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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

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FRED COON, KAREN STRECKER, SCOTT MATHER, CONNIE MATHER, KENNETH KEPPEL, KAREN KEPPEL, and DALE MANGAN

Plaintiffs,

v.

WILLET DAIRY, LP, WILLET DAIRY, LLC, WILLET DAIRY, INC., DENNIS ELDRED, and SCOTT ELDRED,

Defendants.

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SECOND EXPERT REPORT

Civil Action Nos. 02-CV-1195 FJS(GJD), 04-CV-917 (FJS/GJD)

Alexander J. Sagady, B.S.

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Alex J. Sagady makes this Second Expert Report on behalf of the plaintiffs in these actions, pursuant to FRCP Rule 26(a)(2).

1. Qualifications: I am a water pollution control expert. I have over twenty-five years of experience preparing technical review of air, water, waste and resource permits and enforcement matters for industrial, municipal and waste management facilities. My detailed qualifications were provided previously in an initial expert report submitted in this action, and is incorporated by reference here.

Prior to my involvement with this case I analyzed deficiencies in comprehensive nutrient management plans for two other concentrated animal feeding operations (CAFOs). I have also

conducted compliance audit reviews of numerous Michigan CAFOs for the Sierra Club; conducted air and water environmental enforcement reviews of pulp and paper mills and petroleum refineries; drafted national comments on behalf of the Sierra Club national office concerning proposed EPA rulemaking on CAFO operations; and participated on a regulatory negotiation committee concerning development of NPDES permitting rules for CAFOs in Michigan.

2. Opinions and their basis and reasons: It is my opinion, to a reasonable degree of scientific certainty, that:

I was asked by the Plaintiffs in this action to review Willet Dairy's Agricultural Waste Management Plan (AWMP)[1] and AWMP revisions from 2000 to the present[2] for compliance with applicable requirements imposed on Willet Dairy by its CAFO permit, a 2002 administrative consent order, and Natural Resource Conservation Service (NRCS) standards; to review Willet Dairy's compliance with its own AWMP; and to review practices reported in Willet's AWMP for compliance with applicable requirements.

Willet Dairy obtained coverage under NYSDEC General Permit GP-99-01 on July 24, 1999, and coverage under NYSDEC General Permit GP-04-02 on July 1, 2004. Both permits require compliance upon coverage with NRCS standard Codes 590, NY748 and 633, and additional NRCS standards as appropriate, through the permit's requirement to comply with

[1] Also termed a Comprehensive Nutrient Management Plan. The terms are used herein interchangeably.

[2] All documents related to Willet Dairy's AWMP reviewed were provided to Plaintiffs by Willet Dairy in this action, and are referred to herein by their Bates numbers (i.e., WD ___).

NRCS Code NY312. See GP-99-01, Subsection 8(c)(xi); GP-04-02, Subsection VIII(C)(xi).

Both permits also require development and implementation of an AWMP that complies with NRCS Code NY312 and the NRCS standards Code NY312 incorporates. See GP-99-01, Subsection 7; GP-04-02, Subsection VII. NRCS standards include requirements for planning, reporting and recordkeeping, and farm practices.

PLANNING REQUIREMENTS

Requirement to Use Standards Approved by Cornell University

NRCS 590 requires that sampling, testing and calculating waste application rates be determined based on Land Grand University guidance or industry practice. NRCS Code NY590, pp. 2-3, *passim*. The 2003 *Cornell Recommends* is the applicable Land Grant University guidance in NY.[3] Willet Dairy adopted a policy basing its phosphorus guidelines on *Cornell Recommends*. *Cornell Recommends* was amended in 2003 to address high phosphorus fields with greater specificity, recommending reduced phosphorus in subcategories of the "High" phosphorus soil category.[4] Cornell has also incorporated the lower phosphorus recommendations into *Cornell Cropware*, indicating that this should also be considered industry practice.

For field corn, *Cornell Recommends* currently prescribes 10 lbs/acre P_2O_5 where Morgan soil test P is 20-39 lbs/acre. However, Willet is still planning for of 20 lbs/acre P_2O_5, under the

[3] The applicability of the 2003 amendments to Cornell Recommends is confirmed by a recent email from Dr. Quirine M Ketterings of Cornell. See Attachment #1.

[4] See Quirine M. Ketterings, Karl J. Czymmek and Stuart D. Klausner, Department of Crop and Soil Sciences, PHOSPHORUS GUIDELINES FOR FIELD CROPS IN NEW YORK, Cornell University Department of Crop and Soil Sciences Extension Series E03-15, June 20, 2003, available at <http://nmsp.css.cornell.edu/publications/ articles/extension/Pdoc2003.pdf>.

pre-2003 recommendation. Similarly, on established alfalfa/grass, Cornell Recommends currently prescribes 0 lbs/acre P_2O_5 for fields where Morgan soil test P is 21 lbs/acre or more. However, Willet is still planning for 10 lbs/acre for such fields. This violates the applicable NRCS standard, requiring a covered CAFO's AWMP to use methods of calculation for soil phosphorus currently approved by Cornell. One result of not using current applicable recommendations is that Willet Dairy has a substantial and progressively growing number of fields with high soil test P.

Requirement to Develop a Nutrient Budget

NRCS Code NY590 also requires waste management planning to be based in part on the development of a nutrient budget:

> A nutrient budget for nitrogen, phosphorus, and potassium shall be developed that considers all potential sources of nutrients including, but not limited to animal manure and organic by-products, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water.

NRCS Code NY590, p. 1, col. 2. See also id., p. 7, col. 2 (planning must include "quantification of all nutrient sources"). The purpose of the nutrient budget includes "minimiz[ing] agricultural nonpoint source pollution of surface and ground water resources by properly utilizing manure or organic by-products as a plant nutrient source." Id., p. 1, col. 1. Thus, the nutrient budget must be designed as pollution prevention plan, and must recommend limits on the amount of nutrients applied to fields that approach the amount crops grown on these fields are expected to take up. See id., p. 3, col. 2 ("Timing and method of nutrient application shall correspond as closely as possible with plant nutrient uptake characteristics . . .").

Requirement to Budget for All sources of Nutrients

NRCS 590-NY provides:

> A nutrient budget for nitrogen, phosphorus and potassium shall be developed that considers all potential sources of nutrients including, but not limited to animal manure and organic by-products, waste water, commercial fertilizer, crop residues, legume credits and irrigation water.

NRCS Code NY590, p 1.

Land application of solid pack waste is not included in Willet's AWMP recommended waste applications. By failing to include solid wastes in the nutrient budget and planning process, Willet Dairy's AWMP violates the requirement of NRCS 590-NY to budget for all potential sources of nutrients.

For CY 2005, Willet Dairy's nutrient budget allocates the following amounts of animal waste for spreading:[5]

Animal Waste Source	CY 2005 Nutrient Budget Allocations for Disposal (kgals)	Animal Waste Generation by Source Facility (kgals)
Belltown Lagoon	10,870	19,972
Main Barn Lagoon	1,849	2,502
Lane Road Lagoon	-0-	6,140
County Line Lagoon	26,527	2,502
West Corey Slurrystore	3,324	5,757
Total	42,570	47,823

[5] Based on Willet Dairy, CY 2005 "Fertility Management" report, and the ACS file <willet manure labs.xls>, "Manure Labs" for CY 2005.

The table shows that Willet's AWMP for CY 2005 violates NRCS 590-NY's requirement that all potential nutrient sources be accounted for planning because the AWMP does not account for the final disposition of all animal waste generated by the facility. The table shows that, except for County Line Lagoon, the amount of waste generated by specific Willet facilities sources is substantially less than the amount disposed. This also violates the requirement of NRCS 590-NY to budget for all potential sources of nutrients.

In addition, Willet Dairy over-allocated applied nutrients some fields for CY 2005 by not accounting for residual nitrogen on fields in CY 2004. Under traditional approaches to nitrogen planning for animal waste application, not all organically bound nitrogen in the waste is considered to be available as nutrients for plants in the same crop year as application. The "manure residual" amount of nitrogen takes additional time to be converted to plant-available nitrate in the following two crop years. For purposes of nutrient planning, each field receiving animal waste in a prior crop year must be considered to have some residual nitrogen.

The CY 2005 nutrient budget, (WD 4019-4255), was compared to animal waste applications in CY 2004. See Attachment #2. The results show that 36 fields listed with "0" for "manure residual" in CY 2005 received animal waste applications in CY 2004. Id. Such a result violates NRCS 590-NY's requirement that all potential nutrient sources be accounted for planning.

Requirement to Calculate an Accurate P Index

NRCS 590-NY requires Willet Dairy to calculate the risk of runoff of planned phosphorus applications on a field-by-field basis under the New York Phosphorus Runoff Index (P-Index) for

all fields on which Willet Dairy operates. NRCS Code NY590, p. 5. An important component of this calculation is the planned rate of phosphorus application. However, Willet Dairy did not calculate P-Index values for Turek Farm and other "off farm" animal waste spreading conducted by Willet.[6] Failure to calculate P Index values for off-property spreading fields violates NRCS NY590's requirement to conduct a field by field risk assessment.

In addition, for fields for which P-Index values calculated, Willet committed serious errors under-estimating risk of phosphorus runoff. Under the P index, applications of both animal waste and artificial fertilizer (chemical phosphorus) is limited as follows:

Calculated P-Index	**Site Vulnerability**	**Management**
<50	Low	N based management
50 – 74	Medium	N based management with BMPs
75 – 99	High	P applications limited to crop removal rate
100	Very High	No P_2O_5 fertilizer or manure application

As the table shows, a P Index between 75 and 99 requires P_2O_5 application rates that do not exceed crop removal; a P Index calculated at 100 or greater requires zero animal waste and phosphorus fertilizers.

Using the P Index values calculated in Willet Dairy's AWMP, Willet reported exceeding spreading recommendations that would be based on the P Index for fields with a calculated P Index value of 74 or higher. See Attachment #3.

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[6] "Off farm" spreading fields are listed in Willet Dairy, "Off Farm Manure Spreading, 9/1/03-8/31/04," at WD 3579.

a. Field 17A

Animal waste applications by Willet Dairy on field 17A exceeded the planner's nutrient budget recommendation for both waste volume and P_2O_5 additions. However, the actual rate of P_2O_5 in waste applications didn't exceed the animal waste P_2O_5 rate used during the P Index calculation. Willet Dairy didn't account for exceeding the planner's recommendation.

b. Field 106 D

The calculated P Index at 0 lbs/acre P_2O_5 addition from animal waste exceeds 100 at zero inputs of both fertilizer and animal waste P_2O_5. This means no application of animal waste was permitted. Field 106 received liquid animal waste during Sept-Oct, 2004. Willet Dairy thus violated both the P Index requirements, the plan recommendations and the plan's rule against exceeding Cornell Recommends on VH Morgan soil test P fields.

c. Field 114

The calculated P Index value at 0 lbs/acre P_2O_5 addition from animal waste and fertilizer is 76. This value requires that P_2O_5 additions from animal waste not exceed the crop removal rate. Willet's planner indicated this crop removal rate, but then recommended 0 applications of animal waste in the nutrient budget. This field nevertheless received Lane Road pack waste. Willet Dairy thus violated the P Index requirements by improperly calculating the P Index assuming a zero animal waste P_2O_5 rate when they applied at 12.9 lbs/acre. The Dairy also violated the plan nutrient recommendation, by failing to ensure that all waste streams were contained in the plan[7] and exceeded Cornell Recommends on VH Morgan soil test P fields.

[7] All of the Lane Road Pack, as well as all of the other solid waste sources, were excluded from nutrient budget planning in the CY 2005 Fertility Index nutrient budget.

d. Field 131 E

This field is essentially a buffer along a watercourse. Waste application documents indicate that the entire field received waste and there was no breakdown by field/section. It is possible that this area received no waste, so compliance would have to have been verified by visual observation at the time. No such observation is available. That this field has a VH Morgan P soil test and is at the base of a long slope indicates the likelihood that this strip has received overland transport of waste-containing runoff.[8]

e. Field 135 A

The calculated P Index value at zero applications of animal waste was 98. The nutrient recommendation for P_2O_5 must not exceed the crop removal rate. Willet's planner indicated this crop removal rate, but then planned for zero applications of animal waste. This field nevertheless received liquid animal waste in May, 2005. Willet Dairy violated the P Index requirements by improperly calculating the P Index at a zero animal waste P_2O_5 rate when they applied at 51.3 lbs/acre. The Dairy violated the plan nutrient recommendation and plans provisions against exceeding Cornell Recommends on VH Morgan soil test P lands.

f. Field 315D 2

Willet's planner calculated a P Index value of 85 assuming zero animal waste application. The P Index required that P_2O_5 additions from animal waste not exceed the crop removal rate. Willet's planner didn't indicate the crop removal rate, but did recommend zero animal waste

[8] During Plaintiff's inspection activities in November, 2004, this field was observed to be draining sediment-contaminated runoff into surface waters in violation of narrative water quality standards for turbidity. See Expert Report #1.

applications. This field received liquid animal waste in October, 2004. Willet Dairy violated the P Index requirements by improperly calculating the P Index at a zero animal waste P_2O_5 rate when they applied at 35.6 lbs/acre P_2O_5. The Dairy violated the plan requirements by exceeding the plan recommendation without an explanation and by exceeding Cornell Recommends on VH Morgan soil test P lands.

g. Field 317 B

Willet's planner calculated a P Index value exceeding 100 assuming zero animal waste applications. The P Index prohibited application of animal waste. Field 317 B received 43.9 lbs/acre P_2O_5 in solid waste in April, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and failed to ensure that the plan and nutrient budgets included solid wastes. This field has a Morgan P soil test level of 234 lbs/acre (VH). Willet's animal waste applications to this field should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

h. Field 318 D

Willet's planner calculated a P Index value exceeding 100 assuming zero animal waste applications. The P Index prohibited applications of animal waste. Field 318 D received 123 lbs/acre P_2O_5 in both liquid and solid waste from January to April, 2005 at the time of highest application risk. Willet Dairy violated P Index requirements, the plan recommendations and failed to ensure that the plan and nutrient budgets included solid wastes. This field has a Morgan P soil test level of 114 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

i. Field 1234B

Willet's planner calculated a P Index value of 78 assuming zero animal waste applications. The P Index required that P_2O_5 additions from animal waste not exceed the crop removal rate. Willet's indicated this rate in the plan, but this rate violated the AWMP's policy of limiting P_2O_5 additions from animal waste to Cornell Recommends on VH Morgan soil test P fields. Willet's planner failed to incorporate its recommended P_2O_5 rate into the assumptions for calculating the P Index. As a result, proper determination of the P Index failed to occur in violation of NRCS 590-NY. This field received liquid animal waste in September, 2004.

j. Field 1301

Willet's planner calculated a P Index value exceeding 100 assuming zero applications of animal waste. The P Index prohibited animal waste applications on this field. Field 1301 received 80.7 lbs/acre P_2O_5 in liquid waste in Nov, 2004 and May, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and the plan requirement to restrict animal waste applications on VH Morgan soil test P fields to Cornell Recommends. This field has a Morgan P soil test level of 477 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

k. Fields 1302A, 1302B and 1302C

Willet's planner calculated a P Index value exceeding 100 assuming zero applications of animal waste. The P Index prohibited animal waste applications on this field. These three fields received 87.5 lbs/acre P_2O_5 of liquid waste in Nov, 2004 and May, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and the plan requirements to restrict animal

waste applications on VH Morgan soil test P fields to Cornell Recommends. These fields have Morgan P soil test levels of 334, 446 and 403 lbs/acre (VH), respectively. This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

l. Fields 1303 A and 1303 B

Willet's planner calculated a P Index value exceeding 100 assuming zero applications of animal waste. The P Index prohibited animal waste applications on this field. These three fields received 65.8 lbs/acre P_2O_5 in liquid waste in Nov, 2004 and May, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and the plan requirement to restrict animal waste applications on VH Morgan soil test P fields to Cornell Recommends. These fields have a Morgan P soil test level of 185 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

m. Field 1304

Willet's planner calculated a P Index value exceeding 100 assuming zero animal waste applications. The P Index prohibited animal waste applications on this field. This field received 102.5 lbs/acre P_2O_5 in liquid waste in Nov, 2004 and May, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and plan requirements to restrict animal waste applications on VH Morgan soil test P fields to Cornell Recommends. This field has a Morgan P soil test level of 359 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

n. Field 1305

Willet's planner calculated a P Index value exceeding 100 assuming zero animal waste applications. The P Index prohibited applications of animal waste. This field received 99.6 lbs/acre P_2O_5 in liquid waste in Nov, 2004 and May, 2005. Willet Dairy violated the P Index requirements, the plan recommendations and plan requirements to restrict animal waste applications on VH Morgan soil test P fields to Cornell Recommends. This field has a Morgan P soil test level of 651 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

o. Field 1438

Willet's planner calculated a P Index value exceeding 100 assuming zero applications of animal waste. The P Index prohibited animal waste applications. This field received 60.4 lbs/acre P_2O_5 in liquid waste in Nov, 2004. Willet Dairy violated the P Index requirements, the plan recommendations and plan requirements to restrict animal waste applications on VH Morgan soil test P fields to Cornell Recommends. This field has a Morgan P soil test level of 138 lbs/acre (VH). This case should be considered a serious violation of NRCS 590-NY and plan requirements for phosphorus management on VH soil test P lands.

p. Field 1541

Willet's planner calculated a P Index value of 81, assuming zero applications of animal waste. The P Index required that P_2O_5 animal waste applications not exceed the crop removal rate. Willet's planner indicate this rate. However, this nutrient recommendation violated the AWMP's policy of limiting P_2O_5 additions from animal waste to Cornell Recommends on VH Morgan soil test P fields. In addition, Willet's planner failed to incorporate its recommended

P_2O_5 rate into the assumptions for calculating the P Index. As a result that failure and Willet Dairy's disregard for the planned application rate through liquid waste applications in November 2004, proper determination of the P Index failed to occur in violation of NRCS 590-NY.

It is my opinion that were field-by-field P Index values calculated using the actual rate of phosphorus application and using the corrected soil test results from Crop Years 2002 and 2003, numerous field specific P Index determinations by Willet's AWMP in Crop Years 2003-2005 would be found to be erroneously underestimated and both recommended nutrient rates and actual applications of animal waste would be found to be excessive.

In addition to the examples above, for CY 2004 the following fields have calculation errors:

Fields sections 12A, 12B and 12C have Willet-calculated P indexes of 94, 118 and 112, respectively. The 2004 nutrient budget does not show a phosphorus crop removal rate for Field 12A, although the P-Index requires such management.[9]

Field 12A was slated for 10 kgal/acre and 57 lbs P_2O_5/acre and 12A and 12B were slated for 8 kgal/acre and 46 lbs P_2O_5/acre. However, Willet Dairy does not break down their animal waste applications by field section, only by whole fields. The entire field received 221 kgal during April and 55.3 lbs/acre P_2O_5.

Field 12B and 12C with P index over 100 should not have received any animal waste under the P Index policy, and field 12 A should have received phosphorus only at the crop removal rate,

[9] I was unable to find the assumed P_2O_5 rate used in the P-Index calculation because the sheet having that information has that column cutoff compared to the format for similar reports in 2003. See Attachment #4 for all supporting documents.

which was never calculated or shown by Willet.[10] Finally, the nutrient budget didn't show the P_2O_5 at 8 kgal per acre at the correct P_2O_5 lb/acre rate, reported by Willet Dairy to be a total of 55.3 lbs P_2O_5/acre on their CY 2004 "Manure Application Log."

Field 16C and 16E in CY 2004, Willet calculated P-Index values of 91 and 106, respectively. Field 16C should have received P_2O_5 at no greater than the crop removal rate and no animal waste should have been applied to field 16E. The nutrient budget did not calculate a crop removal rate on field 16 C. Willet shows Cornell Recommends at 0 lb P_2O_5 per acre. However, the P Index information reports the assumed P_2O_5 rate for calculation is unavailable.

Field 16 received 368 kgal or 9.2 kgal/acre, less than the rate specified in the nutrient budget. However, the P Index value over 100 reported for field 16E precludes any animal waste application. Nevertheless, the nutrient budget calls for 57 lbs/acre P_2O_5 and the field actually received 64.4 lbs/acre.

In the case of Field 16, the AWMP is deficient because it recommends Fields 16C and 16E be spread at a rate that exceeds both the agronomic rate and P Index recommended rate.

Willet Dairy's manure application logs do not distinguish between different field sections and their assigned spreading limitations. On the basis of Willet's logs, there is no way to know at a field section level whether application rates varied substantially from section to section.

Willet reports a P-Index value of 76 for field 114. The nutrient budget shows a P_2O_5 crop removal rate of 48. Notwithstanding the 40 lb P_2O_5 crop removal "needs" shown, the nutrient budget calls for 15 kgal/acre and 67 lb P_2O_5 from animal waste. As such, Willet's nutrient

[10] Field 12 was also among a number of fields with erroneous calculations of Morgan P soil test conversions, as discussed below.

budget exceeds the P Index recommendation. Willet over-applied 121.2 kgals of animal waste or a rate of 20.2 kgal/acre for a total P_2O_5 rate of 89.8 lbs P_2O_5/acre during Feb-April. This is a clear violation of the P Index and the AWMP recommended P205 nutrient rate.

Willet reports a P-Index value of 216 for field 132 D. However, this field should not have received any animal waste at this calculated P Index. Although the nutrient budget shows this field should receive zero animal waste, Willet's CY 2004 Manure Application log shows the entire 30-acre Field 132 received 234 kgal of animal waste during April or 7.8 kgal/acre, exceeding the P Index recommendation of zero P_2O_5 for most of the field sections.[11] Willet shows *Cornell Recommends* prescribes zero P_2O_5, but the nutrient budget shows the fields were planned for 27 lbs P_2O_5/acre. Willet Dairy admits spreading a total of 54.6 lbs P_2O_5/acre. Willet Dairy did not follow the plan but instead spread at a rate greater than the plan recommends. Willet Dairy also violated the P Index recommendation by spreading on a field with a Willet calculated P Index of 216.

Requirement to Perform Waste Analysis

Willet Dairy is required to test all animal waste streams at least every two years pursuant to NRCS standard 590-NY, at least since September, 2001, when this standard was issued. Permit GP-99-01 required compliance with this standard through its requirement to comply with NRCS 312-NY. See GP-99-01, Subsection 8(c)(xi). With issuance of Permit GP-04-02, a new monitoring and reporting provision at Section IX(M) became applicable immediately requiring annual N and P testing of animal wastes.

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[11] Willet Dairy does not break down their field waste application reports to the field section level.

Each of Willet dairy's four facilities produces liquid animal wastes and solid wastes stored as a "pack." Animal wastes are processed through "solids separators" that remove much of the solid material from the animal waste stream. In addition, some concentrated silage leachate, also liquid, is applied to fields.

Because each waste stream is subject to different physical conditions, including the amount of precipitation that enters liquid waste storage lagoons, the amount of settling of solids, differences in patterns of feed and bedding at each site, etc., it is essential that each waste stream be separately analyzed to determine its nitrogen and phosphorus content.

Solid Waste

Attachment #5 shows animal waste data reported in Willet's AWMP. For the solid waste "packs," there has been no nitrogen or phosphorus (nutrient) analysis since CY 2003. Reported nutrient concentrations in pack wastes from Belltown, Lane Farm, West Corey and the Main Farm for 2002 and 2003 are reported as identical. This suggests no facility-specific nutrient analysis for solid wastes was prepared.

A single analysis indicates a phosphorus concentration in waste of 6.9 lbs./ton. Some average values for dairy waste solids[12] are higher and the failure to test all specific solid wastes streams and to test more frequently means that substantial errors in P_2O_5 rates for solid wastes applied to fields are possible.

Liquid Waste

Liquid waste analysis for CY 2005 was contained in an XLS files provided by ACS. TKN,

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[12] See <http://www.uwex.edu/ces/crops/uwforage/FeedManureP-FOF.htm>. Average P_2O_5 content of dairy solids ranged from 8.84 to 9.69 during 2002-2004.

ammonia and P_2O_5 listed for CY 2005 for liquid waste sources is the same as the CY 2004 data reported in Willet's AWMP for Belltown Lagoon, Lane Road Lagoon, Corey Slurrystore and the Main Barn Lagoon. The Lane Road Lagoon and the Corey Slurrystore liquid waste constituents are the same for CY 2001 through CY 2005. Belltown Lagoon liquid waste is identical for CYs 2001-2003. County Line Lagoon liquid waste was not analyzed for CY 2001 and CY 2002. The Main Barn Lagoon liquid waste analysis for CY 2001 and CY 2002 is identical for TKN, ammonia and P_2O_5. For CY 2000, only the Main Barn Lagoon liquid waste appears to have been analyzed.

Thus, for the last six years Willet Dairy appears to have analyzed solid animal waste only once, from a single facility, and the result was applied to solid waste streams at four different facilities.

Because Willet Dairy has not completed sufficient and timely testing of each of its animal waste streams with the required specificity and testing schedule, it has been in continuing violation of NRCS standard 590-NY and Willet's permit since September 2001. In addition, since mid-2004, Willet Dairy has not complied with Permit GP-04-02 provision IX(M) that requires annual testing of all liquid and solid waste streams directed to field application.

Requirement to Use Current Soil Tests for Nutrient Planning

NRCS Code 590-NY requires the use of "current soil tests" for nutrient planning since 2001. Current soil tests are defined as tests no older than 3 years. Willet's soil sampling policy also applies to "all fields." WD 406.

Attachment #6 lists the fields on which Willet operated without current soil tests. Each

field listed there received an animal waste application in the crop year indicated, but was not sampled for phosphorus during that crop year and the two previous crop years. The largest number of such occurrences was in CY 2003.

In addition, there is ample evidence that Willet Dairy exercises effective control over lands of the Turek Farm for purposes of animal waste disposal. Willet Dairy equipment and personnel appear to be responsible for animal waste spreading operations on the Turek Farms. Willet Dairy transfers no waste to Turek Farms. Turek Farms fields are identified in Willet's AWMP as fields 2611 through 2631. Failure to have current soil test information for all fields in Willet's AWMP violates NRCS 590-NY.

Willet Dairy's AWMP identifies fields and frequently also identifies a field section. Each field section is assigned a recommended rate of phosphorus application based in part on phosphorus soil testing. There are a total of 1,062 identified field sections among Willet Dairy's fields.[13]

The number of field sections that were tested for phosphorus in soils each year is shown in the following table:

Crop Year	**Number of Reported Soil Tests that Include Mehlich III P Determination**
2000	585

[13] Some of the 1,062 field/sections may be double counted as a result of hisorical re-designations and new sectioning of fields.

2001	578
2002	553
2003	298
2004	323
2005	261

The table shows that Willet Dairy tested about 55% of their fields in the earlier years of their plan and fewer on an annual basis since CY 2003. Willet Dairy's soil testing practice thus violates the testing frequency required in its certified AWMP.

Requirement to Convert Mehlich III-P Soil Test Results to Morgan P Values

Willet reports the soil test results for most fields in which it operates in its AWMP. Willet's soil test results are based on a Mehlich III extraction reported in units of parts per million (ppm>. Willet is required to convert soil test results to Morgan equivalents in units of lbs./acre.[14] Willet's AWMP fails to correctly convert Mehlich III soil test results to Morgan P equivalents.

Cornell University provides an online Mehlich III to Morgan P converter for this purpose.[15] Cornell conversion model runs for all CY 2002 and CY 2003 soil test reports are provided in tables in Attachments #8 and #9, respectively. The left columns show the results of the Cornell

[14] See, e.g., WD 4356-4366 for CY 2005. See also field names P2_PPM and P2CALCULATED in the ACS-provided Excel digital files.

[15] Available at <http://nmsp.css.cornell.edu/software/conversions/index.asp>. The Cornell conversion model requires the user to know the lab that tested soil samples. Willet Dairy uses A & L Eastern Laboratory to conduct soil tests. See <http://nmsp.css.cornell.edu/software/conversions/Morganequiv6.xls>. Cornell's conversion tool requires a value for aluminum in soil samples, and was available as early as April 2002. See Attachment #7. Once these methods were approved and published any past Mehlich III P data that also included aluminum should have been reconverted under the Cornell method.

converter.[16] The right columns show the Morgan P values reported in Willet's AWMP as pounds/acre. Also shown is the factor difference between the Cornell converter's Morgan P equivalent values and frequently erroneous AWMP values. Finally, the tables also show the Morgan P soil class[17] for both the erroneous AWMP Morgan P value and the Cornell converter's Morgan P value.

Attachments #8 and #9 show there are significant differences between the calculated results for Morgan Phosphorus in pounds/acre based on the approved (on line) Cornell conversion method and the values for Morgan P pounds/acre reported in Willet's AWMP. Compared to the values reported in Willet's AWMP, Cornell's Morgan P conversions are between 1.1 and 3.0 times higher. These errors are likely to have a significant effect on calculation of nutrient budgets and P-Index values. The errors are summarized in the following table:[18]

Erroneous Morgan Phosphorus Conversions from Crop Years 2003, 2002 and 2000 Reported in Willet Dairy's AWMP

[16] Some of the input soil test conditions were outside of the demonstrated ranges of model accuracy. Most of these were for pH condition slightly above the upper bound of 7.5. Some of the noted conditions were for values outside the upper or lower bounds for input values of K and Mg which do not affect the ultimate value for Morgan P.

[17] Soils classifications are "very high" (VH), "high" (H), "medium" (M), "low" (L) and "very low" (VL).

[18] Tests reported in the table include a fraction of the fields on which Willet Dairy operates because about one-third of Willet's fields are sampled each year.

Error Factor (ratio of correct, Cornell approved method calculation to ACS erroneous report)		Crop Year			
		2005	**2004**	**2003**	**2002**
2003 Soil Test Reports	< 1.0	0	0	0	0
	1.0	7	18	18	0
	1.1 - 1.9	11	11	11	0
	2.0 - 2.5	228	232	236	0
	2.6+	29	31	33	0
	Total 2003 results	275	292	298	0
2002 Soil Test Reports	< 1.0	0	7	18	21
	1.0	0	82	105	137
	1.1 - 1.9	0	31	65	89
	2.0 - 2.5	0	74	104	272
	2.6+	0	16	16	34
	Total 2002 results	0	210	308	553
2000 Soil Test Reports	< 1.0	0	0	0	2
	1.0	0	0	0	1
	1.1 - 1.9	0	0	0	12
	2.0 - 2.5	0	0	0	74
	2.6+	0	0	0	5
	Total 2000 results	0	0	0	94
Total Morgan P Reports Understated		268	395	465	486
Total Soil Tests Considered in AWMP		820	825	747	812
Percent of Morgan P Results Understated in Error in Willet's AWMP		**33**	**48**	**62**	**60**

Because Willet Dairy has not properly reported and used Morgan P soil test information for numerous fields, it is in violation of requirements for proper soil testing and planning requirements under NRCS Code 590.

It appears that Willet's AWMP relies on an earlier obsolete conversion method Cornell published in 2001. See equations contained in the article at Attachment #10. The equations for

Model 1 and Model 2 under the 2001 method notes that: "All data are *in ppm.*" (emphasis in orig.).

Attachments 11, 12 and #13 show calculated Morgan P values for crop years 2003, 2002 and 2000, respectively. For CY 2003, out of a total of 301 field section soil test results reported in Morgan P units, 298 results are converted using Cornell's 2001 model 1 equation (requiring a value for aluminum), which results in a value reported in parts per million. But in Willet's AWMP the same value is reported in lbs./acre. This creates a 50% under-reporting of soil phosphorus concentrations. In addition, all Morgan P values reported in Willet's CY 2002 and 2003 soil test data are out of compliance because were are not based on a conversion method approved by Cornell.

Because CY 2000 soil test results do not include aluminum data, Willet's AWMP used Model 2 from Cornell's 2001 conversion method. Attachment #13 shows many fields had "0" reported for Morgan P equivalents even though the 2001 method has a means for calculating the Morgan P equivalent without knowing aluminum soil concentrations. However, the conversions reported in Willet's AWMP do not change the units from parts per million to pounds per acre, resulting in under-reporting of soil phosphorus concentrations.

Willet eventually adopted the approved method for converting Mehlich III-P to Morgan P values in its CY2004 and 2005 soil test reports. However, after adopting the approved method, Willet did not reconvert the 2002 and 2003 data using that method. Instead, Willet relied on the erroneous converted 2002 and 2003 data for planning in Crop Years 2002-2005. This reliance on erroneous soil test information has thus rendered nutrient planning and P Index values erroneous

for CY 2002-2005 planning for all fields not soil tested in crop years 2004 and 2005.[19] The effect of erroneous soil test information will be reflected in CY 2006 to the extent that fields for which Morgan P is calculated were not sampled in CY 2004 and 2005 and are not sampled in CY 2006.

Requirement to Plan for Areas of Special Environmental Concern

NRCS Code 590-NY provides specific reporting and recordkeeping requirements addressing environmentally sensitive areas and waste application on fields:

> The following components shall be included in the nutrient management plan: . . . location of designated sensitive areas or resources and the associated, nutrient management restriction.
>
> In addition to the requirements described above, plans for nutrient management shall also include....a statement about the relationship between nitrogen and phosphorus transport and water quality impairment. . . .The discussion about phosphorus should include information about phosphorus accumulation in the soil, the increased potential for phosphorus transport in soluble form, and the types of water quality impairment that could results from phosphorus movement into surface water bodies, . . . a statement about how the plan is intended to prevent the nutrients (nitrogen and phosphorus) supplied for production purposes from contributing to water quality impairment, . . . a statement that the plan was developed based on the requirements of the current standard and any applicable Federal, state, or local regulations or policies; and that changes in any of these requirements may necessitate a revision of the plan.
>
> Operation and maintenance addresses the following: . . . documentation of the actual rate at which nutrients were applied. When the actual rates used differ from or exceed the recommended and planned rates, records will indicate the reasons for the differences.

NRCS Code NY590, pp. 7-8.

NRCS Code 312-NY requires an inventory of "areas of potential concern":

[19] Because not all of Willet Dairy's fields are tested each year, phosphorus planning is based on calculations from some soil test data that is three years old.

> The areas of potential concern identified by the inventory will be addressed with the specific watershed and the specific farm location in the watershed taken into account. . . . Each farm will be evaluated for the specific risks to the watershed from biochemical oxygen demand (BOD), nutrients, odors, pathogens, and other potential pollutants that it could potentially release to the environment.

Attachment #14 includes Willet Dairy's policy on phosphorus applications on high phosphorus soil test fields:

> Currently none of the watersheds that Willet Dairy, LP operates in requires P based planning, so manure can be applied up to the nitrogen needs of the crop. However, recognizing that phosphorus is likely to be an environmental concern, it is a policy at Willet Diary LP to limit manure application on sites with very high (VH) P to Cornell Recommends.

Attachment #14, p. 2.

This policy was probably written in 2000-2001. Since the policy was written South Cayuga Lake was designated as a CWA 303(d) impaired water body for phosphorus, requiring its impaired status to be taken into account in Willet's AWMP. Failure to revise its AWMP to reflect the heightened risk of further impairment to Cayuga Lake violates the requirement to consider watershed concerns in Willet's AWMP.

<u>Requirement to Report Phosphorus Accumulation in Soils</u>

NRCS NY590 requires:

> a statement about the relationship between nitrogen and phosphorus transport and water quality impairment. . . . The discussion about phosphorus should include information about phosphorus accumulation in the soil, the increased potential for phosphorus transport in soluble form, and the types of water quality impairment that could result from phosphorus movement into surface water bodies.

No such statement is included in Willet Dairy's AWMP. If it were, such a statement would

have to report progressive soil phosphorus buildup over the last six years, and the potential for further degradation of already phosphorus impaired waters in the Cayuga and Owasco Lakes watersheds. Because its AWMP lacks any statement about the increased potential for phosphorus transport and water quality impairment, Willet Dairy is in violation of the NRCS NY-590 standard requiring such a statement.

Lane Road Heifer Barnyard

"All livestock farms will also address Barnyard Water Management Systems (NY-707)." NRCS Code NY312, p. 1.

Willet Dairy's AWMP does not include planning or reporting for compliance with NRCS Code NY-707 for its outdoor barnyard operation at the Lane Road Facility. Willet has therefore failed to address Code 312-NY for that facility.

Requirement to Evaluate Whether Total Land Available for Spreading is Sufficient

The amount of land Willet Dairy has available for waste disposal must be sufficient to allow the land to properly utilize the nutrients disposed. "The overall system shall include sufficient land for proper nutrient utilization or disposal of waste at locations, times, rates and volumes that maintain desirable water, soil, plant, and other environmental conditions." NRCS Code NY312, p. 2, col. 2.

There is ample evidence in Willet Dairy's AWMP that the facility applies phosphorus from animal waste to cropfields in excess of Cornell Recommends. Willet Dairy applies waste in excess of its own AWMP's phosphorus application recommendations. See Attachment #15.

MONITORING, REPORTING AND RECORDKEEPING REQUIREMENTS

Requirement to Record Incorporation of Waste

NRCS Code NY633 provides: "Wastes . . . shall be applied at times the waste material can be incorporated by appropriate means into the soil within 72 hours of application." NRCS Code NY633, p. 2, col. 2 (September 2001). The standard recommends that covered farms "[r]educe nitrogen volatilization losses associated with land application of some waste by incorporation within 24 hours." Id., p. 3. NRCS 590-NY requires covered farms to:

> [c]onsider application methods and timing that reduce the risk of nutrients being transported to ground and surface waters, or into the atmosphere. Suggestions include . . . *immediately incorporating land applied manure or organic byproducts*. . . . Consider nitrogen volatilization losses associated with the land application of animal manure. *Volatilization losses can become significant, if manure is not immediately incorporated into the soil after application*.

NRCS Code 590NY, p. 6.

Willet Dairy's AWMP includes a policy for record keeping on incorporation. See Attachment #16 (blank log forms, including a column to report incorporation, WD 746-747). However, Willet's CY 2005 spreading logs do not include the date of incorporation or the method of application. Id. See Attachment #17 (an example of Willet's handwritten spreading logs for CY 2005). Most of the logs actually used by Willet do not conform to the log form in its AWMP and do not provide a place to record whether waste was incorporated.[20]

Since Willet Dairy's records indicate it incorporates on few of its spreading fields, it has

[20] The CY 2005 handwritten logs do allow determination of drag line injection methods for waste applications, but no information on whether other applied waste was actually incorporated or the date of incorporation. Out of 3859 ACS records of animal waste applications only 24 indicate incorporation (MANUREINCORP = "Y") up the end of CY 2004. ACS records also include a field (INCLUDEAMONIA) indicating no nitrogen loss from ammonia, for most crop fields. Records where MANUREINCORP are marked "Y" also have INCLUDEAMONIA as "Y."

not meaningfully considered incorporation to reduce the risk of nutrients escaping into the local air and water.

Based on Willet Dairy's failure to document incorporation rates and the waste volumes as applied, ammonia emissions can be expected to be substantial. Animal waste applications in CY 2005 for drag-line injection operations in fields around the County Line Lagoon[21] are excluded. For included wastes, 100% evaporation loss for ammonia was assumed, in keeping with the assumption of no incorporation.

The estimated ammonia emission rate for CY 2005 liquid waste as applied is 252 tons for all Willet Dairy fields.[22] These are significant volatilization losses and should trigger increased incorporation to reduce volatilization.

Requirement to Monitor and Record Waste As Applied

NRCS Standard NY-590 provides:

> Operation and maintenance addresses the following: . . . *documentation of the actual rate at which nutrients were applied*. When the actual rates used differ from or exceed the recommended and planned rates, records will indicate the reasons for the differences.

NRCS Standard NY590, p. 8 (emphasis added).

Willet Dairy's "Manure Application Logs" used a lower concentration of nutrients than were reported in the AWMP "Manure Analysis". Attachment #18 is an example of a page from the CY 2004 "Manure Application Log." Field 2102 shows an application of 133.9 kgals on for

[21] I am aware of no other CY 2005 drag line operations at other locations at the Willet Dairy.

[22] This does not include ammonia releases from lagoons or from confinement barns.

this field on 10/13/2003 from the Belltown Lagoon. The table below summarizes the reported nutrient applications for this field:

Willet Field #2102 – Application on 10/13/03 from Belltown Lagoon of 133.9 kgal of Liquid Animal Waste – An Example of Failure to Report Amount of Nutrients as Applied		
	Nitrogen	P_2O_5
Willet Listed Nutrient Application per acre	36.225 lbs N/acre	41.4 lbs P_2O_5/acre
Willet Used the Following Factor for Calculated lbs of Nutrients per kgal	36.225 lbs N/acre 6.9 kgal/acre = 5.25 lbs N / kgal	41.4 lbs P_2O_5/acre 6.9 kgal/acre = 6.00 lbs P_2O_5/kgal
Actual Physical Content of Nutrients in Wastes as Applied; "Manure Analysis – CY 2004" @ WD4762	18.43 lbs TKN/kgal	7.87 lbs P_2O_5/kgal
Actual Physical Nutrient Application, as applied	127.2 lbs N/acre	54.3 lbs P_2O_5/acre
Amount of Applied Nutrients WD Failed to Report Under "Physical Nutrient As Applied" Requirement	91 lbs N/acre	12.9 lbs P_2O_5/acre

As can be seen from the table, the recorded nutrient application rate is discounted from the physical application rate. Similar failure to report the actual nutrient content as applied appears throughout Willet's application logs for multiple crop years.

The magnitude of the failure to report actual rates of nutrients as applied is very significant for nitrogen. Review of AWMP records indicates that most of the ammonia nitrogen is planned to be lost for most animal waste applications by evaporation. Such a planning approach

substantially increases the potential for over-application of nitrogen and contamination of local groundwater with nitrates.

Willet Dairy's current permit also imposes several monitoring and recordkeeping requirements regarding confinement sites and waste lagoons. See CP-04-02, Subsections IX(N) and IX(O). However Willet's records do not include any such records.

Requirement to Monitor and Record Wet Weather Events

Willet Dairy's current permit requires that weather conditions be recorded for a period 24 hours before and after each waste spreading event. See GP-04-02, Subsection IX(O) ("Land Application Areas," item (i)). However, Willet Dairy's Manure Application Log does not record information on weather conditions. See WD3654-3714.

Requirement to Complete Required Planning Prior to the Start of the Crop Year

Under GP-99-01 Willet Dairy was required to fully implement its AWMP by July 24, 2004. See WD 2961. By the terms of its permit:

> The plan shall describe and ensure the implementation of practices which are *to be used* to assure compliance with the limitations and conditions of this permit.

GP-99-01, Subsection 7(a) (emphasis added).

Thus, to the extent that risk assessment must be incorporated into waste management planning, Willet must complete this assessment prior to spreading waste on crop fields, not during or after.[23] However, at the time of writing, Willet has not completed its nutrient budget, P-

[23] For example, NRCS Code NY 590 provides:

Acceptable phosphorus based manure application rates shall be determined as a function of soil test recommendation or estimated phosphorus removal in harvested plant biomass.

NRCS Code NY 590, p. 4, col. 2.

Index calculation and other required components of its AWMP for CY 2006. It is my opinion that failure to complete required components of its AWMP prior to the beginning of the crop year violates fundamental planning requirements "which are *to be used* to assure compliance with the limitations and conditions of this permit." GP-99-01, Subsection 7(a) (emphasis added).

WILLET DAIRY'S COMPLIANCE WITH ITS OWN AWMP

Apart from deficiencies in Willet Dairy's AWMP, Willet fails to comply with the spreading limits set forth in own AWMP in numerous instances.

Soil Testing Requirements

According to Willet Dairy's AWMP, Willet tests all soils on which it operates annually:

> All fields operated by Willet Dairy, LP are soil sampled annually. Samples are analyzed by A+L Eastern Agricultural Labs. The extraction is Mehlich III, *with phosphorus also extracted using a Morgan test*. All calculations involving phosphorus use the Morgan numbers.

WD 406 (emphasis added).

Willet Dairy's policy using both the Mehlich III-P test and the Morgan P test was practiced only during CY 2001 crop year and for most, but not all of the fields tested that year. All Morgan P soil test results for CY 2000 and CYs 2002-2005 were converted from Mehlich-III test results and are not the result of actual phosphorus soil tests using the Morgan extraction.[24]

Willet Dairy never changed the policy stated in its revised AWMP after CY 2001,

[24] Many producers, including Willet Dairy, rely on soil testing laboratories that use the Mehlich III soil test extraction. In New York, under NRCS 590-NY, soil test results must be expressed in Morgan Phosphorus extraction equivalents. Farms subject to the standard may use soil test results from either a Morgan P extraction soil test or conversion from other soil test extractions like Mehlich-III to the Morgan P equivalent. Cornell University has developed a laboratory-specific conversion from Mehlich III soil test results to Morgan P equivalent that first became available in early 2002. Attachment #7 is an article by Cornell University faculty describing these procedures.

requiring Morgan P extractions for original soil testing. As a result, Willet Dairy's soil testing practices after CY 2001 do not comply with its certified AWMP.[25]

Requirement to Sample Soils for All Fields Annually

Willet Dairy also fails to comply with its AWMP requirement to sample soils in all fields annually. Attachment #19 shows field by field phosphorus soil test results and Willet Dairy animal waste applications. Every occurrence of a phosphorus soil test result is indicated with a "T" and every actual application of liquid or solid animal waste is indicated with a "W."

Requirement to Record Cover Crops

Willet Dairy's AWMP includes a policy to plant cover crops. See Attachment #20.[26] However, Willet has no records of cover crops. Documentation of cover crops is essential to compliance with erosion controls on fields where the controls are required.

Requirement to Limit Spreading to 15,000-Gallon per Acre

The Willet Dairy AWMP limits the acceptable rate of the spreading of animal waste to 15,000 gallons per acre per year (15 kgal/acre-year), notwithstanding any other spreading rate recommended by the AWMP "Manure Application Planner" or allowed by the P-Index. See Attachment #21 and deposition for L. Odell, pp. 41, line 23, to 42, line 13.

In CYs 2001-2005, Willet Dairy exceeded its AWMP limit of 15,000 kgal/acre-year for a number of crop fields. Attachment #22 shows all fields for CYs 2001-2005 (up to July 15, 2005)

[25] For several soil tests in CY 2000 and a limited number in CY 2001, Willet Dairy did not convert its Mehlich III test results to Morgan P equivalents. Consequently, Morgan P for these fields was reported as zero.

[26] Specific field information is shown at WD 220-236 and 2398-2442, plans at WD 270-290, cover crop schedule at WD334-336 and WD2426, conservation plan job sheets at WD338-355, BMP sheets at WD389-395 and WD2782.

that received animal waste applications totaling greater than 15 kgal/acre-year. In addition to exceeding the AWMP's limitation, most of these waste applications substantially exceed agricultural utilization or agronomic rates, and exceed limits under Cornell Recommends.

The following table summarizes the number of fields on which Willet Dairy exceeded the 15 kgal/acre-year limit.

CY	Number of Fields Spread at Rate over 15.0 kgal/acre-year	Total Number of Acres Spread at Rate over 15.0 kgal/acre-year	Total Volume of Excess Waste Spread over the 15.0 kgal/acre-year rate	Highest Rate of Excessive Spreading (kgal/acre-year)
2005	68	1064.4	2430	25.2
2004	61	958.3	3457	36.4
2003	54	925.3	4952	39.2
2002	38	560.7	2052	33.3
2001	62	991.8	5115	31.5

Requirement to Limit Waste Applications to Rates Prescribes by *Cornell Recommends*

A policy of limiting animal waste P_2O_5 to *Cornell Recommends* on very high phosphorus fields is included in Willet Dairy's AWMP. See Attachment #14.

Cornell Recommends prescribes phosphorus rates of 0 lbs/acre P_2O_5 for VH fields. Attachment #23 and Willet's CY 2005 nutrient budget, (WD4019-4255), shows Willet's planned applications of phosphorus from animal waste for CY 2005 exceed *Cornell Recommends* rates. Many of Willet's AWMP recommendations rely on improper Mehlich III to Morgan P soil test conversions made in CY 2003. However, even apart from that issue, Willet's plan recommends phosphorus crop replacement rates for a number of fields even when the underlying AWMP

requirement is to limit phosphorus inputs to Cornell Recommends, which is 0 lbs/acre phosphorus for all relevant crops.

Because Willet Dairy's CY 2005 nutrient budget recommends animal waste applications on VH fields, planning is currently out of compliance with Willet's stated policy on this issue. Out of 192 field/sections totaling 1,412 acres determined to be VH fields in CY 2005, Willet's AWMP recommends animal waste applications for 97 fields. A total of 52 of these recommendations were based on erroneous Morgan soil test P conversions for fields tested in CY 2003, and 45 recommendations to spread of VH fields were made. A total of 9.1 million gallons of liquid animal waste was recommended to be applied to VH fields in CY 2005.

Using ACS data, Attachment #24 shows the actual animal waste spread for CY 2005 and the calculated P-Index for each field for CY 2005.[27] Attachment #24 shows several examples where the actual rate of phosphorus application from animal waste significantly exceeds the plan recommendations in Willet's nutrient budget. While this would be expected with nitrogen planning management, Willet Dairy's policy adopting phosphorus planning (e.g., using Cornell Recommends) prohibits such practices. Actual spreading practices thus violate Willet's AWMP.

Also, Willet's AWMP lacks any statement or explanation of exceedences of planned phosphorus limits in VH fields, and thus violates the applicable reporting and recordkeeping standard under NRCS Code NY590.

BEST MANAGEMENT PRACTICES

Clean Water Act permits for CAFOs must include Best Management Practices (BMPs) to

[27] By including the ACS-calculated P-Index in this analysis I do not accept that the ACS P Index calculation is necessarily correct.

control or abate the discharge of pollutants when, as here, numeric effluent limitations are not included in the permit. See 40 CFR 122.44(k); EPA, GUIDE MANUAL ON NPDES REGULATIONS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS, EPA 833-B-95-001, p. 14 (December, 1995). Accordingly, a number of best management practices are effective upon coverage under the NYSDEC General Permit for CAFOs. See GP-99-01, Section 8; GP-04-01, Section VIII. For example, "Collection, storage, and disposal of liquid and solid waste should be managed in accordance with NRCS standards." GP-99-01, Subsection 8(c)(xi); GP-04-01, Subsection VIII(C)(xi).

Requirement to Avoid Waste Spreading in Wet or Winter Weather

Potential risk for nutrient runoff at Willet Dairy exists because Willet operates in a climate where frozen and snow-covered ground conditions prevail during part of the year, and because Willet operates in a location where all or most runoff flows to tributaries of Salmon Creek, Cayuga Lake or Owasco Lake. See WD 9-24 (listing watersheds into which effluent from Willet Dairy operations flows).

NRCS Code NY590 provides:

> Nutrients shall not be applied to frozen, snow-covered, or saturated soil if the potential risk for runoff exists. The Leaching Index and Phosphorus Index will be used to evaluate both leaching and runoff risk respectively.

NRCS, Code NY 590, *Nutrient Management*, p. 3, col. 2 (June 2003).

According to the User's Manual for Cornell University's P Index model:

> It should be noted that a low or medium score does not imply that P loss does not occur. The poor timing of manure or fertilizer application relative to a rainfall or runoff event may result in substantial P losses.

The New York Phosphorus Runoff Index, USER'S MANUAL AND DOCUMENTATION, p. 7 (July 8, 2003).[28]

An evaluation of the potential risk for runoff therefore cannot rest on the P Index alone, but must consider "timing of manure or fertilizer application relative to a rainfall or runoff event." Id.

Willet Dairy has no policy for determining whether saturated soil conditions may exist. Runoff risk is substantially increased under saturated soil conditions. Nor is there is there any policy for checking weather predictions and timing manure applications to avoid wet weather that may saturate soils. Willet's planning therefore does not consider timing of manure or fertilizer application relative to a rainfall or runoff event and falls short of BMP for manure spreading in wet or winter weather.

Willet Dairy has applied waste to crop fields during or immediately after substantial precipitation, when soils are likely to be saturated, and when soils are frozen or snow-covered. The following table shows total spreading during meteorological winter[29] by crop year:

[28] Recently Cornell University published supplemental guidelines for reducing the risk of runoff during adverse weather. Karl Czymmek, SUPPLEMENTAL MANURE SPREADING GUIDELINES TO REDUCE WATER CONTAMINATION RISK DURING ADVERSE WEATHER CONDITIONS, What's Cropping Up? 15(3): 1-3 (2005). The guidelines urge producers of manure to consider: "Before spreading, especially during wet or snowy periods, evaluate runoff potential along with other management needs: soil wetness, weather forecast for rainfall or snowmelt, presence of diversion or field ditches and drainage tile, rate per acre and total amount of manure to be applied." Id., p. 1 (Executive Summary).The guidelines also urge producers to ask: "Given the current soil and ground conditions and the weather forecast, should manure be applied to all or part of this field today?" Id., p. 2.

[29] for the northern tier of states in the United States meteorological winter is considered to be December 1 through February 28.

Time Interval	Total Liquid Animal Waste Applied	Percentage of Annual Crop Year Liquid Waste Spreading
CY 2001, non-winter	48128	98%
CY 2001, WINTER	984.4	2%
CY 2002, non-winter	26581.4	78%
CY 2002, WINTER	7674.2	22%
CY 2003, non-winter	43244.8	89%
CY 2003, WINTER	5596.3	11%
CY 2004, non-winter	43657.9	94%
CY 2004, WINTER	2829.2	6%
CY 2005, non-winter	46557.8	89%
CY 2005, WINTER	5517.5	11%

The Cornell P-Index adjusts calculations of risk determinations for the season when animal waste spreading occurs. The time of highest risk of pollutants is February-April and the second highest timing-related period of November-January. Correlating these seasonal risk factors with Willet's actual spreading practice results in the following volumes of animal waste reported by Willet as spread during the two highest-risk seasons:

Crop Year	Highest Cornell Timing Source Factor; Feb-April		Next Highest Cornell Timing Source Factor; Nov-Jan	
	Feb-Apr - kgals	% of CY Total	Nov-Jan - kgals	% of CY Total
2001	13367.1	27.2%	7809.9	15.9%

2002	8983.4	26.2%	10432.8	30.5%
2003	14396.4	29.5%	8656.4	17.7%
2004	11502.9	24.7%	9174	19.7%
2005	13083.6	25.1%	18596.4	35.7%

Clearly, Willet spreads substantial volumes of waste at times of greatest risk for runoff, in contravention of the applicable NRCS standard prohibiting such a practice.

Willet Dairy waste applications can also be correlated to heavy rain events. Using local rain gauge data,[30] Attachment #26 shows all liquid waste applications by Willet Dairy by date of application and rain event data. Attachment #27 shows incidents of concern, including saturated soils from precipitation prior to waste spreading, rain during the same 24 hour period as waste spreading events, and heavy precipitation events following waste spreading activity.

The data in Attachments ## 3 and 4 show that Willet applies waste to land within 24 hours of heavy precipitation, when soils would be saturated, in contravention of the applicable NRCS standard prohibiting such a practice.

Cover Crop BMPs

[30] These data are obtained National Climactic Data Center precipitation data for 2000-2005 from a rain gauge known as Locke 2 West, the closest available official rain gauge data to the Willet Dairy operation. The location of the Locke 2 West rain gauge is shown in Attachment #25. Willet Dairy maintains a single rain gauge near the Main Barn on Route 34. Official rain gauge data is generally represents the 24 hour period beginning on the prior day after gauge collection until the record date at 7-8 AM. The Locke 2 West rain gauge data does not distinguish snow from rain. Therefore, snow event data was also obtained from a weather station operated by Cornell University, Site ID 304174 east of Ithaca. All Locke 2 West precipitation events for May through October were presumed as rain. Also, precipitation events of 0.1 inch or more from the Locke 2 West data were disregarded if there was an appreciable snow indication at site #304174 greater than 0.1 inches of snow.

It is my opinion that Willet Dairy cannot verify its cover crop best management practices at the present time since there are no records of cover crops for CY 2001-2006. Indeed, Willet Dairy proposed to drop cover crop requirements from several fields in 2003.

Lane Road Barnyard BMP

There is no barnyard BMP for the open calf area at the Lane Road facility. There is a significant potential for barnyard runoff from that area, and a ponded area immediately south of the facility flows to Locke Creek and ultimately to Owasco Lake.[31]

Liquid Waste Pumping Requirements under Willet Dairy's Consent Order

As a result of an enforcement action, Willet Dairy is required to comply with certain requirements involving animal waste pumping operations. See Attachment #28. These requirements include limiting liquid manure pumping operations to bermed areas and having operators present at the pump at all times.

Willet Dairy has installed a bermed location for pumping operations at the Main Barn Lagoon. However, Willet Dairy has not installed a containment berm for pumping operations at the County Line storage lagoon. Merely placing portable pumping equipment on top of the storage lagoon containment berm circumvents berming as a spill control measure that complies with the consent order.

Willet Dairy's AWMP contains no information about pumping area berm installation at West Corey, Lane Road and Belltown so there is no way to verify compliance with the consent order pumping requirements.

[31] The latter observation is based on publicly available aerial photographs of the area. *See* <http://www.terraserver.microsoft.com>.

Since Fall of 2004, Willet has conducted drag line injection on fields near the County Line Lagoon. Under the pumping policy, an operator must be present in the immediate vicinity of the pump at all times. On October 15, 2004, Willet Dairy conducted drag line operations in field 22. I observed the line was left in place and was observed running from the area of the County Line Lagoon to Field 22 on November 3 and 4, 2004. On information and belief, such drag line operations are carried out by a single person. However, there is not a clear field of view to see the pumping area when the drag line is in field 22. When the operator cannot observe the pump because it is out of view, the consent order is violated.

Additional Observations and Opinions

In my opinion each violation noted above will continue indefinitely until corrective action is taken.

These observations and opinions do not exhaust the violations of the terms and conditions of their Clean Water Act permit that, in my opinion, are being committed by Willet Dairy on an ongoing basis.

3. Data and Other Information Considered: To develop the opinions set forth above, I reviewed planning and reporting records prepared by or for Willet Dairy in connection with Willet Dairy's AWMP; planning and reporting records prepared for Willet Dairy by Agricultural Consulting Services, Inc. (ACS) in connection with Willet Dairy's AWMP; transcripts of depositions in this action; publicly available aerial photos of the locations on which Willet Dairy operates; USDA Soil Conservation Service soil surveys for relevant areas of Tomkins County and Cayuga County; technical guidance on nutrient management available from the Cornell

Nutrient Management SPEAR Program web site, at <http://nmsp.css.cornell.edu>; agricultural practice standards published by NRCS; applicable environmental laws and regulations; and other things typically or customarily relied upon by experts in my field.

4. Compensation: I am being paid at an hourly rate of $40.00/hour plus expenses for investigation and analysis, and $100.00/hour for testimony and testimony preparation.

5. Other Testimony: I provided deposition testimony on June 12, 2002 and June 17, 2002 as plaintiffs' expert in Cholewas v. Viking Energy of Lincoln, Inc., an air pollution case originating in Alpena County, Michigan (26th Judicial Circuit Court).

I provided testimony by affidavit in support of a motion for an injunction in an EPA air pollution rulemaking challenge case, Natural Resources Defense Council, et al., v. Environmental Protection Agency, Docket No. 03-1381 (D.C. Circuit), involving EPA rulemaking on routine equipment replacement and repair and Clean Air Act new source review.

6. Publications: I have no publications.

Dated: October 20, 2005

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Attachment List

1. October 13, 2005 electronic mail from Q. M Ketterings, Cornell University to Alexander J. Sagady, Environmental Consultant

2. Review of CY 2005 Nutrient Budget; Fields Reporting "0" Manure Residual and the CY 2004 Total Liquid Animal Waste Application Rate

3. Compliance Review on CY 2005 Fields with ACS Calculation of P Index Greater than 74

4. Supporting documents for P-Index compliance review section

5. Willet Dairy AWMP - Manure Analysis, CYs 2000-2005

6. Willet Dairy Fields Where Management Practice Has Not Produced Current Soil Test Data for the Indicated Crop Year in Violation of NRCS Standard 590-NY

7. Phosphorus Soil Testing and Nutrient Management Planning in New York Ketterings, Q.M., and K. J. Czymmek (2002). What's Cropping Up? 12(4):1-3.

8. Reconversion of Mehlich III P Soil Tests to Morgan P Equivalents -- Willet Dairy Soil Labs With Cornell Method for A & L Eastern Laboratories – CY 2002

9. Reconversion of Mehlich III P Soil Tests to Morgan P Equivalents -- Willet Dairy Soil Labs With Cornell Method for A & L Eastern Laboratories – CY 2003

10. Conversion Equation Part I; Do Modified Morgan and Mehlich III P Have a Morgan P Equivalent? Q. M Ketterings, et al, What's Cropping Up? 11(3)

11. Reconstruction of ACS Errors in Calculation of Mehlich III P to Morgan P Equivalents – CY 2003

12. Reconstruction of ACS Errors in Calculation of Mehlich III P to Morgan P Equivalents – CY 2002

13. Reconstruction of ACS Errors in Calculation of Mehlich III P to Morgan P Equivalents – CY 2000

14. Willet Diary AWMP – Manure Spreading Summary [Willet policy on phosphorus]

15. Willet Dairy de facto Phosphorus Budget for CY 2005 Fields That Received

Animal Waste

16. Willet Dairy AWMP – Samples of blank logs with place for recording incorporation of animal waste and fertilizers

17. Willet Dairy AWMP – Sample of representative CY 2005 handwritten animal waste spreading log

18. Willet Dairy AWMP - Single page of CY 2004 Manure Application Log at WD3709

19. Field by Field Occurrence of Soil Test P Events and Actual Willet Dairy Waste Applications for CY 2000-2005

20. Willet Dairy AWMP - Soil Management

21. Willet Dairy – Manure Spreading Protocol

22. Review of Willet Dairy Liquid Waste Spreading at Volume per Acre Rates Exceeding the WD Maximum of 15,000 Gallons (15.0 kgal) per Acre per Year for Crop Years 2001-2005

23. Review of CY 2005 Phosphorus Nutrient Budget for Very High Phosphorus Fields at Willet Dairy

24. Review of CY 2005 Plan Recommendations for Very High Soil Test Phosphorus Willet Dairy Fields; ACS Recommendations, Actual Phosphorus and Wastes Applied, Calculated P-Index and P-Index Assumptions

25. Map of location of Locke 2 West Rain Gage, Station ID #304836

26. Willet Dairy Liquid Animal Waste Applications and Precipitation Events 0.10 Inch or Larger for CYs 2001-2005

27. Willet Dairy Liquid Animal Waste Applications and Precipitation Events – Four schedules of events of concern

28. Willet Dairy Consent Order – Schedule for Compliance and Pumping Plan

29. Willet Dairy AWMP – Field Characteristics and Old Winter Risk 1-4 Determination

30. Willet Dairy AWMP - Fertilizer Management Policy