5,908,600.00 or approximately $14.77 per gallon treated in 2012 dollars.

Since MBR system capital costs are comparable to oxidation ditch and conventional activated sludge systems, the capital cost per gallon of waste water treated, was compared to literature cost and Department files costs.[53] The capital costs used for comparison were adjusted for inflation using the Reed Construction Historical Index, as well as for the economies of scale observed within the data. Costing details, such as engineering costs or contingency costs, were not known for each project used to determine secondary cost; however, the Department determined that a reasonable estimate for the cost of secondary treatment is between $11.00 per gallon and $17.00 per gallon of wastewater treated. This suggests that the estimated capital costs for the MBR system at the Knouse Foods Peach Glen site is within the range of the cost for secondary treatment. Therefore, the capital cost estimate for the MBR system is considered reasonable for the BCT cost test. However, this cost estimate is only for the MBR system and does not include the cost for an anaerobic treatment system. The anaerobic treatment system is estimated as half of the cost of the MBR system or $2,954,300.00.[54] Using the estimated anaerobic treatment system and MBR costs, a total capital cost for the Knouse Foods Peach Glen site is $8,862,900.00.

The same methodology used to determine capital cost for the MBR system, was employed to determine O&M cost at an annual average design flow of 0.130 MGD. The simple linear regression analyses for low and high cost for were averaged; however, the values used were in 2004 dollars. To adjust the 2004 average O&M cost, 35% of the total O&M cost was allocated for electricity consumption and was subtracted from the total O&M cost.[55] Electricity costs were subtracted from the total O&M cost because the 2004 O&M cost included electricity cost rates consistent with current Pennsylvania rates. The total O&M cost, minus electricity cost, was then adjusted to 2012 dollar values using the CPI Inflation Calculator referenced earlier. This resulted in a total annual O&M cost of approximately $42,850.00.

The annual capital cost was then calculated using MS Excel assuming an interest rate of 5% over a 30 year period, which resulted in an annual cost of $570,986.00. The capital cost was then added to the O&M cost to determine the total amount that Knouse Foods must pay annually for the system. The total annual cost is calculated to be approximately $614,000.00.

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[53] Adham, Ph.D., Samer, James F. DeCarolis, and William Pearce. *Optimization of Various MBR Systems for Water Reclamation - Phase III.* Denver: U.S. Department of the Interior - Bureau of Reclamation, 2004. Page 4

[54] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 494

[55] Harza, Montgomery Watson. *Evaluation of Newly Developed Membrane Bioreactor Systems for Water Reclamation.* Denver: U.S. Department of the Interior - Bureau of Reclamation, 2009. Page 58

In order to determine the annual load reduction in BOD and TSS, production data and raw product data submitted by Knouse Foods as part of the NPDES application was used to estimate annual mass loads. The combined BOD and TSS annual mass loads within the raw wastewater stream were estimated at 923,652.0 lbs.

The annual cost of $614,000.00 was divided by the annual mass load of 923,652.0 lbs, which results in a cost of $0.664/lb. The annualized cost is less than the industry benchmark of $1.037; therefore, the proposed BCT technology passes the first step of the BCT cost test.

2. The second part of the BCT Cost Test is an Industry Cost-Effectiveness Test, which requires two incremental costs be calculated. The first is the cost per pound removed by the BCT candidate technology relative to BPT; the second is the cost per pound removed by BPT relative to no treatment.[56] This ratio is then compared to an industry benchmark, which is a ratio of two incremental costs: the cost per pound to upgrade a POTW from secondary treatment to advanced secondary treatment is divided by the cost per pound to initially achieve secondary treatment from raw wasteload.[56] The industry benchmark for facilities based on long term data is 1.29; therefore, the cost to upgrade from BPT to BCT relative to upgrading from raw wastewater to BPT must be less than the industry benchmark to pass the second part of the BCT Cost Test.

   In order to calculate the cost to upgrade from BPT to BCT, the capital cost for the MBR system was subtracted from the capital cost for the MBR and anaerobic treatment system. Since MBR systems are considered comparable in terms of cost to secondary activated sludge systems, the MBR system is assumed to be equivalent to BPT.[57] Also, the cost of the MBR system is comparable to other secondary treatment technologies, further supporting its use as a BPT equivalent. Based on the same interest rate and payment period used in Part I of the BCT Cost Test and annual O&M cost, the total annual cost was calculated to be approximately $396,800.00 ($353,928.00 + $42,850.00) for upgrading from BPT to BCT. The MBR system capital cost were used to estimate the annual cost for upgrading from raw wastewater to BPT, which resulted in an annual cost of $424,000.00.

   The load reductions achieved by BPT was estimated using an influent BOD of 190.0 mg/L and TSS of 210.0 mg/L at a flow rate of 0.400 MGD.[32] BPT was assumed to reduce both BOD and TSS to 30.0 mg/L or less and BCT was assumed to reduce BOD and TSS to 10.0 mg/L or less. Under the BPT treatment scenario, influent BOD + TSS mass loadings are reduced by an approximate total of 414,000 lbs. Based on the BCT treatment scenario, influent BOD + TSS mass loadings are reduced by an approximate total of 463,000 lbs.

   The calculated candidate technology cost effectiveness was calculated as follows:

   (Cost of Upgrading from BPT to BCT ($/lbs) / Cost of Upgrading from raw wastewater to BPT ($/lbs)) < 1.29

   ($396,800.00 / 463,000.0 lbs) / ($424,000.00 / 414,000 lbs) < 1.29

   ($0.857/lbs / $1.022/lbs) < 1.29

   $0.838/lbs < 1.29

   The BCT candidate technology passes the second part of the cost test since the cost per pounds is less than the industry benchmark. Therefore, based on BPJ, the proposed BOD and TSS limits are recommended for the draft NPDES permit.

[56] U.S. EPA. ""Best Conventional Pollutant Control Technology; Effluent Limitations Guidelines; Final Rule" 51 Fed. Reg. 24,974, 24,976 (July 9, 1986)." n.d.
[57] Eckenfelder, Jr., W. Wesley, Davis L. Ford, and Jr., Andrew J. Englande. *Industrial Water Quality 4th Edition.* New York: McGraw-Hill, 2009. Page 499