STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

Mr. Steve T. Harrison, President
Harrison Dairy, Inc.
e-copy: stevetharrison@bellsouth.net
215 Harrison Road
Loudon, TN 37774

Re: State Operating Permit No. SOP-14006
Harrison Dairy, Inc.
Loudon, Loudon County, Tennessee

Dear Mr. Harrison:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Resources hereby issues the enclosed State Operating Permit. The continuance and/or reissuance of this Permit is contingent upon your meeting the conditions and requirements as stated therein.

Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application. Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment. Any petition for permit appeal under this subsection (i) shall be filed with the Technical Secretary of the Water Quality, Oil and Gas Board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit. A copy of the filing should also be sent to TDEC's Office of General Counsel.

If you have questions, please contact the Knoxville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Mr. John Newberry at (615) 532-7743 or by E-mail at *John.Newberry@tn.gov*.

Sincerely,

Brad Harris
Manager, Land-Based Systems

Enclosure

cc/ec: Permit File
Knoxville Environmental Field Office
Sam Marshall, TDA, Sam.Marshall@tn.gov
Ms. Angela Warden, Angela Warden Consulting, LLC, awardenconsulting@gmail.com

STATE OF TENNESSEE

OPERATING PERMIT

No. SOP-14006
Revoke and Reissuance

Issued By

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

In accordance with the provisions of Tennessee Code Annotated Section 69-3-108
and regulations promulgated pursuant thereto:

permission is hereby granted to:	**Harrison Dairy, Inc.**
for the operation of:	**a concentrated animal feeding operation (CAFO) with 1,265 dairy cows and 200 calves**
from a facility located:	**at 215 Harrison Road in Loudon, Loudon County, Tennessee**
near receiving waters named:	**Fork Creek**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on:	**July 19, 2016**
This permit shall expire on:	**September 30, 2020**
Issuance date:	**July 19, 2016**

for Tisha Calabrese Benton, Director
Division of Water Resources

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PART I

A. AUTHORIZATION

Harrison Dairy, Inc., located at 215 Harrison Road in Loudon, Loudon County, Tennessee, is authorized to operate a concentrated animal feeding operation (CAFO), which is located near Fork Creek. This CAFO must have all measures, structures, etc. in place and fully implemented, according to the site-specific nutrient management plan (NMP) approved by the Tennessee Department of Agriculture, on or before the permit effective date.

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee shall attain the limitations and requirements of this permit as of the effective date of this permit for the following areas.

1. Production Areas

There must be no discharge of manure, litter, or process wastewater pollutants into waters of the state from the production area.

2. Land Application Areas

Application rates for manure, litter, or process wastewater to land under the ownership or operational control of the CAFO must be managed to minimize phosphorus and nitrogen transport from the application field(s) to waters of the state according to the permittee's site-specific nutrient management plan (NMP).

The discharges from land application areas are subject to the following requirements:

a. The NMP must be fully implemented by the permit effective date.
b. The best management practices (BMPs) listed in subpart III.C must be developed and fully implemented by the permit effective date.
c. Inspections and records shall be maintained as specified in subpart I.E below

3. Timing Limitations

There must not be land application of nutrients including manure, litter or process waste water, within 24 hours of a precipitation event that may cause runoff from the fields. The operator shall not land apply nutrients to frozen, flooded, or saturated soils when the potential for runoff is high. All applications of manure shall be made during the months of February through November subject to the limitations of this section.

4. Nutrient Application Requirements

All additions of plant available nitrogen and phosphorus, including manure, fertilizer, biosolids, etc., to the fields listed in the permittee's NMP shall be documented according to the record keeping requirements listed in section I.D.2 below.

5. Nutrient Calculation Methodology

The permittee has provided the methodology used to determine the amount of nitrogen and phosphorus in the manure, litter, and process wastewater to be land applied. This methodology includes the calculations used to determine the quantity of manure to be land applied and incorporates the nutrient content of the manure and the nutrient needs of the proposed crops. A copy of this methodology is included in Appendix A of this permit.

The permittee must calculate the maximum amount of manure, litter, and process wastewater to be land applied at least once each year using the results of the most recent representative manure, litter, and process wastewater tests for nitrogen and phosphorus taken within 12 months of the date of land application. The permittee shall use the methodology provided in Appendix A for these calculations and shall keep a copy of all calculations with their records, as required by section I.D.2 below.

6. Rainfall Monitoring

A rain gauge shall be kept on site and properly maintained. Amounts of rainfall shall be recorded for all rainfall events, as defined in subpart I.F below.

7. Discharge Notification

If for any reason, there is a discharge to a water body of the state or an overflow or discharge from a waste retention structure, the permittee shall make oral notification within 24-hours to the Division of Water Resources (division) by calling 1-888-891-TDEC and shall notify the division's Knoxville Environmental Field Office (EFO), at the address listed below, in writing within five working days of the discharge from the facility. The written notification must include a description of the discharge (including the cause and flow path of the discharge), volume of discharge, time of discharge, and the cause of the discharge.

Knoxville Environmental Field Office
Water Pollution Control
3711 Middlebrook Pike
Knoxville, TN 37921

In addition, the permittee shall collect a sample of the waste/wastewater discharged and shall analyze the sample for the parameters shown in Table 1 below, at a minimum:

Table 1. Discharge Monitoring Requirements.

Effluent Characteristic	Frequency	Sample Type
Flow	1/Discharge	Estimate
BOD5	1/Discharge	Grab
Total Suspended Solids (TSS)	1/Discharge	Grab
Nitrogen, Total	1/Discharge	Grab
Nitrogen, Ammonia Total	1/Discharge	Grab
Total Kjeldahl Nitrogen	1/Discharge	Grab

Nitrogen Nitrate Total (as N)	1/Discharge	Grab
Phosphorus, Total	1/Discharge	Grab
Phosphorus, Dissolved	1/Discharge	Grab
Escherichia coli	1/Discharge	Grab

*Flow shall be reported in Million Gallons per Day (MGD)

Note: The division suggests that permittees obtain appropriate sampling containers to retain on site or that permittees have a laboratory available that will be able to conduct the required sampling within 30 minutes if a discharge occurs.

Sampling results shall be submitted to the Knoxville EFO along with the following information within 30 days of the discharge:

a. Volume of the discharge: An estimate of the volume of the release and the date and time.
b. Sampling procedures: Samples shall consist of grab samples collected from the over-flow or discharges from the retention structure. A minimum of one sample shall be collected from the initial discharge (within 30 minutes). Samples must be collected in compliance with the requirements of section I.C.2 below.
c. Reasons for not sampling: If conditions are not safe for sampling, the permittee must provide documentation of why samples could not be collected. However, once the unsafe conditions have passed, the permittee shall collect a sample for the retention structure (pond or lagoon) within 30 minutes.
d. All monitoring information required by this section shall be submitted to the division using the forms provided in Appendix D.

C. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified herein shall be representative of the volume and nature of the discharge, and shall be taken prior to mixing with uncontaminated stormwater runoff or the receiving stream.

2. Test Procedures

Monitoring results must be conducted according to test procedures specified in TDEC Rule 0400-40-05-.07.

3. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;
b. The exact person(s) collecting samples;
c. The dates and times the analyses were performed;
d. The person(s) or laboratory who performed the analyses;
e. The analytical techniques or methods used, and;
f. The results of all required analyses.

D. INSPECTION, RECORD KEEPING, AND REPORTING

1. Inspections

Daily inspections of all water lines, including drinking water or cooling water are required.

Weekly inspections are also required for the following:

a. All stormwater diversion devices, runoff diversion structures, and devices channeling contaminated stormwater to the wastewater and manure storage and containment structure, and
b. Manure, litter, and process wastewater impoundments noting the liquid level in the impoundments.

2. Record Keeping

The permittee must create, maintain for five years from the date they are created, and make available to the director, upon request, the following records:

a. All applicable records documenting the implementation and management of the minimum elements of the NMP, as listed in subpart III.B below;
b. All applicable records documenting the implementation and management of the required BMPs, as listed in subpart III.C below;
c. A copy of the CAFO's site-specific NMP and records of its annual review;
d. A copy of the CAFO's most recent permit application;
e. A copy of the CAFO's permit shall be kept on site;
f. Records documenting the following visual inspections:

    i. Weekly inspections of all stormwater diversion devices, runoff diversion structures, and devices channeling contaminated stormwater to the wastewater and manure storage and containment structure(s);
    ii. Daily inspections of water lines, including drinking water or cooling water lines; and
    iii. Weekly inspections of the manure, litter, and process wastewater impoundments noting the liquid level in the impoundments;

g. Weekly records of the depth of the manure and process wastewater in any open surface liquid impoundment as indicated by the required depth marker which indicates the minimum capacity necessary to contain the runoff and direct precipitation of the 25-year, 24-hour rainfall event. In the case of swine or poultry CAFOs that are new sources the depth marker must indicate minimum capacity necessary to contain the runoff and direct precipitation associated with the design storm used for sizing the impoundment.
h. Records documenting any corrective actions taken; deficiencies must be corrected as soon as possible. If deficiencies are not corrected within 30 days of notice of deficiency, the records must include an explanation of the factors preventing immediate correction;
i. Records of mortalities management and practices used to comply with the NMP and the most recent versions of NRCS Conservation Practice Standards 316 and 317, per the requirements of TDEC Rule 0400-40-05-.14;

j. Records documenting the current design of any manure or litter storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity;
k. Annual records of the estimated depth of solids in any open surface liquid impoundment, as indicated by the required depth marker which indicates the minimum capacity necessary to contain the runoff and direct precipitation of the 25-year, 24-hour rainfall event. The permittee shall use these estimated depths of solids and the design specifications of the liquid impoundments to determine when accumulated solids need to be removed;
l. Records of the date, time, and estimated volume of any overflow;
m. Expected and actual crop yields;
n. The date(s) manure, litter, or process wastewater is applied to each field;
o. Weather conditions at time of application and for 24 hours prior to and following application;
p. Test methods used to sample and analyze manure, litter, process wastewater, and soil,
q. Results from annual manure, litter, and/or process wastewater sampling that was analyzed for nitrogen and phosphorus content;
r. Results from most recent soil sampling (a minimum of once every five years) analyzed for phosphorus content;
s. Explanation of the basis for determining manure application rates, as provided in the technical standards established by the NRCS or as otherwise approved by the director or the Tennessee Department of Agriculture and consistent with applicable state and federal rules;
t. Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter, or process wastewater;
u. Total amount of nitrogen and phosphorus actually applied to each field, including documentation of calculations for the total amount applied;
v. The method used to apply the manure, litter, or process wastewater; and
w. Date(s) of manure application equipment inspection and calibration.

3. Annual Report

The permittee must submit an annual report for the previous calendar year, by February 15 that includes:

a. The number and type of animals, whether in open confinement or housed under roof;
b. Estimated amount of total manure, litter and process wastewater generated by the CAFO in the previous calendar year (tons/gallons);
c. Estimated amount of total manure, litter and process wastewater transferred to a third party by the CAFO in the previous calendar year (tons/gallons);
d. Total number of acres for land application covered by the site-specific NMP;
e. Total number of acres under control of the CAFO that were used for land application of manure, litter and process wastewater in the previous calendar year;
f. A summary of all manure, litter and process wastewater discharges to waters of the state from the production area that have occurred in the previous calendar year, including date, time, and approximate volume;
g. A statement indicating whether the current version of the CAFO's NMP was developed or approved by a certified nutrient management planner;
h. The actual crop(s) planted and actual yield(s) for each field;
i. The actual nitrogen and phosphorus content of the manure, litter and process wastewater;

j. The results of calculations to determine the maximum amount of manure, litter and process wastewater to be land applied and the data used in the calculations;
k. The actual amount of manure, litter and process wastewater applied during the previous calendar year;
l. The results of any soil tests for nitrogen and phosphorus conducted in the previous calendar year; and
m. The amount of any supplemental fertilizer applied during the previous calendar year.

Annual reports must be submitted to the Knoxville EFO at the address listed in section I.B.7 above, and to the Nashville Central Office Enforcement and Compliance Section at the address listed below.

Tennessee Division of Water Resources
Compliance and Enforcement Section
Attention: Compliance Review
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

4. Falsifying Reports

Knowingly making any false statement on any report required by this permit may result in the imposition of criminal penalties as provided for in Section 69-3-115 of the Tennessee Water Quality Control Act.

E. SCHEDULE OF COMPLIANCE

Full compliance and operational levels shall be attained from the effective date of this permit.

F. DEFINITIONS

An **animal feeding operation** (AFO) is a facility that (1) stables, confines and feeds or maintains animals (other than aquatic animals) for a total of 45 days or more in any 12-month period and (2) does not sustain crops, vegetation, forage growth, or post-harvest residues in the normal growing season over any portion of the facility. Two or more AFOs under common ownership are considered to be a single AFO for the purposes of determining the number of animals at an operation, if they adjoin each other or if they use a common area or system for the disposal of wastes.

For the purpose of this permit, **annually** is defined as a monitoring frequency of once every twelve (12) months beginning with the date of issuance of this permit so long as the following set of measurements for a given 12 month period are made approximately 12 months subsequent to that time.

A **bypass** is defined as the intentional diversion of waste streams from any portion of a treatment facility.

For the purpose of this permit, a **calendar day** is defined as any 24-hour period from midnight to midnight or any other 24-hour period that reasonably approximates the midnight-to-midnight time period.

A **concentrated animal feeding operation (CAFO)** means an "animal feeding operation" which meets the criteria in 40 Code of Federal Regulations Part 122, or which the director designates as a significant contributor of pollution pursuant to TDEC Rule 0400-40-05.

Degradation means the alteration of the properties of waters by the addition of pollutants or removal of habitat.

De Minimis – Alterations, other than those resulting in the condition of pollution or new domestic wastewater discharges, that represent either a small magnitude or a short duration shall be considered a de minimis impact and will not be considered degradation for purposes of implementing the antidegradation policy. Discharges other than domestic wastewater will be considered de minimis if they are temporary or use less than five percent of the available assimilative capacity for the substance being discharged. If more than one activity has been authorized in a segment and the total of the impacts uses no more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow, they are presumed to be de minimis. Where total impacts use more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow they may be treated as de minimis provided that the division finds on a scientific basis that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to consume more than five percent of the assimilative capacity, available habitat or 7Q10 low flow.

Discharge or **discharge of a pollutant** refers to the addition of pollutants to waters from a source.

Land application area means the land under the control of an AFO owner or operator to which manure, litter or process wastewater from the AFO production area is or may be applied.

A **large CAFO** (Class I CAFO) is an AFO that confines greater than or equal to the number of animals specified in table 0400-40-05-.14.1.

The term **manure** is defined to include manure, bedding, compost and raw materials or other materials commingled with manure or set aside for disposal.

A **medium CAFO** (Class II CAFO) is an AFO that confines greater than or equal to the number of animals specified in table 0400-40-05-.14.1 and also meets the criteria of 0400-40-05-.14 (3).

A site-specific **nutrient management plan (NMP)** is a conservation plan that is unique to animal feeding operations. It is a grouping of conservation practices and management activities which, when implemented as part of a conservation system, will help to ensure that both production and natural resource protection goals are achieved. Guidance for developing a NMP is located in USDA-NRCS's National Planning Procedures Handbook.

The **NRCS** is the United States Department of Agriculture, Natural Resources Conservation Service.

Owner or operator means any person who owns, leases, operates, controls or supervises a source.

Production Area means that part of an AFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas.

- The animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milk rooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways associated with barns or barnyards, and stables.
- The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. If an AFO stores manure in the field (i.e., manure or litter piled for more than several days before land application occurs), the field storage is considered to be a production area. Note that manure or litter stored uncovered for more than two weeks is not considered to be short-term or temporary storage, and is included in the definition of production area.
- The raw materials storage area includes but is not limited to feed silos, silage bunkers, and organic bedding materials.
- The waste containment area includes but is not limited to settling basins, and areas within berms and diversions that separate uncontaminated stormwater.
- The production area also includes any egg washing or egg processing facility, and any area used in the storage, handling, treatment, or disposal of mortalities.

Process wastewater means water that comes in contact with a production process, its raw materials, products or byproducts. This includes spillage, wash-water, and overflow from animal watering systems or contact-cooling water. In the case of AFOs, process water would include water that contacts manure, litter, feed, milk, eggs or bedding.

A **rainfall event** is defined as any occurrence of rain, preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event. Ten -year, 24-hour rainfall event, 25-year, 24-hour rainfall event, and 100-year, 24-hour rainfall event are mean precipitation events with a probable recurrence interval of once in 10 years, or 25 years, or 100 years, respectively, as defined by the National Weather Service in Technical Paper No. 40, ‘‘Rainfall Frequency Atlas of the United States,’’ May, 1961, or equivalent regional or state rainfall probability information developed from this source.

Setback means a specified distance from surface waters or potential conduits to surface waters where manure, litter, and process wastewater may not be land applied. Examples of conduits to surface waters include but are not limited to: open tile line intake structures, sinkholes, and wells.

TDA is the Tennessee Department of Agriculture.

Unavailable Conditions exist where water quality is at, or fails to meet, the criterion for one or more parameters.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Vegetated buffer means a narrow, permanent strip of dense perennial vegetation established parallel to the contours of and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching surface waters.

Waters means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

PART II

A. DUTY TO COMPLY

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Water Quality Control Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

B. DUTY TO REAPPLY

The permittee is not authorized to operate after the expiration date of this permit. In order to receive authorization to operate beyond the expiration date, the permittee shall submit such information and forms as are required to the director no later than 180 days prior to the expiration date.

C. PROPER OPERATION AND MAINTENANCE

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

D. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. Causes for such permit action include but are not limited to the following:

1. Violation of any terms or conditions of the permit;
2. Obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; and
3. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

E. PROPERTY RIGHTS

This permit does not convey property rights of any sort, or any exclusive privilege.

F. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the commissioner, within a reasonable time, any information which the commissioner may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the commissioner upon request, copies of records required to be kept by this permit.

G. INSPECTION AND ENTRY

The permittee shall allow the commissioner, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the commissioner.

H. MONITORING, RECORDS AND REPORTING

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the director at any time.

1. Records of monitoring information shall include:

    a. the date, exact place, and time of sampling or measurements;
    b. the individual(s) who performed the sampling or measurements;
    c. the date analyses were performed;
    d. the individual(s) who performed the analyses;
    e. the laboratory where the analyses were performed;
    f. the analytical techniques or methods used; and
    g. the results of such analyses.

2. Monitoring results must be conducted according to test procedures approved under 40 CFR part 136.

3. Regular reporting (at a frequency of not less than once per year) to assure that compliance is being achieved will normally be required of the discharger in any permit as indicated below:

    a. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the commissioner. Monitoring may also be reported via electronic reporting methods established by the commissioner.
    b. If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or other reporting form specified by the commissioner.
    c. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in the permit.

I. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to the commissioner shall be signed and certified by the persons identified in 0400-40-05-.05(6)(a-c), making the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

J. PLANNED CHANGES

The permittee will annually review and update the NMP and notify the director whenever there have been significant changes that affect the amount of manure produced, such as the number of animals on site; changes in how the manure is handled, stored, transferred, or land applied; or changes to how animal mortalities are handled. The permittee shall give notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The alteration or addition to a permitted facility is considered a new source per 0400-40-05-.02 (54);
b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged; or
c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices.

K. TRANSFERS

Individual permits are not transferable to any person except after notice to the commissioner, as specified below. The commissioner may require modification or revocation and reissuance of the permit to change the name of the permittee.

1. The permittee notifies the commissioner of the proposed transfer at least 30 days in advance of the proposed transfer date.
2. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them.
3. The permittee must provide the following information to the commissioner in their formal notice of intent to transfer ownership:

    a. The permit number of the subject permit;
    b. The effective date of the proposed transfer;
    c. The name and address of the transferor;
    d. The name and address of the transferee;
    e. The names of the responsible parties for both the transferor and transferee;
    f. A statement that the transferee assumes responsibility for the subject permit;
    g. A statement that the transferor relinquishes responsibility for the subject permit;
    h. The signatures of the responsible parties for both the transferor and transferee pursuant to the signatory requirements of this part; and
    i. A statement regarding any proposed modifications to the facility, its operations, or any other changes, which might affect the permit, limits and conditions contained in the permit.

L. BYPASS

Bypass, as defined by 0400-40-05-.02(1), is prohibited unless:

1. bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
2. there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
3. for anticipated bypass, the permittee submits prior notice, to the Division, if possible at least ten days before the date of the bypass; or
4. for unanticipated bypass, the permittee submits notice to the Division of an unanticipated bypass within 24 hours from the time that the permittee becomes aware of the bypass.

A bypass that does not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation.

M. OVERFLOW

Overflows as defined by 0400-40-05-.02 are prohibited.

N. NONCOMPLIANCE

In the case of any noncompliance which could cause a threat to human health or the environment, the permittee shall report the noncompliance to the commissioner within 24 hours from the time the permittee becomes aware of the circumstances. A written submission must be provided within five days of the time the permittee becomes aware of the noncompliance. The permittee shall provide the following information:

1. A description of, and the cause of the noncompliance;
2. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue;
3. The steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

O. UPSET

An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the permittee can identify the cause(s) of the upset;
2. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
3. The permittee submitted information required under "Reporting of Noncompliance" within 24 hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
4. The permittee complied with any remedial measures required under "Adverse Impact."

P. ADVERSE IMPACT

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

Q. NOTIFICATION

The following notification requirements apply to industrial/mining dischargers and publicly owned treatment works.

Industrial/mining dischargers shall notify the commissioner as soon as they know or have reason to believe:

a. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

   i. One hundred micrograms per liter (100 ug/l);
   ii. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

iii. Five times the maximum concentration value reported for that pollutant(s)in the permit application; or
iv. The level established by the commissioner.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. Five hundred micrograms per liter (500 ug/l);
ii. One milligram per liter (1 mg/l) for antimony;
iii. Ten times the maximum concentration value reported for that pollutant in the permit application; or
iv. The level established by the commissioner.

R. LIABILITIES

1. Civil and Criminal Liability

Except as provided in permit conditions nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or the Federal Water Pollution Control Act, as amended.

PART III

OTHER REQUIREMENTS

A. REOPENER CLAUSE

If an applicable standard or limitation is promulgated under TDEC Rule 0400-40-05 and that effluent standard or limitation is more stringent than any effluent limitation in the permit or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

B. NUTRIENT MANAGEMENT PLAN (NMP)

The permittee's NMP is entitled "Comprehensive Nutrient Management Plan" for Operation Name "Harrison Dairy, Inc." and Owner Name "Harrison Dairy, Inc.." The updated NMP for a permit modification was received by the division on May 31, 2016. This NMP and any future

revised NMPs, authorized according to section III.B.3 below, are incorporated into this permit by reference.

The NMP must incorporate the requirements listed in sections III.B.1 and III.B.2 below. Nutrient application rates shall be based on a field-specific assessment of the potential for nitrogen and phosphorus transport from the field and that addresses the form, source, amount, timing, and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and phosphorus movement to surface waters.

Application rates for manure, litter, and other process wastewater applied to land under the ownership or operational control of the CAFO must minimize phosphorus and nitrogen transport from the field to surface waters in compliance with the technical standards for nutrient management established by the director.

1. Contents of Nutrient Management Plan (NMP)

The permittee has developed and submitted for state approval from TDA a site-specific nutrient management plan (NMP). The NMP must be kept on site. The NMP is available for public review at the Nashville central office, the Knoxville Environmental Field Office and the TDA Ellington Agriculture Center. The permittee must have all measures, structures, etc., of the NMP in place and fully implemented upon the date of permit issuance. The NMP must comply with applicable state rules and:

a. Includes best management practices and procedures necessary to implement applicable effluent limitations and standards,
b. Ensures adequate storage of manure, litter, and process wastewater including procedures to ensure proper operation and maintenance of the storage facilities,
c. Ensures proper management of mortalities (i.e., dead animals) so that they are not disposed of in a liquid manure, stormwater, or process wastewater storage or treatment system that is not specifically designed to treat animal mortalities as outlined in NRCS Conservation Practice Standard 316, October 2002 (or the most recent edition) and/or the NRCS Animal Waste Handbook, and/or University of Tennessee Extension publications,
d. Ensures that clean water is diverted, as appropriate, from the production area,
e. Prevents direct contact of confined animals with waters of the state,
f. Ensures that chemicals and other contaminants handled on-site are not disposed of in any manure, litter, process wastewater, or stormwater storage or treatment system unless specifically designed to treat such chemicals and other contaminants,
g. Identifies appropriate site specific conservation practices to be implemented, including, as appropriate, buffers or equivalent practices to control runoff of pollutants to waters of the state (these practices must meet minimum standards set in the NRCS Field Office Practice Standard and/or the NRCS Animal Waste Handbook),
h. Identifies protocols for appropriate testing of manure, litter, process wastewater, and soil that are approved by the University of Tennessee testing lab for Tennessee conditions,
i. Establishes protocols to land apply manure, litter or process wastewater in accordance with site specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter or process wastewater, and
j. Identifies specific records that will be maintained to document the implementation and management of the minimum elements described in items a through i above.

k. In addition to NRCS technical standards, NMPs must address facility maintenance until all manure and/or litter is transferred to a third party or land applied in accordance with the NMP, see subpart III.E below.

2. Terms of the NMP

The terms of the permittee's site-specific nutrient management plan (NMP) are enforceable through this permit. The terms of the NMP are the information, protocols, best management practices, and other conditions in the NMP determined by the director to be necessary to implement the NMP. The terms of the NMP, with respect to protocols that ensure appropriate agricultural utilization of the nutrients in the manure, litter or process wastewater, must include field-specific rates of application properly developed in accordance with recommendations by the University of Tennessee Extension and any timing limitations identified in the NMP concerning land application on the fields available for land application.

3. Changes to a NMP

The permittee must review their NMP annually to determine if any changes are necessary. Whenever the permittee makes changes to its NMP previously submitted to the director:

a. The CAFO owner or operator must provide the director with the most current version of the CAFO's nutrient management plan and identify changes from the previous version, except that the results of calculations made in accordance with the requirements of section I.B.5 above are not considered to be changes to the nutrient management plan subject to the requirements of this paragraph.
b. The director must review the revised NMP to ensure that it meets the requirements of this paragraph and applicable effluent limitations and standards and must determine whether the changes to the NMP include revisions to the terms of the NMP as set forth in section III.B.2 above. The director must advise the CAFO owner or operator whether or not the changes meet the requirements of this paragraph and applicable effluent limitations and standards and upon such notification the CAFO must either make further revisions to the NMP or implement the revised NMP.

C. BEST MANAGEMENT PRACTICES (BMPS)

1. General Requirements

a. The permittee shall prevent discharge of pesticide-contaminated waters into retention structures. All wastes from dipping vats, pest and parasite control units, and other facilities utilized for the management of potentially hazardous or toxic chemicals shall be handled and disposed of in a manner such as to prevent pollutants from entering the retention structures or waters of the state.
b. All discharges to containment structures shall be composed entirely of wastewater from the proper operation and maintenance of a CAFO and the precipitation runoff from the CAFO areas. The disposal of any materials (other than discharges associated with proper operation and maintenance of the CAFO) into the containment structures is prohibited by this permit.
c. Chemicals, manure, litter, and/or process wastewater shall be managed to prevent spills. Procedures for cleaning up spills shall be developed and the necessary equipment to implement clean up shall be available to facility personnel.

d. No CAFO liquid waste management system shall be constructed, modified, repaired, or placed into operation after April 13, 2006, unless it is designed, constructed, operated, and maintained in accordance with final design plans and specifications which meet or exceed standards in the NRCS Field Office Technical Guide and other guidelines as accepted by the Departments of Environment and Conservation, or Agriculture, per TDEC Rule 0400-40-05-.14(14).
e. The operator shall notify the division in the event of any fish kill or other impacts to aquatic life that may indicate a problem with the manure management system.
f. Where employees are responsible for work activities which relate to permit compliance, those employees must be regularly trained in the proper operation and maintenance of the facility and waste disposal. Training shall include topics as appropriate such as land application of wastes, proper operation and maintenance of the facility, good housekeeping and material management practices, necessary record-keeping requirements, and spill response and clean up. The permittee is responsible for determining the appropriate training frequency for personnel and the NMP shall identify periodic dates for such training.
g. Uncontaminated storm water runoff shall be diverted away from manure, litter, process wastewater, waste retention structures, and mortality management areas, i.e., lagoons, under floor pits, composters, etc.

2. Depth Marker

All open surface liquid impoundments must have a depth marker which clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation of the 25-year, 24-hour rainfall event (equivalent to 5.4 inches of precipitation at this location) and the minimum required freeboard according to the lagoon design.

3. Land Application of Animal Waste

The following best management practices (BMPs) are required to be implemented through the permittee's NMP that incorporates a field-specific assessment of the potential for nitrogen and phosphorus transport from the field and that addresses the form, source, amount, timing, and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and phosphorus movement to surface waters:

a. Application rates for manure, litter, and other process wastewater applied to land under the ownership or operational control of the CAFO must minimize phosphorus and nitrogen transport from the field to surface waters in compliance with technical standards for nutrient management that:

    i. Include a field-specific assessment of the potential for nitrogen and phosphorus transport from the field to surface waters, and address the form, source, amount, timing, and method of application of nutrients on each field to achieve realistic production goals, while minimizing nitrogen and phosphorus movement to surface waters, that employs the Tennessee Phosphorus Index (a tool developed by the University of Tennessee Extension Service and the NRCS to assess the risk of phosphorus movement from the application area to waters of the state); and
    ii. Include appropriate flexibilities for any CAFO to implement nutrient management practices to comply with the technical standards, including consideration of multi-year phosphorus application on fields that do not have a high potential for

phosphorus runoff to surface water, phased implementation of phosphorus-based nutrient management, and other components, as determined appropriate by the director;

b. Annual manure analysis for nitrogen and phosphorus content, using procedures outlined in Tennessee NRCS Conservation Practice Standard 590, January 2003 (or most recent), and soil analysis at a minimum of once every five years for phosphorus content (the results of these analyses are to be used in determining application rates for manure, litter, and other process wastewater);
c. Periodic inspection of equipment used for land application of manure, litter and other process wastewater;
d. Application of manure, litter, and process wastewater that:

   i. Is applied no closer than 100 feet to any down-gradient surface waters, open tile line intake structures, sinkholes, agricultural well heads, or other conduits to surface waters unless,

      1) The CAFO substitutes the 100-foot setback with a 35-foot wide vegetated buffer or by leaving in place a 60-foot natural riparian buffer, where applications of manure, litter, or process wastewater are prohibited; or
      2) The CAFO demonstrates that a setback or buffer is not necessary because implementation of alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent to or better than the reductions that would be achieved by the 100-foot setback;

   ii. Is applied no closer than 100 feet for any potable well, public or private or as recommended by the University of Tennessee Extension; and

e. For new CAFOs that are located adjacent to exceptional Tennessee waters and outstanding national resource waters (as identified by the department), leave in place a minimum 60-foot natural riparian buffer between the stream and the land application area.
f. There must not be land application of nutrients including manure, litter or process waste water, within 24 hours of a precipitation event that may cause runoff from the fields. The operator shall not land apply nutrients to frozen, flooded, or saturated soils when the potential for runoff is high.

D. TRANSFER TO THIRD PARTY

In cases where CAFO-generated manure, litter, or process wastewater is sold or given away in its entirety to be used for land application activities that are not under the control of the permitted CAFO, land application does not need to be addressed in the permitted CAFO NMP. However, the permittee must do the following for every transfer of waste:

a. Provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis, consistent with 40 CFR § 412 and approved by the University of Tennessee Extension; and
b. Ensure that the recipient sign the Agreement for the Removal of Litter, Manure and/or Process Wastewater using the form in Appendix B below. The permitted CAFO must keep a

copy of the signed Agreement along with other records required by this permit, per section I.D.2 above.

In addition, the permittee must retain for five years records of the date, recipient name and address, and approximate amount of manure, litter or process wastewater transferred to a third party using the form in Appendix C.

E. CLOSURE PLAN

The permittee must fully implement the closure/rehabilitation plan for the waste system storage/treatment structure(s) within 360 days of ceasing operation.

In addition to NRCS technical standards, the plan must address facility maintenance until proper closure and include the following:

a. All mortalities must be properly disposed of, in accordance with the requirements of subpart III.F below;
b. No lagoon or other earthen basin shall be permanently abandoned,
c. Lagoons and other earthen basins shall be maintained at all times until closed in compliance with this subpart,
d. All lagoons and other earthen basins must be closed if the permittee ceases operation. In addition, any lagoon or other earthen basin that is not in use for a period of twelve consecutive months must be closed unless the permittee is viable, intends to resume use of the structure at a later date, and; maintains the structure as though it were actively in use, to prevent compromise of structural integrity; or removes manure and wastewater to a depth of one foot or less and refills the structure with clean water to preserve the integrity of the synthetic or earthen liner. In either case, the permittee shall notify the division of the action taken and shall conduct routine inspections, maintenance, and record keeping as though the structure were in use. Prior to restoration of use of the structure, the permittee shall notify the division and provide the opportunity for inspection,
e. All closure of lagoons and other earthen basins must be in accordance with NRCS standards (Field Technical Guide No. 360, Closure of Waste Impoundment). Consistent with NRCS standards, the permittee shall remove all waste materials to the maximum extent practicable and dispose of them in accordance with the permittee's NMP, unless otherwise authorized by the division.
f. Unless otherwise authorized by the division, completion of closure for lagoons and other earthen basins shall occur as promptly as practicable after the permittee ceases to operate or, if the permittee has not ceased operations, 12 months from the date on which the use of the structure ceased, unless the requirements above are met.

F. MORTALITY MANAGEMENT

The permittee must ensure proper management of mortalities (i.e., dead animals) so that they are not disposed of in a liquid manure, stormwater, or process wastewater storage or treatment system that is not specifically designed to treat animal mortalities. Mortalities must be handled in such a way as to prevent the discharge of pollutants to surface water. At a minimum, the requirements of the most recent versions of Tennessee NRCS Conservation Practice Standards 316-Animal Mortality Facility, May 1, 2006 (or most recent) and 317-Composting Facility, May

2002 (or most recent) must be followed, and/or the NRCS Animal Waste Handbook, and/or University of Tennessee Extension publications as applicable. Records documenting compliance with the NRCS Conservation Practice Standards shall be maintained in compliance with section I.D.2 above.

Appendix A – Nutrient Calculation Methodology

Assumptions and Calculations for Harrison Dairy, Inc.

Removal Rates for crops grown:

Corn Silage (yield 30 ton):	**Small Grain (yield 9 ton):**	**Fescue Pasture Maint (4 ton):**
N = 8.3 lb. / yield	N = 25 lb. / yield	N = 38 lb. / yield
P2O5 =3.6 lb. / yield	P2O5 = 7 lb. / yield	P2O5 =18 lb. / yield
K2O = 8.3 lb. / yield	K2O = 31 lb. / yield	K2O = 52 lb. / yield

Orchardgrass Hay Maintenance (yield 5 ton):
N = 50 lb. / yield
P2O5 =17 lb. / yield
K2O = 62 lb. / yield

Key:
"*"= multiply
ac. = acre
lb. = pound

Given the above yields and removal rates, to calculate actual removal rate per crop:
*Crop yield * removal rate lbs./ acre =crop removal rate*

Harrison Dairy, Inc. 30 corn silage has the following removal rates (lb. / acre):
N = 30 * 8.3 = 249 lb. / ac. removal for N
P2O5 = 30 * 3.6 = 108 lb. / ac. removal for P2O5
K2O = 30 * 8.3 = 249 lb. ac. removal for K2O

Harrison Dairy, Inc. 9 Bu Small Grain Hay and the following removal rates (lb. / acre):
N = 9 * 25 = 225 lb. / ac. removal for N
P2O5 = 9 * 7 = 63 lb. / ac. removal for P2O5
K2O = 9 * 31 = 279 lb. / ac. removal for K2O

Harrison Dairy, Inc 4 ton fescue and the following removal rates (lb. / acre):
N = 4 * 38 = 152 lb. / ac. removal for N
P2O5 = 4 * 18 = 72 lb. / ac. removal for P2O5
K2O = 4 * 52 = 208lb. / ac. removal for K2O

Harrison Dairy, Inc. 5 ton Orchardgrass and the following removal rates (lb. / ac.):
N = 5 * 50 = 250 lb. / ac. removal for N
P2O5 = 5 * 17 = 85 lb. / ac. removal for P2O5
K2O = 5 * 62 = 310 lb. / ac. removal for K2O

BEES # 100 Lime and Fertilizer Recommendations Univ. of Tennessee
Corn Silage (based on yield of 26 Bu. / acre or higher):
Nitrogen = 180 lbs. per acre per year (lb./ac./yr.)
P2O5 (based on soil test values): L = 200; M = 100, H = 0, V(H) = 0
K2O (based on soil test values): L = 300; M = 200, H = 0, V(H) = 0

Small Grain (9 ton.):
Nitrogen = 60-180 lbs./ac./yr.
P2O5 (based on soil test values): L = 80; M = 40, H = 0, V(H) = 0
K2O (based on soil test values): L = 80; M = 40, H = 0, V(H) = 0

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

BEES # 100 Lime and Fertilizer Recommendations Univ. of Tennessee

Tall Fescue Pasture/ Hay Maintenance (4 ton):
Nitrogen = 60-120 / 60-165 lbs./ac./yr.
P2O5 (based on soil test values): L = 60; M = 30, H = 0, V(H) = 0
K2O (based on soil test values): L = 60; M = 30, H = 0, V(H) = 0

Orchardgrass Maintenance (5 ton):
Nitrogen = 60-120 lbs./ac./yr.
P2O5 (based on soil test values): L = 60; M = 30, H = 0, V(H) = 0
K2O (based on soil test values): L = 60; M = 30, H = 0, V(H) = 0

Nitrogen (N):
Plant Available Nitrogen (PAN)

Organic N = Total N – NH4+-N

MMP Assumptions % N Mineralized first Year:
Holding Pond = 30
Manure Dry Stack = 45
Manure Pack = 25

*Organic N * Mineralization Factor (above) = Available Organic N 1st year*

PAN (in lb. / gal or lb. / ton) = NH4+ (from manure analysis) + Available Organic N

Calculating Liquid Manure Applications:

Spreader capacity = 12,000 gal/ 1,000 = Liquid Spreader Factor (LSF)

*Plant Available Manure Nutrients * LSF = lb. Plant Available Nutrient/ load*

Take Values from Lab Analyses:

___ lb. N (PAN) per 1,000 gal * ___ LSF = ___lb. PAN/ load

___ lb. P2O5 per 1,000 gal * ___ LSF = ___lb. P2O5/ load

___ lb. K2O (PAN) per 1,000 gal * ___ LSF = ___lb. K20/ load

*LSF * 43,560 ft2/acre = 1000 gal. Manure applied per acre*
*Width of spread (ft.) * distance traveled (ft.)*

*Nutrients lb./1000 gal * 1,000 gal applied per acre = Nutrients applied in lb. per acre*

Assumptions and Calculations for Harrison Dairy, Inc. (cont.

___ lb. N (PAN) per 1,000 gal * ___ 1,000 gal applied per acre = ___lb. PAN/ acre

___ lb. P2O5 per 1,000 gal * ___ 1,000 gal applied per acre = ___lb. P2O5/ acre

___ lb. K2O (PAN) per 1,000 gal * ___ 1,000 gal applied per acre = ___lb. K20/ acre

Calculating Solid Manure Applications:

*Plant Available Manure Nutrients * Spreader Capacity = lb. Plant Available Nutrient/ load*

Take Values from Lab Analyses:

___ lb. N (PAN) per ton * ___ tons applied per acre = ___lb. PAN/ load

___ lb. P2O5 per ton * ___ tons applied per acre = ___lb. P2O5/ load

___ lb. K2O (PAN) per ton * ___ tons applied per acre = ___lb. K20/ load

Spreader capacity (tons) 43,560 ft2/acre = tons Manure applied per acre*
*Width of spread (ft.) * distance traveled (ft.)*

*Nutrients lb./ton * tons applied per acre = Tons Nutrients applied in lb. per acre*

___ N (PAN) lb. per ton * ___ tons applied per acre = ___lb. PAN/ ac.

___ P2O5 lb. per ton * ___ tons applied per acre = ___lb. P2O5/ ac.

___ K2O lb. per ton * ___ tons applied per acre = ___lb. K20/ ac.

Purdue University Calculations for Crop Available N, P, and K:

Organic N = Total N – NH4+-N

*Available Organic N (year 1) = Organic N * Storage Type N Mineralization Factor*

Efficiency Coefficient for Nitrogen:
Incorporated within 12 hours = 80% or .8
Incorporated at application = 100% or 1

Phosphorus Coefficient = 100% or 1

Crop Available P (year 1) = Total P * 0.07

Conversions and Volumes:

lb. P2O5 * 0.44 = lb. P
lb. P * 2.29 = lb. P2O5
lb. K2O * 0.83 = lb. K

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

SOIL:
Parts per million (ppm) X 2 = lb. acre
5 lb. P_2O_5 increases soil test P by 1 ppm
1.75 lb. K_2O increases soil test K value by 1 ppm

Liquid Manure:
Ppm/ 10,000 = %
Lb./1,000 gal = ppm/120
ppm P * 0.019 = lbs. P_2O_5/1,000 gal
ppm K/100 = K_2O/1,000 gal
% P * 192 = lb. P_2O_5/1,000 gal
% K * 100 = lbs. K_2O/1,000 gal

1 acre inch = 27,154 gal

Solid Manure:
lb. / ton = %
20

lb. / ton = ppm/500
ppm P * 0.0046 = lb. P_2O_5/ ton
ppm K * 0.0024 = lb. K_2O/ ton
% P * 46 = lb. P_2O_5/ ton

Fertilizer Applications:

Nitrogen and any Potassium shown commercially are done so in terms of pounds (lbs.) per acre to give Harrison Dairy, Inc. flexibility in terms of the type they actually choose. For example, if Ammonium Nitrate is purchased (33-0-0) and the UT recommendation for application to pastureland in spring is 60 lbs., to calculate the amount of ammonium nitrate needed, simply perform the following math: 60/.33=181 lb. ammonium nitrate/acre. If 60lbs. of N is recommended and Urea is used, simply perform the following calculations to determine the amount of Urea (46-0-0) needed: 60/.46= 91 lbs. of Urea needed for apply 60 lbs. of N.

Whenever the Nitrogen Leaching Index is rated "high," it is recommended (not required) to use a fertilizer stabilizer whenever applying ammonium nitrate (UAN) or urea.

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

The Remaining Information was obtained from Penn State Extension (Douglas B. Beegle, Extension Agronomist) and taken from The Penn State Agronomy Guide 2015-2016 (Table 1.2-11):

Fertilizer properties Many different physical and chemical forms of commercial fertilizer are available. Fertilizer materials can be solids, liquids, or gases. Each physical form has its own uses and limitations, which provide the basis for selecting the best material for the job.

Fertilizer grade or analysis is the weight percent of available nitrogen (N), phosphate (P_2O_5), and potash (K_2O) in the fertilizer, usuallly expressed as N-P_2O_5-K_2O. For example, 10-20-10 indicates 10 percent N, 20 percent P_2O_5, and 10 percent K_2O by weight.

Fertilizer ratio is the ratio of weight percents of N-P_2O_5-K_2O and is determined by dividing the three numbers by the smallest of the three.

Again using 10-20-10 as an example, the ratio is 10/10-20/10-10/10 = 1-2-1.

A given weight of two fertilizers can contain different amounts of actual plant food. After soil tests indicate the need for a certain amount of plant food, you must determine the total amount of fertilizer needed, based on the grade of product. For example, 100 pounds of a 10-30-10 fertilizer contains 10 pounds of N, 30 pounds of P_2O_5, and 10 pounds of K_2O, whereas 100 pounds of a 7-21-7 fertilizer contains 7 pounds of N, 21 pounds of P_2O_5, and 7 pounds of K_2O. Both of these fertilizers have the same ratio (1-3-1) but different grades (10-30-10 versus 7-21-7). Different total amounts of fertilizer are required to provide equal amounts of plant food. Application rates must be determined on the basis of the plant food needed.

Granulated fertilizer materials are solid, homogenous mixtures of fertilizer materials generally produced in ammoniation granulation plants by combining raw materials such as anhydrous ammonia, phosphoric acid, and potassium chloride. Granulated materials are N-P or N-P-K grades of fertilizer. Each uniform-size fertilizer particle contains all of the nutrients in the grade. For example, each particle in a 10-20-10 granulated fertilizer theoretically contains 10 percent nitrogen, 20 percent phosphate, and 10 percent potash. The principle advantage of granulated materials is this uniform distribution of nutrients. There is no segregation of the nutrients in handling or spreading, and plant roots absorb a complete set of the applied nutrients. Granulated fertilizers generally have good handling properties, with little tendency to cake or dust.

Blended fertilizers: are simple physical mixtures of dry fertilizer materials. The ingrediants of a blended fertilizer can be straight materials, such as urea or potassium chloride; they can be granulated compound fertilizer materials mixed together; or they can be a combination of the two. In blended fertilizers, the individual particles remain separate in the mixture, and there is a potential for segragation of the nutrients. This problem can be reduced by using materials that are the same size. Properly made blends are generally equal in effectiveness to other compound fertilizers. Blends have the advantage of allowing a very wide range of fertilizer grades that makes it possible to match a fertilizer exactly to a soil test recommendation. Blends have been used effectively as starter fertilizers; however for this purpose, urea and diammonium phosphate should be avoided because both materials produce free ammonia, which can hinder seed germination and seedling growth.

Fluid fertilizers: are becoming more commonly used. Fluids can be either straight materials, such as nitrogen solutions, or compound fertilizers of various grades. Fluid fertilizers are categorized into two groups: (1) clear solutions, and (2) suspensions.

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

In *Clear solutions*, the nutrients are completely dissolved in water. The major advantage is ease of handling. In addition, the phosphorus in these materials is highly water soluble. The disadvantages are that only relatively low analyses are possible, especially when the material contains potassium, and the cost per unit of nutrients is generally higher. Clear solutions are equal in agronomic effectiveness to other types of fertilizers, ehen equal amounts of plant food are compared.

Suspension fertilizers are fluids in which solubility of the components has been exceeded and clay has been added to keep the very fine, undissolved, fertilizer particles from settling out. The major advantage is that they can be handled as a fluid. Another advantage of suspensions is that they can be formulated at much higher analyses than clear solutions. Analyses as high as those of dry materials are possible. The major disadvantages ae that suspensions require constant agitation, even in storage, and suspension fertilizer cannot be used as a carrier for certain chemicals, for example Paraquat. As in the case of clear solutions, the agronomic effectiveness of suspensions is equal to other types of fertilizer materials when equal amounts of plant food are compared.

When making calculations on fluid fertilizers, remember that the grade or analysis is given on a weight percent basis, *not on a per gallon basis*. Thus to determine the actual plant food content, you must know the weight per gallon of the material. Most fluids weigh between 10 and 12 pounds per gallon. The following example illustrates the calculations:

10 - 34 - 0 weighs 11.4 pounds per gallon

Therefore one gallon contains:
$11.4 \times .10 = 1.14$ pounds nitrogen per gallon
$11.4 \times .34 = 3.88$ pounds phosphate per gallon

It takes about 9 gallons of this fluid to equal 100 pounds of total fertilizer. For comparing fluids on price per ton basis, divide the weight per gallon into 2,000 to get the number of gallons per ton. In the above example, the calculation is:
$2000 \div 11.4 = 175$ gallons per ton

This calculation can be used to compare a liquid priced in dollars per gallon with a solid priced in dollars per ton.

Soil pH can be changed by the reaction of fertilizer materials. The most important such reaction is the microbial oxidation of ammonium nitrogen to nitrate nitrogen. This occurs regardless of the source of ammonium nitrogen (fertilizer, manure, or organic residues). The acidity of a fertilizer is usually given by convention as the amount of pure limestone that would be required to offset the acidity produced by the reaction of the fertilizer.

Material	Equivalent acidity (lb. $CaCO_3$ per lb. of N
Anhydrous ammonia	1.8
Urea	1.8
Ammonium nitrate	1.8
Manure	1.8
Diammonium phosphate (DAP)	3.5
Ammonium sulphate	5.3
Monoammonium phosphate (MAP)	5.3

Equivalent acidities can be used to compare materials, but the actual amount of limestone required to neutralize the acidity from the fertilizer is probably greater than shown here. Remember the residual effect of the materials. Many of these materials greatly, but temporarily, increase the soil pH. Another example of this temporary pH change is the

reaction of the superphosphate materials. The initial reaction is a drastic lowering of the pH around the fertilizer particle, but the residual effect of the superphosphates changes the soil pH very little. The common potassium materials are neutral salts that have no effect on the soil pH.

Chemical forms of the nutrient itself are critical for agronomic crops only in special situations. There is generally little practical difference for example between an ammonium and a nitrate nitrogen source (if leaching or denitrification are serious potential problems, then the ammonium form is preferred) or between orthophosphates and polyphosphates (unless insoluble micronutrients ae added to a liquid fertilizer, in which case the polyphosphates are preferred) or between potassium chloride and potassium sulfate (some crops such as tobacco are sensitive to chloride, in which case the sulfate is preferred).

Soluble salts, at high concentrations in soil solution, can cause injury or death to plants or prevent germination of seeds. Under normal conditions, fertilizers uniformly distributed at recommended rates do not cause soluble salt levels that are high enough to damage plants. However, a concentrated application of fertilizer or manure placed in contact with the seed or in a band near the germinating seed or growing plant can cause damage. An estimate of potential salt injury from different fertilizers is given as the salt index for that material. The salt indes is a relative scale useful for comparing materials for special placement (such as for drilling with the seed, banding at high rates, and for pop-up treatments) when a low salt index is preferred. The salt index for several common fertilizer materials is give here:

Material	Salt index*
*The salt index assumes equal weights of the primary nutrient are being compared.	
Nitrogen (N)	
Ammonium sulfate	54
Ammonium nitrate	49
Urea	27
Anhydrous ammonia	10
Phosphate (P_2O_5)	
Triple superphosphate	4
Monoammonium phosphate (MAP)	7
Diammonium phosphate (DAP)	8
Potash (K_2O)	
Potassium chloride	32
Potassium sulfate	14

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

Fertilizer	Total N, %	Available phosphoric acid, %	Soluable potash, %	Equivalent acidity [1]	Salt index [2]	Comments
Anhydrous ammonia—NH_3	82	0	0	1.48	47	A high-pressure liquid that turns into a gas when released. Must be injected 6–8 inches deep on friable, moist soil. N loss by volatilization can occur if not properly injected, or if soil is too wet or too dry at application.
Urea—NH_2-CO-NH_2	46	0	0	0.84	75	A dry material in granular or prilled form, urea-N rapidly hydrolyzes to NH_4^+. Can be used for direct application, in mixed fertilizers, and in liquid nitrogen. N at application is present as urea-N. Within 1 day after application, about 66% of urea-N is hydrolyzed to ammonia-N; all within 1 week. When not incorporated, significant N loss by volatilization can occur until approximately 0.5 inch of rain has fallen. Not recommended for starter use. Broadcast (incorporated) or sidedress.
Ammonium nitrate—NH_4NO_3	33–34	0	0	0.63	105	A dry material in granular or prilled form, in which half of the N is as nitrate and half is as ammonium. Used for direct application and in the production of nitrogen solutions (see below). Broadcast or sidedress. Can be left on surface or incorporated into soil. Ammonium nitrate is a good fertilizer but it can be very difficult to get because it is used as an explosive.
Nitrogen solutions (UAN)—Urea+NH_4NO_3+Water	28–32 (mostly 30 in PA)	0	0	0.54	74	A mixture of ammonium nitrate, urea, and water. Urea supplies about half of the N that may be subject to volatilization loss—read comments above for urea. The other half of N is supplied by ammonium nitrate—read comments above for ammonium nitrate. Once applied, nitrogen solution behaves exactly like dry urea and ammonium nitrate.

1. Pounds of calcium carbonate equivalent per pound of fertilizer material. Positive numbers indicate that the material increases soil acidity, that is, lowers soil pH. Negative numbers indicate that the material reduces acidity, that is, raises soil pH.
2. Salt index of equal weights of the fertilizer material compared to sodium nitrate, which equals 100. Useful for comparing the salt effect of different fertilizer materials.

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

Fertilizer	Total N, %	Available phosphoric acid, %	Soluable potash, %	Equivalent acidity [1]	Salt index [2]	Comments
						To minimize N loss, incorporate into soil as soon as possible after application. Use caution when spraying, as leaf burn can occur. To minimize injury, do not spray on vegetation. For postemergence application, use a directed spray or dribble between the rows.
Ammonium sulfate—$(NH_4)_2SO_4$	21	0	0	1.12	69	A dry crystalline material in which the nitrogen is all in the ammonium form. Produced by two methods—by-product and synthetic. Used for direct application and blended complete fertilizers. Broadcast or sidedress. Can be left on surface or incorporated into soil. Contains 24% sulfur. Good starter N source.
Diammonium phosphate (DAP)—$(NH_4)_2HPO_4$	18	46	0	0.74	34	A dry granular or crystalline material. Common analysis is 18-46-0. Used for direct application and in blended fertilizers. Starter fertilizers containing DAP should be used with caution; be sure to band at least 2 inches to the side and 2 inches below seed.
Monoammonium phosphate (MAP)—$NH_4H_2PO_4$	11	52	0	0.65	30	A dry granular material. Common analysis 11-52-0. Used for direct application and in blended fertilizers. Makes an excellent starter fertilizer, either alone or with a small amount of potash.
Ammonium polyphosphate	10	34	0	0.53	-	A liquid solution (10-34-0). The agronomic effectiveness of APP is similar to that of MAP. Sequesters some micronutrients and impurities in fluid fertilizers, keeping them in solution.
Triple superphosphate—$Ca(H_2PO_4)_2$	0	46	0	0	10	Dry granular material. Used for direct application and in blended fertilizers.
Muriate of potash—KCl	0	0	60–62	0	116	Dry granular material. Used for direct application and in blended fertilizers.
Potassium sulfate—K_2SO_4	0	0	50	0	46	Dry crystalline material. A specialty fertilizer used for direct application and in blended fertilizers.
Potassium nitrate—KNO_3	13	0	45	-0.26	74	Dry crystalline material. A specialty fertilizer used for direct application and in blended fertilizers.

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

Fertilizer	Total N, %	Available phosphoric acid, %	Soluable potash, %	Equivalent acidity [1]	Salt index [2]	Comments
Potassium hydroxide— KOH	0	0	70	-0.89	-	Crystalline material usually used in liquid fertilizers. Basic nature of this material allows production of neutral liquid fertilizers. Primarily used in liquid starter fertilizers.
Sulfate of potash magnesia— Sul-Po-Mag or K-Mag	0	0	22	-	-	Crystalline material made from langbeinite. Contains 22% sulfur and 11% magnesium.

Ammonium nitrogen (NH_4^+) carries a positive charge and is adsorbed onto soil particles. In this chemical form, leaching of nitrogen does not occur; however, NH_4^+ is changed to the NO_3^- form by bacteria. This process occurs rapidly (beginning within 2 to 3 days) as the soil temperature climbs above 50°F. Complete conversion from NH_4^+ to NO_3^- occurs within about a month of application.

Nitrate nitrogen (NO_3^-) carries a negative charge and is not adsorbed onto soil particles; it is free to be leached from the soil. Nitrate nitrogen also can be lost to the atmosphere through denitrification when soils become water saturated. The nitrogen fertilizers listed in Tables "Description of fertilizer materials" and "Nitrogen conversion — approximate pounds of materials required per acre to supply rates of nitrogen recommended per acre" contain nitrogen in either or both of these forms. Products called nitrification inhibitors can inhibit the conversion of N from the nonmobile ammonium form to the very mobile nitrate form. This can reduce the loss of N. This effect is greatest under the following conditions: N applied long before crop uptake; N applied to very coarse-textured soils, especially when significant rain is expected before crop uptake; and N applied to poorly drained soils, again especially when significant rain is expected before crop uptake. Generally, even though the products may work perfectly, there is less benefit for N applied at planting or at sidedressing time.

A long-term effect of all ammonium-based nitrogen fertilizers is to lower soil pH. Anhydrous ammonia, urea, diammonium phosphate, and nitrogen solutions, when first applied, greatly but temporarily increase soil pH in the zone of application. Ammonia is released and can "burn" germinating seeds or seedling roots in the area of fertilizer placement. In the eventual conversion of NH_4^+ to NO_3^-, however, an acid residue is formed. The residual acidity from the common N sources is given in Table: "Description of fertilizer materials".

Acidity is a particular problem under no-till and minimum-till conditions, because the nitrogen is concentrated on the soil surface. An "acid roof" can form; the pH in the upper 1 to 2 inches may be 0.5 to 1.0 pH units lower than at deeper depths. This greatly decreases the efficiency of triazine herbicides and can negatively impact root growth. Therefore, the upper 2 inches of soil should be tested for pH regularly. For details on taking this sample, see the discussion on sampling no-till fields earlier in this chapter.

If the normal soil sample does not indicate a need for limestone, check the surface pH. If the surface pH is below 6.2, apply 2,000 pounds of calcium carbonate equivalent per acre. This should be sufficient to take care of the acidity caused by nitrogen fertilizer. As a rule of thumb, 6 pounds of limestone are required for each pound of nitrogen applied as ammonium sulfate, and 3 pounds of limestone are required for each pound of nitrogen applied as anhydrous ammonia, urea, ammonium nitrate, or nitrogen solution. The effect of manure nitrogen on soil pH is very variable. The ammonium nitrogen in all manure can lower soil pH. However, some manures, particularly poultry layer manure, may contain significant calcium carbonate which can actually increase pH over time.

The nitrogen in urea is completely water-soluble. Upon application, urea nitrogen changes rapidly to NH_4^-N. Urea nitrogen therefore is readily available to plants on application to the soil. Urea presents another problem, in that when it is surface-applied, significant quantities of nitrogen as ammonia may be lost through volatilization. These losses happen very rapidly, with most occurring within the first day or two following application and can account for over one-third of the urea N being lost within a week after application. Losses are accelerated by warm moist soils, high pH, and surface organic matter. Losses are higher on low cation exchange capacity (CEC) or sandy soils than

on soils with a high CEC, a heavy clay content, or a high organic matter content. Thus, urea or nitrogen solutions (which are approximately 50 percent urea) should be incorporated into the soil by mechanical mixing or by water movement. Light tillage or one-half inch of rain usually is adequate. Non-urea N sources, such as ammonium nitrate and ammonium sulfate, are not subject to volatilization under Pennsylvania conditions.

Research also has shown that volatilization losses from nitrogen solution can be reduced significantly by dribbling the solution in a band on the surface, rather than spraying it over the entire soil surface. This can be accomplished by using drop tubes on a conventional sprayer. Urease inhibitors can also be used to effectively reduce volatilization from surface application. These are only effective on urea-containing fertilizers and will only provide a benefit if the fertilizer is not incorporated immediately by tillage or rainfall.

Urea and urea-blended fertilizers are not recommended as starter fertilizers because of possible ammonia toxicity to germinating seeds, which results in reduced plant stand.

Nitrogen conversion — approximate pounds of materials required per acre to supply rates of nitrogen recommended per acre.

When the different nitrogen fertilizer materials are applied properly, they give the same results per unit of nitrogen applied. For equivalent conversions of the different materials, see Table: "Nitrogen conversion — approximate pounds of materials required per acre to supply rates of nitrogen recommended per acre".

To compare nitrogen costs for these materials, convert the prices to a per-unit-of-actual-nitrogen basis by dividing the price per ton of fertilizer by the pounds of actual nitrogen in a ton of each material. This figure is given at the bottom of the table. Example:

Compare urea at $500/T with ammonium sulfate at $300/T.
Urea: $500/920 lb N = $0.54/lb N
Ammonium sulfate: $300/420 lb N = $0.71/lb N

In this example, urea is the best buy. Other factors such as suitability of the material, convenience, method of application, and other fertilizer properties also should be considered.

Actual N lb/T = 2,000 × N analysis (as a decimal)
Example: Calculation of lb N/T UAN of 30% liquid nitrogen (30-0-0)
Actual N lb/T = 2,000 × 0.30 = 600 lb N/T of UAN

Also, note that the analysis of fertilizer is always on a weight basis. Therefore when applying a liquid fertilizer like UAN in gallons per acre, this must be converted to a weight to determine the amount of actual N applied.

Example: Actual N applied in a 20 gal of UAN/A application.
UAN weighs 10.85 lbs/gal, therefore 20 gal/A = 217 lbs UAN/A
Since UAN is 30% N by weight, the actual N applied would be 217 lbs UAN/A x 0.30 = 65 lbs N/A

Reference: Table 1.2-12, The Agronomy Guide.

	Material to supply rate of N per acre (pounds per acre)				
For a nitrogen recommendation of	**Anhydrous ammonia (82% N)**	**Ammonium nitrate (33.5% N)**	**Ammonium sulfate (21% N)**	**Liquid nitrogen (UAN)(30% N)**	**Urea (46% N)**
30	37	90	143	100	65
40	49	120	190	133	87
50	61	149	238	167	109

Assumptions and Calculations for Harrison Dairy, Inc. (cont.)

Reference: Table 1.2-12, The Agronomy Guide.

For a nitrogen recommendation of	Material to supply rate of N per acre (pounds per acre)				
	Anhydrous ammonia (82% N)	Ammonium nitrate (33.5% N)	Ammonium sulfate (21% N)	Liquid nitrogen (UAN)(30% N)	Urea (46% N)
60	73	179	286	200	130
70	85	209	333	233	152
80	98	239	381	267	174
90	110	269	429	300	196
100	122	299	476	333	217
110	134	328	524	367	239
120	146	358	571	400	261
130	158	388	619	433	283
140	171	418	667	467	304
160	195	478	762	533	348
180	220	537	857	600	391
200	244	597	952	667	435
220	268	657	1048	733	478
Actual N (lbs/T)	1640	670	420	600	920

APPENDIX B – Agreement for the Removal of Litter, Manure and/or Process Wastewater

The conditions listed below help to protect water quality. These conditions apply to litter, manure and/or process wastewater removed from an AFO. This agreement is for (amount of waste removed, i.e. tons, gallons, etc.) _____ of waste, removed on (date)_____, from the facility owned by Harrison Dairy, Inc. and located at 215 Harrison Road, Loudon, TN.

A. The litter, manure and/or process wastewater must be managed to ensure there is no discharge of litter, manure and/or process wastewater to surface or groundwater.

B. When removed from the facility, litter, manure and/or process wastewater should be applied directly to the field or stockpiled and covered with plastic or stored in a building.

C. Litter, manure and/or process wastewater must not be stockpiled near streams, sinkholes, wetlands or wells.

D. Fields receiving litter, manure and/or process wastewater should be soil tested at least every two or three years.

E. A litter, manure and/or process wastewater nutrient analysis should be used to determine application rates for various crops.

F. Calibrate spreading equipment and apply litter, manure and/or process wastewater uniformly.

G. Apply no more nitrogen or phosphorus than can be used by the crop.

H. A buffer zone is recommended between the application sites and adjacent streams, lakes, ponds, sinkholes and wells. The following non-application buffer widths, taken from NRCS Conservation Practice Standard 590, should be used when applicable:

Object, Site	Buffer Width, feet	Situation
Wells	150	Up-slope of application site
	300	Down-slope of application site, if conditions warrant application
Water body	30-100	Depending on the amount and quality of vegetation and slope
Public Use Area	300	All
Residences	300	Other than producer

I. Do not apply litter, manure and/or process wastewater when the ground is frozen, flooded, saturated or on steep slopes subject to flooding, erosion or rapid runoff.

J. Cover vehicles hauling litter, manure and/or process wastewater on public roads.

K. Keep records of locations where poultry litter will be used as a fertilizer.

I, _____ am the person receiving litter, manure, and/or
(name)
process wastewater and do understand the conditions listed above.

_____ _____
(signature) (date)

_____ _____
(address) (phone)

APPENDIX C - Names of Persons and/or Firms that Remove Litter, Manure and/or Process Wastewater from

Harrison Dairy, Inc. (SOP-14006)

Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
Phone No.:	_____	Phone No.:	_____
Tons Removed:	_____	Tons Removed:	_____
Date:	_____	Date:	_____
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
Phone No.:	_____	Phone No.:	_____
Tons Removed:	_____	Tons Removed:	_____
Date:	_____	Date:	_____
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
Phone No.:	_____	Phone No.:	_____
Tons Removed:	_____	Tons Removed:	_____
Date:	_____	Date:	_____
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
Phone No.:	_____	Phone No.:	_____
Tons Removed:	_____	Tons Removed:	_____
Date:	_____	Date:	_____
Name:	_____	Name:	_____
Address:	_____	Address:	_____
	_____		_____
Phone No.:	_____	Phone No.:	_____
Tons Removed:	_____	Tons Removed:	_____
Date:	_____	Date:	_____

APPENDIX D – Discharge Report Form

DISCHARGE REPORT FORM

PERMIT NUMBER: SOP-14006

(NOTE: Read instructions before completing this form.)

*** Required notification information per section I.B.3., Discharge Notification, may be included with this form. ***

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*

NAME	**Harrison Dairy, Inc.**
ADDRESS	215 Harrison Road
	Loudon, TN 37774
FACILITY	Harrison Dairy, Inc.
LOCATION	Loudon County, Tennessee
	Attn: Mr. Steve T. Harrison

DISCHARGE INFORMATION:

DATE: TIME:

DURATION:

FLOW RATE: VOLUME ESTIMATE

DESCRIPTION:

CAUSE:

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				No. Ex	Frequency of Analysis	SAMPLE TYPE
		Average	Maximum	Units	Minimum	Average	Maximum	Units			
BOD, 5-Day (20 Deg C) 00310 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Solids, Total Suspended 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Nitrogen Total (as N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Nitrogen Nitrate Total (as N) 00620 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Nitrogen Kjeldahl Total (as N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Phosphorus, Total (as P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
Phosphorus, Dissovled 00666 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab

Name/Title Principal Executive Officer	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.		Telephone		Date		
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MONTH	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS ***(Reference all attachments here)***

General Instructions

1. If for any reason, there is a discharge to a water body of the state, the permittee shall make immediate oral notification within 24-hours to the Division of Water Resources (division) and notify the division in writing within five working days of the discharge from the facility. In addition, the permittee shall keep a copy of the notification submitted to the division together with the NMP. The notification shall include the following information:

    a. Description of the discharge: A description and cause of the discharge, including a description of the flow path to the receiving water body. Also, an estimation of the flow rate and volume discharged.
    b. Time of the discharge: The period of discharge, including exact dates and times, and the anticipated time the discharge is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the discharge.
    c. Cause of the discharge: If caused by a precipitation event(s), information from the onsite rain gauge concerning the size of the precipitation event must be provided.

2. Enter "Sample Measurement" data for each parameter under "Quantity" and "Quality" in units specified in permit. "Average" is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during "Monitoring Period"; "Maximum" and "Minimum" are normally extreme high and low measurements obtained during "Monitoring Period".

3. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date.

4. Enter "Name/Title of Principal Executive Officer" with "Signature of Principal Executive Officer or Authorized Agent", "Telephone Number", and "Date" at bottom of form.

5. Mail signed Report to Office(s) by date(s) specified in permit. Retain copy for your records.

6. More detailed instructions for use of this Discharge Report Form may be obtained from Office(s) specified in the permit.

Legal Notice

Penalties for violating the terms and conditions of a permit and/or the Water Quality Control Act are assessed on a case by case basis according to the actual or potential environmental harm that has resulted in each instance. The Water Quality Control Act authorizes the department to assess up to $10,000.00 per day, per violation, according to those conditions.

DISCHARGE REPORT FORM

PERMIT NUMBER: SOP-14006

(NOTE: Read instructions before completing this form.)

*** Required notification information per section I.B.3., Discharge Notification, may be included with this form. ***

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*

NAME	**Harrison Dairy, Inc.**
ADDRESS	215 Harrison Road
	Loudon, TN 37774
FACILITY	Harrison Dairy, Inc.
LOCATION	Loudon County, Tennessee
	Attn: Mr. Steve T. Harrison

DISCHARGE INFORMATION:

DATE:	TIME:
DURATION:	
FLOW RATE:	VOLUME ESTIMATE
DESCRIPTION:	
CAUSE:	

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				No. Ex	Frequency of Analysis	SAMPLE TYPE
		Average	Maximum	Units	Minimum	Average	Maximum	Units			
E. Coli MTEC-MF, #/100mL 31648 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(13)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	#/100 ml		Once per Discharge	Grab
Flow, Total 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********		(03)	********	********	********	*****		01/DS	EST
	PERMIT REQUIREMENT	DISCHARGE PER DAY, Total		MGD	********	********	********	*****		Once per Discharge	Estimate
Nitrogen Ammonia Total (as NH4) 71845 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	********	********	*****	********	********		(19)		01/DS	GR
	PERMIT REQUIREMENT	********	********	*****	********	********	REPORT	mg/L		Once per Discharge	Grab
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

Name/Title Principal Executive Officer	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.		Telephone		Date		
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MONTH	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS ***(Reference all attachments here)***

General Instructions

1. If for any reason, there is a discharge to a water body of the state, the permittee shall make immediate oral notification within 24-hours to the Division of Water Resources (division) and notify the division in writing within five working days of the discharge from the facility. In addition, the permittee shall keep a copy of the notification submitted to the division together with the NMP. The notification shall include the following information:

    a. Description of the discharge: A description and cause of the discharge, including a description of the flow path to the receiving water body. Also, an estimation of the flow rate and volume discharged.
    b. Time of the discharge: The period of discharge, including exact dates and times, and the anticipated time the discharge is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the discharge.
    c. Cause of the discharge: If caused by a precipitation event(s), information from the onsite rain gauge concerning the size of the precipitation event must be provided.

2. Enter "Sample Measurement" data for each parameter under "Quantity" and "Quality" in units specified in permit. "Average" is normally arithmetic average (geometric average for bacterial parameters) of all sample measurements for each parameter obtained during "Monitoring Period"; "Maximum" and "Minimum" are normally extreme high and low measurements obtained during "Monitoring Period".

3. Where violations of permit requirements are reported, attach a brief explanation to describe cause and corrective actions taken, and reference each violation by date.

4. Enter "Name/Title of Principal Executive Officer" with "Signature of Principal Executive Officer or Authorized Agent", "Telephone Number", and "Date" at bottom of form.

5. Mail signed Report to Office(s) by date(s) specified in permit. Retain copy for your records.

6. More detailed instructions for use of this Discharge Report Form may be obtained from Office(s) specified in the permit.

Legal Notice

Penalties for violating the terms and conditions of a permit and/or the Water Quality Control Act are assessed on a case by case basis according to the actual or potential environmental harm that has resulted in each instance. The Water Quality Control Act authorizes the department to assess up to $10,000.00 per day, per violation, according to those conditions.

RATIONALE

Harrison Dairy, Inc.
PERMIT NO. SOP-14006
Loudon, Loudon County, Tennessee

June 10, 2016

Permit Writer: John Newberry
Revoke and Reissuance

I. DISCHARGER

Harrison Dairy, Inc.
215 Harrison Road
Loudon, Loudon County, Tennessee

Contact Person:
Mr. Steve Harrison
215 Harrison Road,
Loudon, TN 37774
Phone Number: 865-458-6740

Nature of Business: Dairy

SIC Code(s): 0241 (Dairy Farms)

II. PERMIT STATUS

This application was received on May 31, 2016.

Environmental Field Office: Knoxville
Primary Longitude: -84.297927 **Primary Latitude: 35.652432**

III. FACILITY ADJACENT WATERS

Harrison Dairy, Inc. operates a dairy farm at 215 Harrison Road in Loudon, Loudon County, Tennessee. This operation is located near Fork Creek. All wastewater discharges from a CAFO production area to waters of the state of Tennessee are prohibited, except when either a chronic or catastrophic rainfall event causes an overflow of process wastewater from a facility properly designed, constructed, operated, and maintained to contain all process wastewater resulting from the operation of the CAFO (such as wash water, parlor water, watering system overflow, etc.).

The Fork Creek is classified for fish and aquatic life, recreation, irrigation, and livestock watering and wildlife.

IV. PERMIT LIMITS AND MONITORING REQUIREMENTS

The following limitations will be established for the operation of a Concentrated Animal Feeding Operation (CAFO) at Harrison Dairy, Inc..

Application rates for manure, litter, or process wastewater to land under the ownership or operational control of the CAFO must be managed to minimize phosphorus and nitrogen transport from the application field to waters of the state according to the permittee's site-specific nutrient management plan (NMP).

A. DISCHARGE CRITERIA

There must be no discharge of manure, litter, or process wastewater pollutants into waters of the state from the production area.

B. REPORTING REQUIREMENTS

If for any reason, there is a discharge to a water body of the state or an overflow or discharge from a waste retention structure, the permittee shall make immediate oral notification within 24 hours to the division and notify the division in writing within five working days of the discharge from the facility. In addition, the permittee shall keep a copy of the notification submitted to the division together with the NMP. The notification shall include the following information:

a. Description of the discharge: A description and cause of the discharge, including a description of the flow path to the receiving water body. Also, an estimation of the flow and volume discharged.
b. Time of the discharge: The period of discharge, including exact dates and times, and the anticipated time the discharge is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the discharge.
c. Cause of the discharge: If caused by a precipitation event(s), information from the onsite rain gauge concerning the size of the precipitation event must be provided.

C. SAMPLING REQUIREMENTS

The permittee must collect a sample of the waste/wastewater discharged and shall analyze the sample for the following parameters, at a minimum: flow, biochemical oxygen demand (BOD_5), total suspended solids (TSS), total nitrogen, total ammonia nitrogen, total kjeldahl nitrogen, total nitrate nitrogen (as N), total phosphorus, dissolved phosphorus, and *Escherichia coli*. Sampling results must be submitted to the Knoxville EFO along with the following:

a. Volume of the discharge: An estimate of the volume of the release and the date and time.
b. Sampling procedures: Samples shall consist of grab samples collected from the over-flow or discharges from the retention structure. A minimum of one sample shall be collected from the initial discharge (within 30 minutes).
c. Reasons for not sampling: If conditions are not safe for sampling, the permittee must provide documentation of why samples could not be collected. However, once the unsafe conditions have passed, the permittee shall collect a sample for the retention structure (pond or lagoon) within 30 minutes.

V. OTHER REQUIREMENTS

The following additional requirements will be included in the permit:

A. NUTRIENT MANAGEMENT PLAN

The permittee has developed and submitted for state approval (from TDA) a site-specific nutrient management plan (NMP). The NMP was prepared in accordance with NRCS Field Office Conservation Practice Standards and/or the NRCS Animal Waste Handbook. The NMP must be kept on site. The NMP is available for public review at the Nashville Central Office, the Knoxville Environmental Field Office or at the Tennessee Department of Agriculture, Ellington Agricultural Center in Nashville, Tennessee.

B. LAND APPLICATION REQUIREMENTS

All dairy, cattle, swine, poultry and veal CAFOs that land apply manure, litter, or process wastewater must apply setbacks from existing streams, lakes and sinkholes that are adequate to protect water quality, public health, well heads and groundwater, consistent with the guidelines found in 0400-40-05.14(11) (a)-(e) and in the NRCS Field Office Technical Guide.

The natural riparian buffer requirements are based on data presented in NCASI Technical Bulletin No. 799, "Riparian Vegetation Effectiveness," which indicated that a strip of approximately 60' of diverse vegetation (shrub, grass and trees) provides optimal pollutant removal.

C. TRANSFER TO THIRD PARTY

Prior to transferring any of manure, litter or process wastewater to a third party, the permittee must provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis (consistent with 40 CFR § 412 and 0400-40-05.14(11)(b)), and ensure that the third party signs the Agreement for the Removal of Litter, Manure and/or Process Wastewater from an AFO form (Appendix B) to be used for land application activities that are not under the operational control of the permitted CAFO.

D. RECORD KEEPING

Permittee must create, maintain on site for five years, and make available to the director, upon request all records in accordance with 0400-40-05-.14(10)(b).

VI. PERMIT DURATION

According to the requirements of TDEC Rule 0400-40-05-.11 each issued permit shall have a fixed term not to exceed five years.