TECHNOLOGY PROVIDER
TECHNOLOGY INFORMATION REQUEST

Solution Name:	Trident MD Press		
Information by: (14.a)	Frank Engel	**Date:**	Oct 7, 2024

COMPANY INFORMATION

Company:	TRIDENT TNZ LLC.		
Phone:	1-800-799-3740	**Web Site:**	https://www.tridenttnz.com
Address:	37 Highgate Rd.	**City:**	St. Louis
State:	MO	**Zip Code:**	63132

TECHNICAL CONTACT (14.a)

Name:	Frank Engel
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Email:	frank.engel@tridenttnz.com
Address:	-
City:	-
State:	BC, Canada
Zip Code:	

DEMONSTRATION SITE CONTACT (15.a)

Site Name:	Aurora Ridge Dairy
Contact:	Frank Engel
Title:	-
Phone:	Upon request
Email:	Upon request
Address:	Upon request
City:	Upon request
State:	New York
Zip Code:	-

INITIAL TECHNOLOGY OVERVIEW

This information is to guide in the development of a more specific and detailed Technology Information Request.
Please answer the following questions for each Technology or Service Provided.

What is the name of the technology or service you provide?

Trident MD Press for polymer assisted fine-solid manure separation incl. Phosphorus recovery

Please provide a brief (1-2 sentence) description and a full description of this technology.

Attach pages or separate document if necessary.

Summary: (1.a) Trident MD Press for efficient fine-solid manure separation incl. phosphorus recovery

Full description: (1.b) The Trident MD Press is a screw-press type separator specifically designed for polymer assisted separation of fine solids from liquid manure, digestate and other waste streams. The MD Press is suitable for secondary treatment of effluent from (existing) primary manure separators like rotary drum screen, slope screen, roller press, screw press. The flocculated waste stream flows from the MD floc & mixing tank into the MD Press dewatering cylinder. An internal screw moves the concentrated solids through the cylinder to the solids discharge opening. An assembly of moving and stationary discs acts as filter allowing liquid to drain through fine clearances between the discs. The filtered liquid is captured in the filtrate tank below.

While primary manure treatments are capable of removing coarse solids effectively, the effluent water still contains a high amount of suspended fine solids incl. nutrients. The polymer assisted MD Press treatment captures these fine solids and concentrates them to a stackable cake with approx. 25% solids content. The MD Press' self-cleaning working principal requires minimal operator oversight. The equipment is suitable for batch or continuous operation.

Please explain how this technology will improve water quality and/or air quality by one or more of the following: (2.a)

- **i. Reducing the nutrient content, organic strength, and/or pathogen levels of manure and agricultural waste.**
- **ii. Reducing odors and gaseous emissions**
- **iii. Facilitating desirable waste handling and storage**
- **iv. Producing value added byproducts that facilitate manure and waste utilization.**

i. Effective removal of suspended fine solids (< 50 microns) from water. Phosphorus reduction of up to 90%. Effluent water is typically around 1 %TS or less.

ii. An indirect benefit of fine solids removal is a reduced feedstock for microbial activity which may help reduce odor emissions. The fine-solids capture is also proven to reduce methane emissions from lagoon storage.

iii. Cleaner effluent water helps improve lagoon storage and land application (e.g. high efficiency irrigation through center pivot, Rain360, drip tape etc.). High cost of lagoon cleanouts are reduced or eliminated. Storage and transportation of the solids cake is optimized and hauling cost are reduced.

iv. The nutrient dense cake may be used as feedstock for e.g. fertilizer production and/or offsets commercial chemical fertilizer.

Do you have a preferred region or area for the location of projects?

Applicable for all regions throughout North America

Location of farm(s)?

Several in North America

What's the smallest and largest farm using this system?

From 250 to 5,000+ cows

Input and output of this unit/system – do you have a mass balance analysis? (3.a)
If a mass balance is available, please include below or attach as a separate document.

See example mass-balance attached

Example calculation for approx. 1,500 cow dairy with existing primary separation: From 50,000 GPD at 4%TS influent the projected outputs with the MD Press treatment is approx. 46,200 GPD (92%) effluent at ~ 0.8%TS and the balance is 27 tons/day cake with approx. 25%TS

Input material description and characteristics: (4.a)
For example: raw manure, digestate, screened digestate, suitable non-farm feedstocks, other.

Effluent from manure or digestate after separation of coarse solids (primary treatment).

Please provide the expected performance of this technology related to the following: (5.a)

i. **Changes in form or handling characteristics**
ii. **Nutrient fate or end use projections**
iii. **Macro-nutrient reductions or transformations**
iv. **Pathogen reductions or elimination**
v. **Air emissions (including gaseous ammonia, hydrogen sulfide, and volatile organic compounds)**

i. Outputs are clarified effluent water (low solids, low nutrient content, "low smell – low slip") and nutrient dense stackable solids cake
ii. Concentrated nutrients are available for land application and can be used as feedstock for e.g. commercial fertilizer production
iii. Tbc
iv. Trident can provide add-on treatment if pathogen reduction is required
v. Tbc

Do you consider this a mature system or ongoing farm development?

mature

Any weather constraints? **Yes** ☑ **No** ☐ *If so, please describe.*

Preferably operated in a weather protected area/covered building.

Any bedding constraints? **Yes** ☐ **No** ☑ *If so, please describe.*

Suitable for all major bedding types. However, primary separation is required (sand separation and or coarse solids)

Output material description and characteristics:
Please include the % of the total stream for each material, i.e. 10% fiber and 90% screened liquid by weight.

Example calculation for approx. 1,500 cow dairy with existing primary separation: From 50,000 GPD at 4%TS influent the projected outputs with the MD Press treatment is approx. 46,200 GPD (92%) effluent at ~ 0.8%TS and the balance is 27 tons/day cake with approx. 25%TS

Do the outputs of the process have a resale market identified? **Yes** ☑ **No** ☐
If so, under what brand name or who is the contract with?

Highly depended on regional demand. The nutrient dense cake could be marketed as feedstock for commercial fertilizer production.

Please provide any alternative uses for the byproducts produced by this technology. (11.a)

Effluent water can be recycled for on farm use e.g. sand separation, flush etc; or for irrigation.

Is this process scalable and to what extent (top and bottom limits)? **Yes** ☑ **No** ☐ *If so, please describe.*

The MD Press offering includes several models with one, two or three dewatering cylinders, each with different treatment capacities. This generally allows linear scalability and makes it suitable for most farm sizes (100 – 10,000+ cows)

Does this technology require any air input? **Yes** ☐ **No** ☑

What is the preferred air connection? *For example: psi, fitting size, air quality.*
If not distributed by the system, please list each connected device.

n/a

Does this technology require any water input? **Yes** ☑ **No** ☐ *If so, please describe.*

Fresh water is intermittently required for CIP spray bar and polymer makedown (ancillary polymer system).

What is the preferred water connection? *For example: psi, fitting size, water quality, gpm.*
If not distributed by the system, please list each connected device.

Up to 40 gpm fresh water for a short period of time (used intermittently for CIP spray bar and polymer makedown only). On average we assume approx. 2gpm of fresh water during system operation.

Does this technology require any electrical input? **Yes** ☑ **No** ☐ *If so, please describe.*

Depending on MD Press size/model selection: approx. 0.5 HP - 10 HP, includes one electrical motor per dewatering cylinder and one per floc tank. Any ancillary equipment extra.

What is the preferred electrical connection? *For example: phase #, voltage, full load amps.*
If not distributed by the system, please list each connected device.

3 phase 230/460V

Does this technology require any mechanical input? **Yes** ☑ **No** ☐ *If so, please describe.*

Electrical motors

What is the preferred mechanical connection? *For example: horsepower, connection, rpms.*
If not distributed by the system, please list each connected device.

Electrical motors, depending on the MD Press model with 0.25 to 2 HP per cylinder

Does this system require any special plumbing? **Yes** ☑ **No** ☐ *If so, please describe what is required.*

Standard plumbing for liquid feed and discharge

Does this system require any special foundations or pads? **Yes** ☑ **No** ☐ *If so, please describe.*

Preferably a level concrete pad

Do you consider this technology part of a larger system that you provide? **Yes** ☑ **No** ☐ *If so, please describe.*

The MD Press treatment is considered a secondary treatment as it requires primary/pre-treatment. The MD Press can be integrated with other pre or post equipment or individually.

Does this system require any other components that you do not provide or are not included in this proposal? **Yes** ☐ **No** ☑
If so, please describe.

Trident offers the MD Press w/ polymer system. If required, additional ancillary components e.g. tanks, conveyors, pumps, controls & automation can be supplied as well.

How is the system delivered to the site? *For example: skid mounted, assembled on site, constructed on site.*

Equipment is assembled and ready for installation (plumbing, piping, electrical extra)

Is this system portable or configured in such a way that it could be easily transported for use in several locations?
Yes ☑ **No** ☐ *If so, please describe.*

Customization is available; the MD Press can be supplied as a skid mounted unit, containerized or trailer mounted

Does this technology negatively impact another critical area or have other regulated characteristics (i.e. emissions, sound, odor)? If so, what are these impacts and what mitigation measures have been if required by state or local agencies?
If so, please describe the recommended means of mitigating these impacts.

n/a

What spare parts and redundant components are included with the system?

None. A list of recommended spare parts is available upon request.

What equipment, time and resources are required for monitoring this technology and what equipment is included for monitoring this technology? (6.a)

The equipment can be supplied for manual or fully automated operation, in which case a controls package will be provided incl. sensing equipment, PLC, VFD and HMI. Advanced features like sms or email alarm or remote access can be provided. For budgetary purposes we recommend to allow 30-60 min per day for visual checks, monitoring, occasional cleaning, greasing etc.

What equipment, time and resources are required to control this technology and what equipment is included for controlling this technology? (6.b)

If the system is set up for automated operation the PLC program will control system operation based on specific system parameters.

What is the usable life of the system?

15+ years

What is the salvage value at the end of the usable life?

tbc

What is the educational and technical level of competence for the operation of the system?

moderate

What level of maintenance is required for the system? (7.a)
Please indicate if rebuilds or major components must be replaced and what the frequency is for these components.

moderate

Are consumables used in the process? **Yes** ☑ **No** ☐
Please provide the nature and purchase relationship for these consumables. For example: proprietary, special contract, generally available.

Polymer, available through third party suppliers

Which of these NRCS codes would this technology be classified under? *Check all that apply. Add if necessary.*

CODE	NRCS DESCRIPTION	CHECK ALL THAT APPLY
472	Access Control	☐
560	Access Road	☐
309	Agrichemical Handling	☐
371	Air Filtration and Scrubbing	☐
591	Amendments for the Treatment of Agricultural Waste	☐
366	Anaerobic Digester	☐
672	Building Envelope Improvement	☐
372	Combustion System Improvement	☐
317	Composting Facility	☐
554	Drainage Water Management	☐
375	Dust Control from Animal Activity on Open Lot Surfaces	☐
373	Dust Control on Unpaved Roads and Surfaces	☐
374	Farmstead Energy Improvement	☐
512	Forage and Biomass Planting	☐
561	Heavy Use Area Protection	☐
516	Livestock Pipeline	☐

590	Nutrient Management	☑
521A	Pond Sealing or Lining, Flexible Membrane	☐
533	Pumping Plant	☐
588	Roof Runoff Structure	☐
367	Roofs and Covers	☐
318	Short-Term Storage of Animal Waste and By-Products	☐
570	Stormwater Runoff Control	☐
606	Subsurface Drain	☐
635	Vegetated Treatment Area	☐
601	Vegetative Barrier	☐
360	Waste Facility Closure	☐
632	Waste Separation Facility	☑
313	Waste Storage Facility	☐
634	Waste Transfer	☐
629	Waste Treatment	☑
359	Waste Treatment Lagoon	☐
		☐
		☐
		☐

Please provide an estimated installed capital cost for this technology and indicate the model, cow number or volume that this cost applies to. (8.a)
Please include all components and designate if provided by you or others.

Starting at approx. $100,000 (example for a small 2 cylinder model for approx. 10,000 GPD; ancillary components, automation etc. Extra)

Please provide an estimated annual operation cost for this technology and indicate the model, cow number or volume that this cost applies to. (8.b)
Please include all costs and designate if provided by you or others.

At 22 hrs/day runtime: approx. $2,350/year electrical cost (rate $0.12 per KwH), approx. $11,500/year for labor (incl. 1 hr/day for visual checks, cleaning etc. at $30/hr), $9,300/year for parts. (example for a small 2 cylinder model approx. 10,000 GPD; ancillary components, automation etc. Extra)

Is there financing available for this system? **Yes** ☑ **No** ☐ *If so, what are the conditions for this financing?*

3rd party financing provider

Is the system available for lease? **Yes** ☐ **No** ☑ *If so, please describe.*

What sort of warrantee or guarantee do you provide with this technology? (9.a)
Do you provide any performance guarantees or strictly defects in parts and materials?

One-year against defects in parts and materials

Explain how this system is unique or transformative and how does it improve upon or go beyond other technologies that are currently available.

The MD Press technology is based on the proven working principal of a screw press with an internal screw auger. However, the MD Press is specifically designed to separate flocculated material with very low mechanical pressure, requiring low-horsepower motors. The filter assembly consists of stationary and moving rings that promote very effective solid-liquid separation and also have a self-cleaning effect. With its robust construction and very little operator oversight required, the MD Press is very suitable for on farm application.

Please provide the recommended record keeping procedures for end users of this technology. (10.a)

n/a

NRCS considers it the responsibility of the technology provider to furnish information from a university or other independent research entity to document the effectiveness of the technology to achieve its intended purpose in order to be funded through its programs. This information must provide independent, verifiable data demonstrating results of the use of the facility, technology or process in other similar situations and locations and, if available, document the effectiveness of the technology under different climatic factors. Documentation from peer reviewed journals is preferable. Where use of a waste treatment facility or process to improve one resource concern negatively impacts another, impacts and mitigation measures, if required by state or local agencies, are to be documented.

Can you provide independent, verifiable data demonstrating results for the use of this technology in other similar situations and locations? Would you be willing to provide this data in order to qualify for NRCS funding? (12.a)

Independ third party reviews for Trident's nutrient recovery process incl. the MD Press are available (e.g. University of Missouri Extension, Agriculture and Agri-Food Canada)

If information is provided related to the previous question, please provide the credentials of the individual collecting the data and analyzing the results along with disclosure of potential conflicts of interest. (13.a)

Available upon request

Newtrient has developed a third-party evaluation protocol that can be used in conjunction with a local university or state extension agency to evaluate technologies in a way that will meet the NRCS requirements. Please contact mstoerm@newtrient.com if you are interested in contracting for this service.

TECHNOLOGY REFERENCES

Please provide customers with whom we can discuss this technology and its performance. (15.a)
Include a company name, location, contact name and contact information.

Reference 1

Company Name:	Seabreeze Farms
Company Location:	Delta, BC
Contact Name:	Jerry Keulen
Contact Information:	Available upon request

Reference 2

Company Name:	Vanguard Renewables/Project Goodrich Dairy
Company Location:	Salisbury, VT
Contact Name:	Lance Butler
Contact Information:	Available upon request

Reference 3

Company Name:	Windy Ridge Dairy
Company Location:	Fair Oaks, IN
Contact Name:	Jason Dykstra
Contact Information:	Available upon request

Reference 4

Company Name:	Prairies Edge Dairy (formerly Fair Oaks Farms)
Company Location:	Fair Oaks, IN
Contact Name:	Carl Ramsey
Contact Information:	Available upon request

Are there any other facts about this technology that you feel should be included in this document?

The questions above have been adapted to attempt to glean as much information as possible in order to help Newtrient develop technology documentation that will meet the standards of what is required in a review package for technology to be approved under NRCS Practice Standard 629 (CPS 629 - Waste Treatment) **Note the definition of Waste Treatment is "The use of unique or innovative mechanical, chemical or biological technologies that change the characteristics of manure and agricultural waste".**

NRCS documentation specifies that the review package shall contain the following 15 items (in black) and from these Newtrient has developed the questions in this document (in red):

1. **A description of the technology. If lengthy, this may be placed in an appendix.**
    a. **Please provide a brief (1-2 sentence) description of this technology.**
    b. **Please provide a full description of this technology. (Attach pages if necessary)**
2. **An explanation of how this technology will accomplish one or more of the purposes of the standard.**
    a. **Please explain how this technology will improve water quality and/or air quality by one or more of the following:**
        i. **Reducing the nutrient content, organic strength, and/or pathogen levels of manure and agricultural waste.**
        ii. **Reducing odors and gaseous emissions**
        iii. **Facilitating desirable waste handling and storage**
        iv. **Producing value added byproducts that facilitate manure and waste utilization.**
3. **The range of volumetric and mass flow rate capacities and hydraulic retention times of the waste streams including the influent, effluent, and recycle streams.**
    a. **Please provide a detailed mass balance that demonstrates the range of volumetric and mass flow rate capacities and hydraulic retention times of the waste streams including the influent, effluent, and recycle streams for this technology by model number or as related to a specific flow or number of animals (i.e.1,000 cows per day or 100,000 gallons per day).**
4. **The characteristics of the influent waste stream important to the waste treatment or process.**
    a. **Are there any characteristics of the influent waste stream important to the proper operation of this technology?**
5. **Expected system performance related to changes in form, nutrient fate projections, macro-nutrient reductions, pathogen reductions and air emissions including gaseous ammonia, hydrogen sulfide, and volatile organic compounds.**
    a. **Please provide the expected performance of this technology related to the following:**
        i. **Changes in form or handling characteristics**
        ii. **Nutrient fate or end use projections**
        iii. **Macro-nutrient reductions or transformations**
        iv. **Pathogen reductions or elimination**
        v. **Air emissions (including gaseous ammonia, hydrogen sulfide, and volatile organic compounds)**
6. **Process monitoring and control system requirements.**
    a. **What equipment, time and resources are required for monitoring this technology and what equipment is included for monitoring this technology?**
    b. **What equipment, time and resources are required to control this technology and what equipment is included for controlling this technology?**
7. **A typical operation and maintenance plan that includes performance monitoring requirements and a replacement schedule for components that do not have a minimum life span of ten or more years.**
    a. **Please provide a typical operation and maintenance plan that includes performance monitoring requirements and a replacement schedule for components that do not have a minimum life span of ten or more years.**
8. **Estimated installation and annual operation cost.**
    a. **Please provide an estimated installed capital cost for this technology and indicate the model, cow number or volume that this cost applies to.**
    b. **Please provide an estimated annual operation cost for this technology and indicate the model, cow number or volume that this cost applies to.**
9. **An example of a warranty on all construction or applied processes not covered by other NRCS Conservation Practice Standards.**

   a. Please provide an example of a warranty on all construction or applied processes included with this technology.
10. Recommended record keeping procedures for end users.
   a. Please provide the recommended record keeping procedures for end users of this technology.
11. Alternatives for the use of the byproducts produced by the system.
   a. Please provide the alternative uses for the byproducts produced by this technology.

It is the responsibility of the technology provider to furnish information from a university or other independent research entity to document the effectiveness of the technology to achieve its intended purpose. Provide independent, verifiable data demonstrating results of the use of the facility or process in other similar situations and locations. If available document the effectiveness of the technology under different climatic factors. Documentation from peer reviewed journals is preferable. Where use of a waste treatment facility or process to improve one resource concern negatively impacts another, impacts and mitigation measures, if required by state or local agencies, are to be documented.

12. Independent, verifiable data demonstrating results for the use of the facility or process in other similar situations and locations.
   a. Can you provide independent, verifiable data demonstrating results for the use of this technology in other similar situations and locations? Would you be willing to provide this data in order to qualify for NRCS funding?
13. The credentials of the individual collecting the data and analyzing the results along with disclosure of potential conflicts of interest.
   a. If information is provided related to the previous question, please provide the credentials of the individual collecting the data and analyzing the results along with disclosure of potential conflicts of interest.
14. Contact information for the technology provider.
   a. Please provide a technical contact and a business contact to answer questions regarding the information provided for this technology.
15. Contact information for individuals that have implemented this technology at the farm scale.
   a. Please provide contact information for individuals that have implemented this technology at the farm scale.