



# IV.-G.

Agenda Item

## County of Hanover

**Board Meeting: July 23, 2014**

**Subject:** Request for Authorization to Advertise Public Hearing – Lease of County Property – Between Hanover County and Zynnovation LLC for a location to pilot a new recycling technology. **(Beaverdam Magisterial District)**

**Summary of Agenda Item:** Zynnovation, located in the Hanover County Clean Technology Innovation Center, proposes to evaluate the feasibility of recovering polymers from soiled disposable diapers. The recovered polymers would be utilized to manufacture irrigation tree mats. The Department of Public Works proposes to lease a 40' by 20' area at the Solid Waste Transfer Station site for the purposes of locating a 100 square foot processing building. Zynnovation will be responsible for all operating costs including diaper collection from local day cares, electricity, water, sewage (discharge approved by Hanover County DPU) and residue disposal costs. The lease would be for one year beginning October 1, 2015 and ending September 30, 2016. The Virginia Department of Environmental Quality has approved this project that is dependent on Zynnovation receiving a grant from the National Science Foundation. The lease amount will be \$1 per year.

The Department of Public Works will amend its Site Plan and Operations Plan to incorporate the pilot project upon Zynnovation receiving its grant approval from the National Science Foundation. This is anticipated to require a nominal amount of staff time.

The County Attorney's Office has approved the attached form of the agreement.

**County Administrator's Recommended Board Motion:**

Authorize the advertisement of a public hearing for August 27, 2014 at 7:00 p.m. to consider the lease of County property between Hanover County and Zynnovation LLC for a location to pilot a new recycling technology.

**PUBLIC HEARING NOTICE**  
**HANOVER COUNTY BOARD OF SUPERVISORS**

The Hanover County Board of Supervisors will conduct a public hearing on **Wednesday, August 27, 2014, at 7:00 p.m.** in the Board meeting room at the Hanover County Administration Building, 7516 County Complex Road, at Hanover Courthouse, Hanover, Virginia, on the following lease of County Property:

**A lease of County property, an area approximately 40' x 20' at the Hanover County Solid Waste Transfer Station between Hanover County and Zynnovation LLC for a location to pilot a new recycling technology.**

The purpose of this public hearing is to receive public comment on the proposed lease of County property. Copies of the proposed lease and related information may be reviewed at the office of the County Administrator, Hanover County Administration Building, 7516 County Complex Road, at Hanover Courthouse, Hanover, Virginia any regular working day between 8:30 a.m. and 5:00 p.m.

All persons wishing to comment on the proposal may appear at the stated time and place. Persons requiring special assistance to participate in this hearing should contact Hanover County at (804) 365-6176.

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Cecil R. Harris, Jr., County Administrator

Publish: 2014

## LEASE AGREEMENT

### LEASE OF PORTION OF 301 TRANSFER STATION PROPERTY GPIN 8810-41-8712

THIS LEASE AGREEMENT is entered into \_\_\_\_\_, 2014, by HANOVER COUNTY, a political subdivision of the Commonwealth of Virginia ("County"), and Zynnovation LLC, a Virginia limited liability company ("Tenant").

#### RECITALS

A. The County is the owner of property known as the 301 Transfer Station property, located at 7301 Courtland Farm Road, Hanover, Virginia 23069 and designated as GPIN 8810-41-8712.

B. The County desires to lease to the Tenant and the Tenant desires to lease from the County the right to occupy and use, for the sole purpose of constructing and operating a pilot plant for baby diaper materials recycling or recovery and related purposes, the following described property located in Hanover County, Virginia, together with a non-exclusive right of access for the purposes described in this Lease Agreement, from the nearest public road to the leased premises:

A portion of that certain tract of land shown highlighted on Attachment A to this agreement and designated as "leased area" on Attachment B. The portion to be leased consists of 20 feet by 40 feet, more or less (the "leased premises"), and is a portion of that property located at 7301 Courtland Farm Road, Hanover, Virginia 23069 and known as the 301 Transfer Station property and designated GPIN 8810-41-8712.

#### AGREEMENT

In consideration of mutual benefits and in reliance on the representations and warranties contained in this Lease Agreement, the parties agree as follows:

1. The term of this lease shall be one year beginning October 1, 2015 and ending September 30, 2016. This lease may be terminated by either party upon written notice of violation of the terms of the Lease Agreement. Any materials, equipment and/or buildings remaining on the

leased premises after termination notification shall be removed by the Tenant, if desired by the County, and the County shall have no responsibility for removal of equipment or buildings or otherwise cleaning up the leased premises.

2. This lease is subject to the condition that the Tenant is able to procure the award of the Small Innovative Research Initiative (SBIR) Phase II Award from National Science Foundation (NSF). After making every reasonable effort, if the Tenant is unable to procure such Award and so notifies the County within 30 days after receiving the formal announcement of the award denial, this lease shall be null and void.

3. For the lease of the leased premises, the Tenant agrees to pay the County an annual rent of one dollar (\$1.00) as detailed on Attachment C. Said rent shall be payable yearly in the full amount due on September 1, 2015.

4. The Tenant may install a small building/shed to house the pilot plant for diaper recycling and separation process (described on Attachment D) to be conducted on the leased premises.

5. The Tenant is fully responsible for payment of any cost to install and remove the building/shed and equipment used in the pilot plant.

6. The Tenant may use its own generator to provide power to the process of the pilot plant.

7. The Tenant agrees to pay the County the applicable capacity fee and service charge for the water usage by the pilot plant at the applicable rate for the size of meter installed. The Tenant understands it is responsible for the costs of meter installation.

8. The Tenant agrees that it is fully responsible for collection of all wastewater in tanks and transport of wastewater to indirect discharge area of wastewater facility, which has been approved by the Public Utilities Department of Hanover County.

9. The Tenant agrees to go through the scale for any unprocessed baby diapers or leftover materials during pilot trials and pay the County the disposing fee for the weighted solid waste.

10. The County reserves the right of its officers, employees, and agents to enter the leased premises at any time for the purpose of viewing, surveying, testing and boring, or making any other investigations, the same not to interfere with the occupancy of the Tenant. The Tenant may require a non-disclosure agreement executed by any individual prior to entering the leased premises to protect the intellectual property and trade secrets of the Tenant. The individuals do not represent the County by signing this non-disclosure agreement.

11. The Tenant shall comply with all applicable Federal, State, and County laws and regulations.

12. This Lease shall be terminated upon breach of any of the provisions of this Agreement, upon written notice.

13. Any notice required by this Agreement shall be effective if given by certified mail, return receipt requested, to Tenant in the name and at the address given below; provided that change of address shall be effective if given in accordance with this paragraph. Any notice to the Tenant shall be given to: 319 Business Lane, Suite 1000, Ashland, Virginia 23005. Any notice to the County shall be given to: County Administrator, P.O. Box 470, Hanover, Virginia 23069-0470. The Tenant agrees to notify the County immediately of any change of legal status or of address.

14. The Tenant shall provide the labor and materials necessary to maintain the leased premises and its improvements during the rental period in as good condition as it was at the beginning of the lease term.

15. Upon termination of this Lease, the Tenant agrees to pay the County reasonable compensation for any damages to the leased premises for which the tenant is responsible.

16. There shall be no storage of any materials on the leased premises without the prior written consent of the County.

17. This Lease is not assignable, and subletting shall not be permitted.

18. Binding on Heirs: The provisions of this Lease shall be binding upon the heirs, executors, administrators, and successors of the Tenant in like manner as upon the original parties, except as provided by mutual written agreement.

19. Insurance Requirements: The Tenant shall maintain, throughout the lease term, a General Liability Insurance Policy with limits not less than **\$1,000,000.00** on which the County is named as additional insured. The Tenant shall assume all liability for bodily injury, personal injury or property damage, including environmental damage resulting from the leasing of the leased premises, shall defend and hold the County harmless from any such liability and shall maintain contractual liability insurance coverage for this assumption of liability. The Tenant shall also maintain Worker's Compensation Insurance as required by law and Employer's Liability Insurance with coverage of **\$500,000.00** bodily injury by accident, **\$500,000.00** each employee, **\$500,000.00** policy limit for disease. The Tenant shall provide the County with a Certificate of Insurance evidencing required coverage.

20. Rights on Intellectual Property: Any and all inventions, discoveries, developments and innovations conceived by the Tenant on the leased premises under this Agreement shall remain the exclusive property of the Tenant; and the County does not claim any right, title, and interest in the intellectual property developed by the Tenant.

21. The County will be responsible for amending the site plan as required and amending the Transfer Station's Operations Plan as required.

The signatures of the parties or their authorized representatives are set out below in acknowledgment of this agreement.

**HANOVER COUNTY, a political  
subdivision of the Commonwealth of Virginia**

\_\_\_\_\_  
Date

By: \_\_\_\_\_ (SEAL)  
Frank W. Harksen, Jr.  
Deputy County Administrator

**ZYNNOVATION LLC, a Virginia limited  
liability company**

\_\_\_\_\_  
Date

By: \_\_\_\_\_ (SEAL)  
Signature

\_\_\_\_\_  
Typed or Printed Name

\_\_\_\_\_  
Title

Approved as to form:

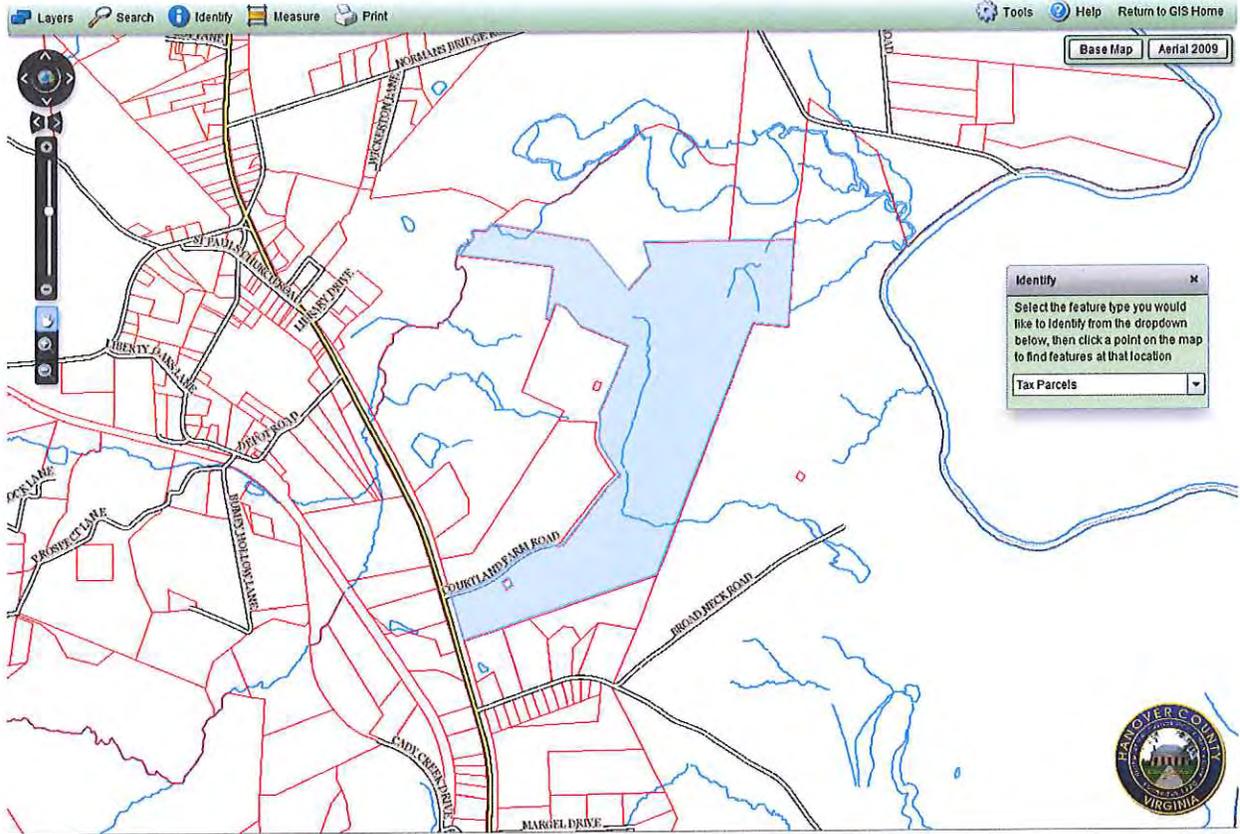
Approved as to substance:

\_\_\_\_\_  
Rebecca B. Randolph  
Assistant County Attorney

\_\_\_\_\_  
J. Michael Flagg, P.E.  
Director of Department of Public Works

**ATTACHMENT A**

**GPIN NO. 8810-41-8712**



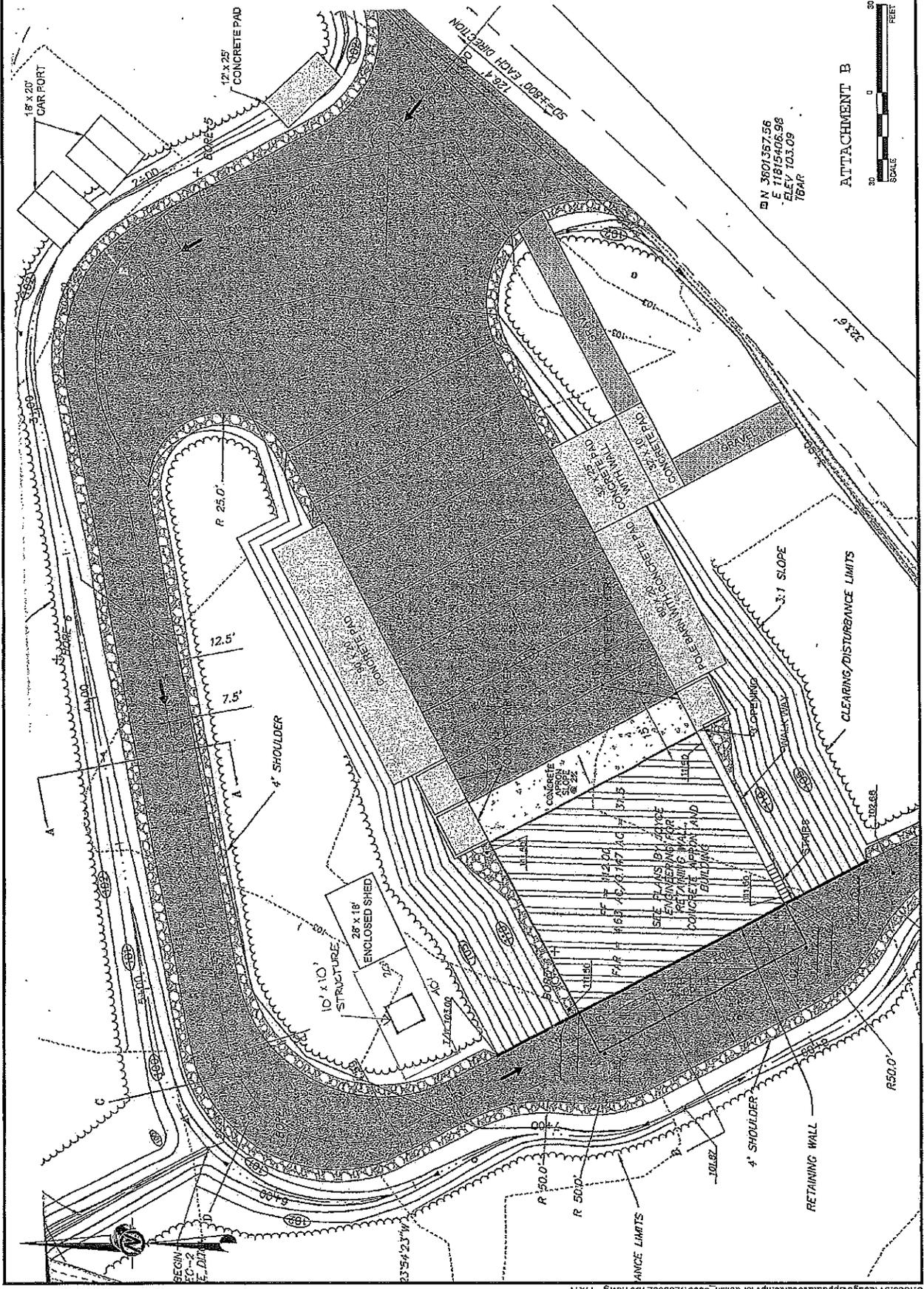


HANOVER COUNTY  
TRANSFER STATION  
HANOVER COUNTY, VIRGINIA

SITE PLAN AMENDMENT

PROJECT No.	123-98624
FILE No.	12398624B01
REV. 0	SCALE AS SHOWN
DESIGN	JRD 07/09/13
DRAWN	AWL 07/09/13
CHECK	AKH 07/11/13
REVIEW	JRD 07/11/13

DRAWING 1



D N 3601357.56  
E 11815406.98  
ELEV 103.09  
18AR

ATTACHMENT B



ATTACHMENT – C

The Tenant Data Sheet

**LEGAL NAME:** ZYNNOVATION LLC  
**ATTN:** HAILING YANG, President and CEO  
**MAILING ADDRESS:** 319 BUSINESS LANE, SUITE 1000  
ASHLAND, VIRGINIA 23005  
**TELEPHONE:** (540) 239-2902  
**FACSIMILE:** (804) 302-9100  
**INCORPORATED DATE:** MARCH 30, 2010  
**DUNS:** 962153891  
**EIN:** 27-2241045  
**SCC Identification number :** s3220003  
**VA SWaM Certification number:** 700845

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ANNUAL</u>
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1.	<b>LEASE OF 301 TRANSFER STATION PROPERTY</b>	<b>\$1.00</b>
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Annual lease of approximately 20 ft by 40 ft of land, more or less, known as a portion of the County's 301 Transfer Station property, for pilot plant of baby diaper materials recycling or recovery and related purposes. The Transfer Station property is located at 7301 Courtland Farm Road, Hanover, Virginia, 23069.

## ATTACHMENT D

**To:** Steve E. Chidsey  
**From:** Hailing Yang  
**cc:** Wei Zhang, William Daughtery  
**Date:** April 14, 2014  
**Re:** Zynnovation pilot plant for diaper recycling

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Dear Mr. Steve Chidsey,

Zynnovation LLC is an early stage research and development company developing a novel technology to recycle baby diapers and make green products from the recovered materials. Zynnovation is located in the Hanover County Clean Technology Innovation Center *dba* Dominion Resources Innovation Center at 319 Business Lane, Suite 1000, Ashland, VA 23005.

As we have discussed, Zynnovation is seeking a Phase II SBIR grant from National Science Foundation. In the proposal being prepared, we like to perform pilot scale operation to recycle baby diapers to be collected from child care centers.

Thank you for your time showing us the space within the Route 301 Transfer Station at 7301 Courtland Farm Road, Hanover, VA 23069. Zynnovation LLC is very interested in leasing an area of 20 ft by 40 ft from Hanover County and placing a pilot plant for diaper recycling facility at this location.

The leasing term is expected to stand for the period of Phase II project which approximately begins at March 2015 and ends in February 2017 if awarded. Zynnovation will install a small building/shed to house the pilot plant. Zynnovation will be fully responsible to cover any cost to install and remove the shed and equipment used in the pilot plant. Zynnovation will begin the installment after the leasing begins and remove the pilot plant before the lease ends. Zynnovation will purchase the business liability insurance for the pilot plant facility that meets or exceeds the requirements of Hanover County.

We plan to use a generator to provide power to the process. We will use water from your facility with a meter installed. All the sewage will be firstly collected in a tank and then hauled to indirect discharge area of waste water facility, which has been approved by the Public Utilities department. If there will be any unprocessed baby diapers or leftover materials during pilot trials, Zynnovation will go through the scale and pay for disposing.

Below is a description of the pilot plant design and layout.

### **Background Information**

Disposable diapers are made from a number of different polymer materials. The major components include an absorbent pad made of cellulose or cellulose acetate and superabsorbent polymer (SAP) i.e. sodium polyacrylate for absorption of body fluids, sandwiching nonwoven made of polyester, paper, or polypropylene, and non-permeable film made of polyethylene or cloth-like polyolefin films.<sup>7</sup>

To separate these different components, disposable diapers were first shredded and settled in a separation medium such as water i.e. wet method. The basis for their separation is their relative density to the separation medium, which is water in this case. Although high purity materials cannot be obtained by this separation method, they are adequate for the proposed applications. The materials with density lower than water are mainly polyolefins and the rest of the diaper materials are superabsorbent polymers (SAP), cellulose and small amount of polyesters.

The separation process will be repeated by using soiled disposable diapers. Slight changes to the already developed process for pre-consumer diapers will be made to include a sanitation procedure and wet-shredding procedure. The wet-shredding process replaces the dry-shredding process used in Phase I project and it requires special equipment. A twin-shaft shredder is requested to perform this task. Some parameters that affect the separation efficiency and production rate may be changed by addition of this procedure so a new set of parameters will be optimized.

The sanitation and baby feces removal procedure is not expected to be difficult since other similar procedures are used cloth diaper service businesses that are still existing in large metro areas. These cloth diaper service businesses use large industrial washers to wash diapers, which of course excludes baby feces and sanitizes diapers. Disposable diapers cannot survive the vigorous agitation in such washers because of the water swelled SAP creates stress for the diapers. A milder but similar process can be used for the sanitation and baby feces removal process. A tumbling tube with conveyer belts is one device that will be experimented. An industrial washer with controllable agitation speed will be an alternative method for the sanitation process.

The sanitation and washing process will be incorporated into the pilot plant before the shredding process as described below.

### **Pilot Scale Diaper Recycling Separation Process**

Continuous processes are usually for higher production rate with higher degree of automation compared to batch processes. A report of a previous attempt for disposable diaper recycling published such a process that performs continuous operation. This process is not suitable for the proposed separation because the targeted products from the separation process are different. Modifications of this process resulted in a design shown in Figure 1.

This proposed system consists of four sequential steps: washing and sanitizing, shredding, settling, and filtering. Drying polyolefins is another step of the whole process but it can be treated as a separate system, which can be done by using either a tumbling dryer or air dry. In this proposed system, the collected soiled diapers will be first sanitized and washed using the selected device as discussed above. To prevent bad smells, soiled diapers will be stored in air-tight trash bags. They have to be opened prior to this step for adequate contact of diapers with bleach. Manual opening will be used for this project. But an automated system will be acquired for larger scale productions in later stages.

The slurry and fluid handling from 3 to 4, 4 to 6, 5 to 3, and 6 to 3 will be done by a trash pump. The selection of trash pumps will be based on the optimum size of the shredded diaper components and the solid/water ratio. Further optimization may have to be done if no suitable trash pump is available. This will allow smooth handling of fluids without clogging while maintaining high separation efficiency and high production rate.

Minimize use of water was set as an initial goal for this project. So water reuse and recycling is important. Water removed from the upper layer polyolefins-rich slurry and lower layer SAP-rich slurry coming out of 3 will be filtered by using a two different screens 4 and 5. 5 is a screen with large holes so

that only the polyolefin fibers and strips will be removed from the rest of slurry, which will return back to **3**. **4** is a screen with small holes to be used for filtering SAP out of water. Vacuum may be applied to remove as much water as possible. The removed water will be pumped to the recycle tank **6** for reuse.  $\text{CaCl}_2$  or a different salt as well as bleach can be added to the recycle tank for two purposes: prevent bacteria growing in this tank and serve as a source of salt for the settling process.

The subsystem including a settling tank **7** and a filter screen **8** (dotted lines for flow directions) may be repeated to obtain better separation for polyolefins. It was found in Phase I project that incomplete removal of SAP particles from polyolefin strips and fibers result in poor mechanical properties, especially under wet conditions. The presence of swelled SAP particles create pores in the compression molded panels and ruin the mechanical properties. In Phase I project, the batch process was repeated at least once for the polyolefins. It is anticipated that at least one repetition of **7** and **8** is needed. The lower layer from **7** and the water coming out the **8** will be returned back to **3**.

A simplified version eliminates **8** and **9** where additional cleaning of polyolefins is done. This simplified version can be easily placed within a 10 ft x 10 ft building as demonstrated in Figure 2.

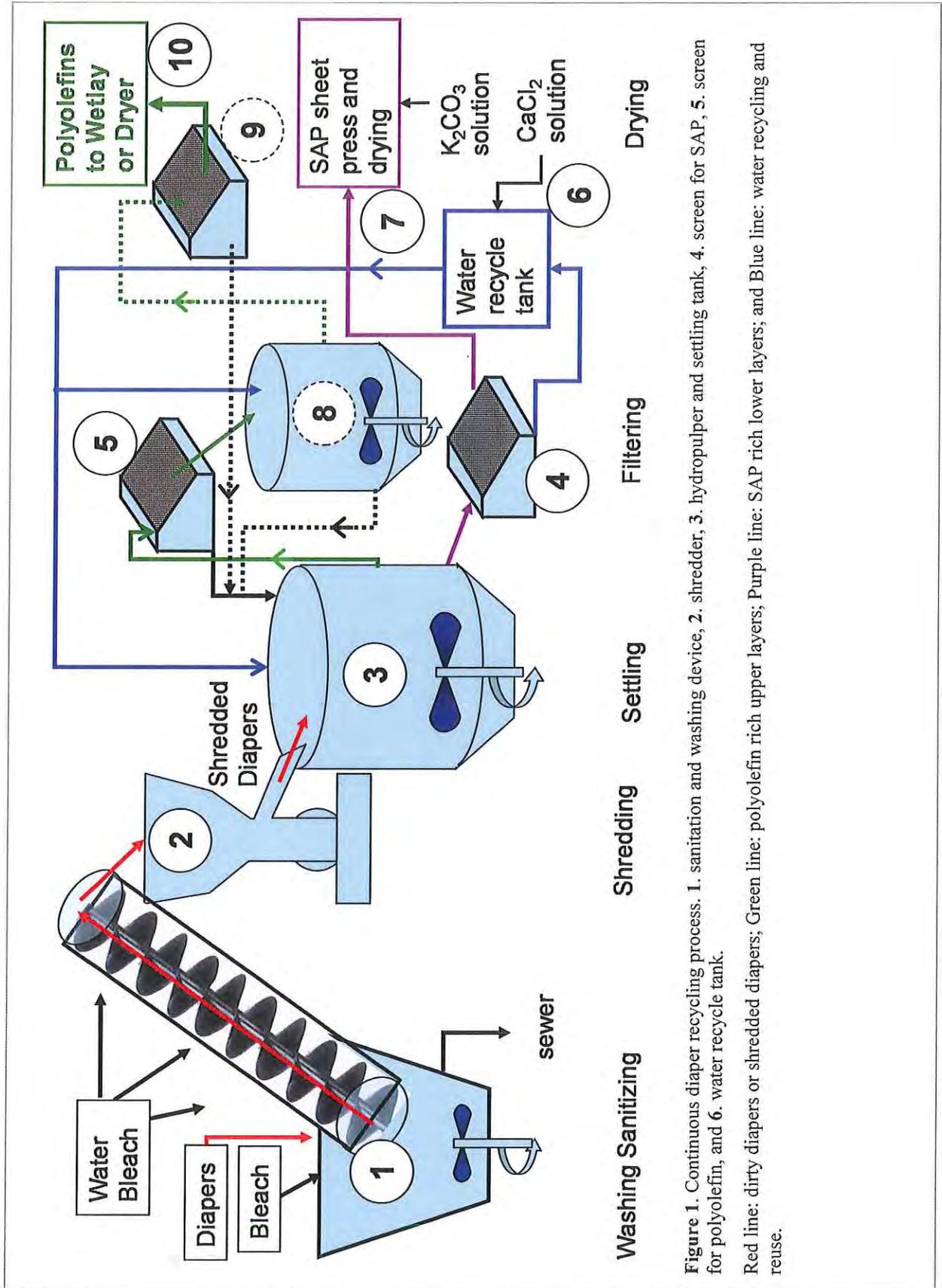


Figure 1. Continuous diaper recycling process. 1. sanitation and washing device, 2. shredder, 3. hydropulper and settling tank, 4. screen for SAP, 5. screen for polyolefin, and 6. water recycle tank.

Red line: dirty diapers or shredded diapers; Green line: polyolefin rich upper layers; Purple line: SAP rich lower layers; and Blue line: water recycling and reuse.

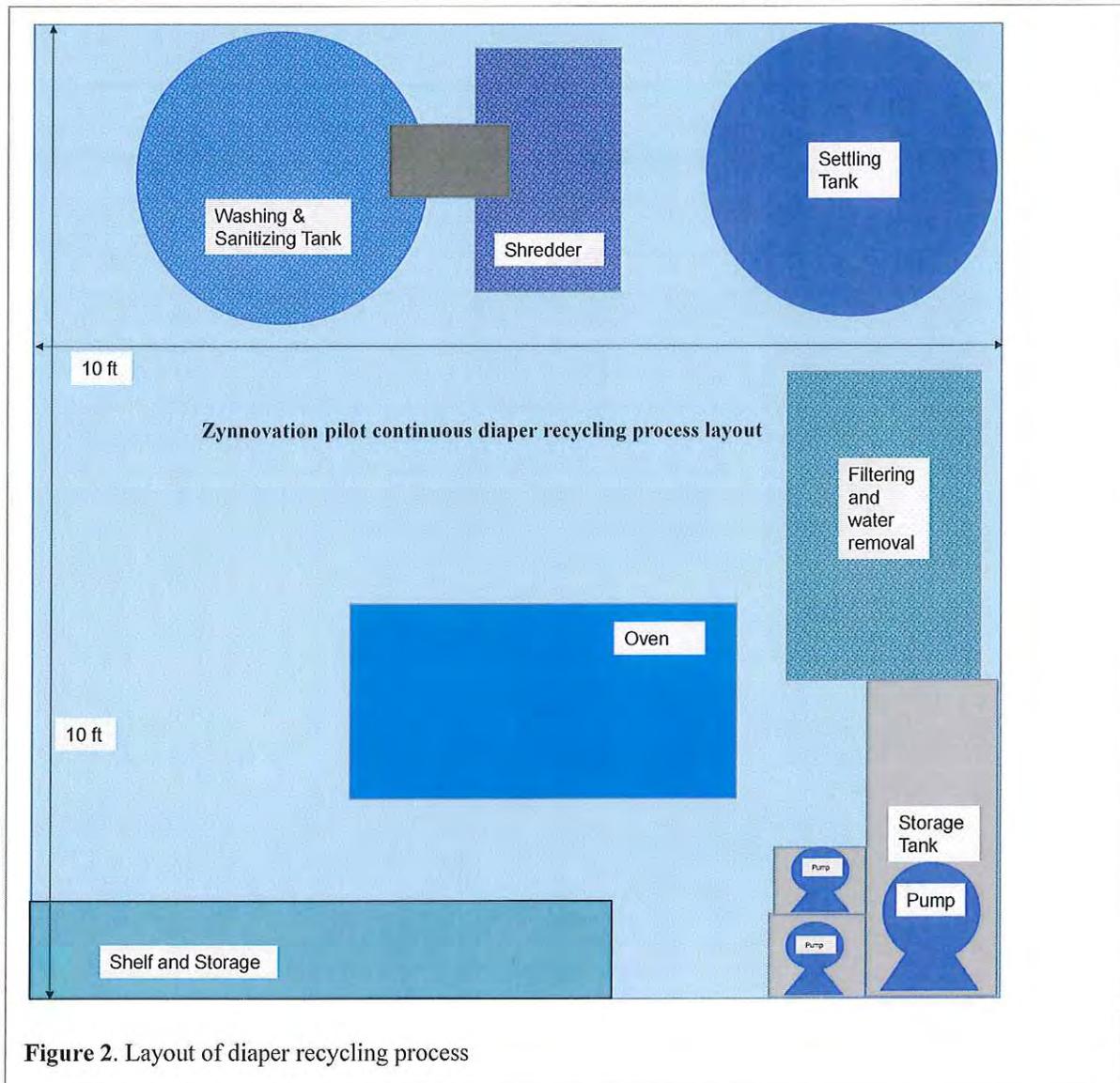


Figure 2. Layout of diaper recycling process