INDIRECT DISCHARGE PERMIT
FACT SHEET

June, 2016

PERMIT NO.:	ID-9-0055 PIN: NS93-0006
PERMITTEE:	Grafton Village Cheese Company 400 Linden Street Brattleboro, VT 05301
NATURE OF WASTE:	Whey and washwater generated from the production of cheese at the permittee's manufacturing facility in Grafton, and whey generated from the production of cheese at the permittee's Brattleboro facility (washwater from the Brattleboro facility is discharged to the municipal wastewater system). This waste is non-sewage, non-pathogenic waste.
DISPOSAL LOCATIONS:	The land application of whey and washwater on agricultural fields listed in Attachment A-1 of the indirect discharge permit, "Approved Disposal Fields", in the towns of Grafton, Newfane, Townsend, Brookline, Rockingham, Athens, Brattleboro, Vernon, Putney, Dummerston and Westminster, Vermont.
DISPOSAL VOLUME:	5,500,000 gallons per year (maximum)
RECEIVING STREAMS:	Saxtons River, South Branch Saxtons River, Hinkley Brook, West River, Connecticut River

Compliance with Land Application Limits

During the previous permit period, 2011 – 2015, the permittee was in compliance with virtually all daily and annual disposal limits. There were a couple of apparent exceedances of daily and annual limits for a couple of seasonal areas of fields consisting of 50' wide strips of land, but given the method in which whey and washwater is land applied, it is unlikely that the total volume of whey and washwater reported as land applied on those seasonal strips of land was actually done.

According to groundwater depths reported by permittee, no spraying was done on well-verified fields when groundwater levels were within 36" of ground surface.

Summary of Land Application of Whey and Washwater

The following are annual summaries of the volume of whey and washwater land applied on approved agricultural fields, discharged to manure pits or discharged to an anaerobic digester, as reported by the permittee from January, 2011 thru December, 2015.

WHEY

Year	Gallons Sprayed on Approved Fields	Gallons Discharged to Approved Manure Pits	Gallons Discharged to Approved Digester	Total Gallons of Whey Discharged	Average Daily Gallons
2011	111,400	0	168,400	279,800	767
2012	341,650	6,000	0	347,650	952
2013	354,400	0	0	354,400	971
2014	667,000	23,500	55,000	745,500	2,042
2015	716,650	0	129,900	846,550	2,319
Note: In accordance with previous permit requirements, the permittee doubled the actual gallons of whey discharged in their monthly reports for the purpose of complying with disposal limits for each field. The gallons indicated above are actual gallons discharged.					

WASHWATER

Year	Gallons Sprayed on Approved Fields	Gallons Discharged to Approved Manure Pits	Total Gallons of Washwater Discharged	Average Daily Gallons
2011	544,000	0	544,000	1,490
2012	484,300	0	484,300	1,327
2013	466,500	0	466,500	1,278
2014	516,600	0	516,600	1,415
2015	566,650	0	566,650	1,552

Summary of Field Loading Rates

The following is a summary of loading rates for fields that received whey and washwater during the period 2011 – 2015, based on whey and washwater analytical data.

Field	Acres	Gallons Whey Land Applied	Gallons Washwater Land Applied	Total Waste Land Applied	Total P lbs/year	Total N lbs/year
1A	5.81	70,300	95,700	166,000	70	196
1B	8.93	65,100	179,800	244,900	82	221
1C	7.07	6,600	69,200	75,800	18	45
1D	4.64	40,900	95,000	135,900	48	131
1E	6.42	82,900	92,500	175,400	78	223
1G	5.92	26,400	113,800	140,200	41	107
1H	7.56	149,900	264,600	414,500	160	444
3C	11.39	278,050	378,800	656,850	275	775
3D	14.72	58,400	127,450	185,850	67	184
4A	7.24	50,100	94,900	145,000	55	151
4B	2.49	22,600	25,400	48,000	21	61
7A	13.80	48,500	94,100	142,600	53	147
7B	11.50	134,500	308,200	442,700	157	429
8A	27.20	249,350	596,800	846,150	296	807
9A	23.90	288,700	9,000	297,700	212	638
9B	24.30	596,300	32,800	629,100	441	1,323
9C	12.00	13,500	0	13,500	10	30
12C	33.90	9,000	0	9,000	7	20

Summary of Whey Quality

The following is a summary of the quality of whey from the Grafton and Brattleboro facilities which was sprayed on agricultural fields, discharged to manure pits or discharged to an anaerobic digester, based on 20 sample results during the period 2011 - 2015.

Parameter	**Mean Value (mg/L)**	**Range (mg/L)**
Total Dissolved Solids (TDS)	38,535	24,000 – 50,000
Total Suspended Solids (TSS)	4,865	2,700 – 6,700
Biochemical Oxygen Demand (BOD)	47,350	35,000 – 83,000
Chemical Oxygen Demand (COD)	79,450	68,000 – 120,000
Total Kjeldahl Nitrogen (TKN)	1,315	1,100 – 1,500
Ammonia Nitrogen (NH3)	131	17 – 570
Nitrite-Nitrate Nitrogen (NO2-NO3)	0.7	0.1 – 2.1
Total Phosphorus (TP)	437	350 – 570
Total Dissolved Phosphorus (TDP)	377	30 – 550
Sodium (Na)	350	130 – 460
Chloride (Cl-)	1,167	760 – 1,600
pH	5.47 S.U.	4.61 – 6.42 S.U.

Summary of Washwater Quality

The following is a summary of the quality of washwater from the Grafton facility which was sprayed on agricultural fields, based on 10 sample results during the period 2011 - 2015.

Parameter	Mean Value (mg/L)	Range (mg/L)
Total Dissolved Solids (TDS)	4,149	910 – 9,700
Total Suspended Solids (TSS)	2,220	410 – 12,000
Biochemical Oxygen Demand (BOD)	5,178	2,000 – 10,000
Chemical Oxygen Demand (COD)	8,120	2,100 – 19,000
Total Kjeldahl Nitrogen (TKN)	252	92 – 670
Ammonia Nitrogen (NH3)	56	11 – 89
Nitrite-Nitrate Nitrogen (NO2-NO3)	8.9	0.1 – 30
Total Phosphorus (TP)	115	40 – 440
Total Dissolved Phosphorus (TDP)	60	30 – 130
Sodium (Na)	583	260 – 1,900
Chloride (Cl-)	521	140 – 1,100
pH	4.38 S.U.	4.02 – 6.32 S.U.

A toxic scan analysis was performed on the washwater generated at the Grafton facility to determine the presence of toxic constituents in the washwater. Washwater from the Brattleboro manufacturing facility was not tested because it is discharged to the Brattleboro wastewater treatment facility. The results indicate that the washwater is not a hazardous waste because it did not contain any of the analytes in Table 1, Section 7-208 of the Vermont Hazardous Waste Management Regulations in concentrations above their respective reporting limits. Total aluminum, calcium, copper, iron, magnesium, nickel, potassium, sodium and zinc were detected, but none are regulated metals for the characterization of toxicity. All of the volatile organic compounds, semi-volatile organic compounds, pesticides and herbicides tested for were not detected, with the exception of 2-butanone (277 µg/L), chloroform (24 µg/L), benzyl alcohol (15.8 µg/L) and 3&4-methylphenol (249 µg/L).

The chromatographic peaks from the laboratory toxic scan analysis was reviewed and researched by a second consulting firm to determine the presence of other compounds in the washwater at concentrations below laboratory reporting limits. The tentatively identified compounds were determined to be representative of breakdown products of surfactants used in the cleaning process and saturated fatty acids found in animals and plants.

Groundwater Quality

The following is a summary of groundwater quality mean values upgradient and downgradient of Field 1D, based on 10 sampling events from 4 monitoring wells during the period 2011 – 2015.

Parameter (mg/L)	Field 1D		Groundwater Standards		
	Upgradient	Downgradient	ES[1]	PAL[2]	IP[3]
Total Dissolved Solids	151	68	500	250	-
Total Kjeldahl Nitrogen (TKN)	0.81	0.56	-	-	-
Ammonia Nitrogen	0.21	0.22	-	-	-
Nitrite/Nitrate Nitrogen	0.2	0.3	10	5	-
Total Phosphorus	0.26	0.14	-	-	-
Total Dissolved Phosphorus	0.028	0.012	-	-	-
Sodium	3.8	4.7	-	-	+10
Chloride	7.0	5.5	250	125	-
pH (S.U.)	6.50	5.98	-	-	+1

Notes:
1. Enforcement Standards
2. Preventative Action Limits
3. Indicator Parameter

From January 1, 2011 thru December 31, 2015, 40,900 gallons of whey and 95,000 gallons of washwater were applied to Field 1D. This equates to an average annual application rate of 8,180 gallons of whey and 19,000 gallons of washwater per year. Based on 2011 – 2015 whey and washwater sampling results, an average of 48 pounds of total phosphorus and 131 pounds of total nitrogen were applied to this field annually.

The table above shows that the land application of whey and washwater on Field 1D is in compliance with the Groundwater Protection Rule and Strategy. None of the individual results from the downgradient monitoring wells exceeded any enforcement standard, preventative action limit or indicator parameter limit of the Groundwater Protection Rule and Strategy. However, there was only 5,400 gallons of whey and 8,400 gallons of washwater applied to Field 1D during the month of sampling or the month prior to sampling, so no real conclusions can be drawn.

Surface Water Quality

No receiving stream monitoring was required in the previous permit; therefore, no surface water quality monitoring was performed.

The following is a summary of dilution ratios and theoretical increases in total phosphorus and total nitrogen concentrations in the receiving streams during the months of June – October when the streams are typically at base flow conditions. The fields indicated below received the majority of the whey and washwater during the period 2011 – 2015, were applied at higher rates, or have the lowest stream dilution ratios.

Field	Daily Max Whey Land Applied June-Oct	Daily Max Washwater Land Applied June-Oct	Receiving Stream	Est. Low Median Monthly Flow (gpd)	Calc. Max Increase Total P (mg/L)[1]	Calc. Max Increase Nitrate (mg/L)[2]	Calc. Max Increase Chloride (mg/L)[3]
1B	3,000 gal.	9,000 gal.	S. Branch Saxtons R.	2,649,900	0.009	0.158	3.0
1D[4]	3,000 gal.	5,500 gal.	S. Branch Saxtons R.	2,649,900	0.007	0.154	2.3
1H	3,000 gal.	3,000 gal.	S. Branch Saxtons R.	2,649,900	0.006	0.152	1.9
3C	6,300 gal.	4,000 gal.	West River	49,443,251	<0.001	0.017	0.1
3D	4,800 gal.	6,000 gal.	West River	49,443,251	<0.001	0.013	0.1
4A	3,000 gal.	6,000 gal.	Saxtons R.	5,429,063	0.003	0.076	1.2
7B	2,400 gal.	3,000 gal.	Saxtons R.	8,014,331	0.001	0.040	0.5
8A	5,400 gal.	12,000 gal.	Saxtons R.	8,466,753	0.005	0.088	1.4
9A	9,600 gal.	3,000 gal.	West River	80,401,835	<0.001	0.016	0.1
9B	6,000 gal.	3,000 gal.	West River	80,401,835	<0.001	0.010	0.1

Notes:

1. Assumes 100x reduction in total phosphorus concentration due to binding with soil particles and plant uptake based on data from another dairy processing waste land application program.
2. Assumes 10x reduction in total nitrogen concentration for the conversation of Total Kjeldahl Nitrogen (TKN) to nitrite/nitrate nitrogen based on data from another dairy processing waste land application program.
3. Assumes no reduction in chloride concentrations through soil.
4. Field with groundwater monitoring wells
5. Assumes both whey and washwater applied to same field on same day

The following is a summary of estimated downstream concentrations of nitrate nitrogen, total phosphorus and chloride using available water quality information under a worse-case scenario (maximum land application of both whey and washwater, low median monthly flow conditions, conservative reduction factors for nitrogen and phosphorus) based on mass balance calculations, and how the estimated concentrations compare with the Vermont Water Quality Standards. No water quality data is available from the South Branch of Saxtons River so estimated stream concentrations could not be determined.

Field	Receiving Stream	Stream Class	Nitrate N		Total P		Chloride	
			Std. (mg/L)	Est. Conc. (mg/L)	Std. (mg/L)	Est. Conc. (mg/L)	Std. (mg/L)	Est. Conc. (mg/L)
1B	S. Branch Saxtons R.	MHG[1]	5.0	???	0.015	???	230	???
1D	S. Branch Saxtons R.	MHG	5.0	???	0.015	???	230	???
1H	S. Branch Saxtons R.	MHG	5.0	???	0.015	???	230	???
3C	West River[2]	WWMG[3]	5.0	0.08	0.027	0.016	230	11.8
3D	West River	WWMG	5.0	0.08	0.027	0.016	230	11.8
4A	Saxtons R.[4]	MHG	5.0	0.13	0.015	0.011	230	13.8
7B	Saxtons R.	MHG	5.0	0.09	0.015	0.009	230	13.1
8A	Saxtons R.	MHG	5.0	0.14	0.015	0.013	230	14.0
9A	West River	WWMG	5.0	0.08	0.027	0.016	230	11.8
9B	West River	WWMG	5.0	0.08	0.027	0.016	230	11.8

Notes:
1. MHG = Medium High Gradient stream
2. Water quality data from locations in the upper West River
3. WWMG = Warm Water Medium Gradient stream
4. Water quality data from Saxtons River from locations above Saxtons River village wastewater treatment facility

The Vermont Water Quality Standards also contain criteria for ammonia, dissolved oxygen and pH. The ammonia standard is based on EPA April 2013 criteria; the dissolved oxygen standard is 6.0 mg/L, minimum, in cold water and 5.0 mg/L, minimum, in warm water; and the pH standard is to be within 6.5 – 8.5 standard units. An estimate of the theoretical downstream concentration of these parameters could not be calculated because dissolved oxygen and pH are directly measured, and ammonia concentrations are based on pH values.

In 2014, the Agency performed a water quality and aquatic habitat update of earlier biological assessment work performed on Saxton River. The results of the assessment indicate that the aquatic biota of the upper Saxtons River (above the Saxton River village wastewater treatment facility) is rated very good to excellent and good to very good for fish habitat.

For the West River, biological assessments are limited for the portion of the West River where the permittee's fields are located. A macroinvertebrate assessment in 2013 resulted in an excellent rating.

Chemicals Used

The permittee has provided the Agency with a list of chemical product names, the chemical components, the use, and the amount used for each chemical used for cleaning and sanitizing purposes that could be in the washwater. No chemicals are expected to be found in the whey. The results of a toxic scan analysis of the washwater are discussed on page 5 of this Fact Sheet.

Proposed Action

The Agency proposes to issue a permit renewal to Grafton Village Cheese Company. Although there is limited groundwater quality data and no stream quality data, the available stream flow and biological assessment information indicates that the land application of whey and washwater is not having a detrimental impact on water quality in the receiving streams. The draft permit renewal contains additional monitoring requirements to further verify this conclusion.

Proposed Changes to Permit

The draft permit requires a revised Quality Assurance/Quality Control plan to be submitted by September 30, 2016 for groundwater monitoring of a minimum of two additional fields, expanding the monitoring of Field 1D, and the addition of surface water sampling.

The draft permit requires sampling of the South Branch of Saxtons River in August and September each year to obtain water quality data during the seasonal low flow period. Previously, no surface water sampling has been required.

The draft permit requires groundwater sampling to be performed during the months of August and September instead of in April and August to coincide with sampling of the South Branch of Saxtons River.

The draft permit requires the land application of whey and washwater on the fields subject to groundwater monitoring to the maximum extent possible during the summer months prior to

groundwater and surface water sampling to provide more meaningful groundwater and surface water data and a determination of compliance with groundwater and surface water standards.

The draft permit requires a toxic scan analysis of the Grafton washwater and a water quality evaluation to be submitted by September 30, 2020 to coincide with an application for renewal of the indirect discharge permit.

Due to updated low median monthly flow estimates in Attachment A-1, some of the daily application rates in Attachment A-2 have been revised.