

**CHELSEA CENTER FOR RECYCLING AND ECONOMIC DEVELOPMENT**  
**UNIVERSITY OF MASSACHUSETTS**

**RBED Report**

**Sustainable New Bedford Phase I**

November 2002

80 Everett Avenue, Suite 221 Chelsea, Massachusetts 02150  
Tel: (617) 887-2300 Fax: (617) 887-0399 [www.chelseacenter.org](http://www.chelseacenter.org)  
Cover Printed on Recycled Paper Manufactured in Massachusetts ♻️

# Sustainable New Bedford Phase I

Marsha Gorden, TRTG, Cambridge, Project Consultant

Members of the New Bedford Area Chamber of Commerce SGNB Advisory Committee

**Sustainable Greater New Bedford** (SGNB) is a committee of the New Bedford Area Chamber of Commerce. It is chaired by Jim Mathes, President of the Chamber, and co-chaired by John Bullard, Director of the Family Business Center at the University of Massachusetts Dartmouth and former Director of the Department of Commerce Office of Sustainability. Present members of the SGNB Committee are listed in Chart One.

## Chelsea Center for Recycling and Economic Development

### Community Economic Development through Recycling Program

November 2002

This report has been reviewed by the Chelsea Center for Recycling and Economic Development and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Chelsea Center, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

All rights to this report belong to the Chelsea Center for Recycling and Economic Development. The material may be duplicated with permission by contacting the Chelsea Center. This project is funded by the University of Massachusetts' Chelsea Center for Recycling and Economic Development, through the Executive Office of Environmental Affairs and the Clean Environment Fund, which is comprised of unredeemed bottle deposits.

The Chelsea Center for Recycling and Economic Development, a part of the University of Massachusetts' Lowell Center for Sustainable Production, was created by the Commonwealth of Massachusetts in 1995 to create jobs, support recycling efforts, and help the economy and the environment by increasing the use of recyclables by manufacturers. The mission of the Chelsea Center is to develop an infrastructure for a sustainable materials economy in Massachusetts, where businesses will thrive that rely on locally discarded goods as their feedstock and that minimize pressure on the environment by reducing waste, pollution, dependence on virgin materials, and dependence on disposal facilities. Further information can be obtained by contacting the Chelsea Center for Recycling and Economic Development, 80 Everett Avenue, Suite 221, Chelsea, MA 02150, 617-887-2300.

© Chelsea Center for Recycling and Economic Development, University of Massachusetts Lowell

## TABLE OF CONTENTS

<b>INTRODUCTION.....</b>	<b>3</b>
<b>SGNB AND THE CHELSEA CENTER.....</b>	<b>4</b>
<b>SGNB TASK A. COLLECT INFORMATION ON ORGANIC FOOD, WOOD AND RUBBER WASTE STREAMS .....</b>	<b>5</b>
<u>FISH PROCESSING WASTES.....</u>	<u>5</u>
Figure 1.....	6
Chronology of Major Actions by TRTG: September 1 – November 30, 2001 .....	6
<b>STRUCTURE FISH PROCESSING SECTOR .....</b>	<b>6</b>
<u>INSTITUTIONAL AND RESTAURANT ORGANIC FOOD SCRAPS.....</u>	<u>7</u>
<u>SCRAP RUBBER .....</u>	<u>7</u>
<u>WOOD WASTE.....</u>	<u>8</u>
Figure 2.....	8
Chronology of Major Actions by TRTG: December 1, 2001 – February 28, 2002 .....	8
<b>SGNB TASK B. DEVELOP A WASTE REUSE OR REPROCESSING CONCEPT INTO A POTENTIAL JOB-CREATING OR JOB-EXPANDING PROJECT .....</b>	<b>9</b>
<u>INDUSTRIAL ECOLOGY AND NB/D WASTE STREAMS.....</u>	<u>9</u>
<u>SELECTION OF PRIORITY WASTE STREAMS.....</u>	<u>9</u>
<u>ADVANCED MARINE TECHNOLOGIES AS A FISH WASTE SOLUTION .....</u>	<u>11</u>
<u>FULLCIRCLE AND THE USE OF VERMICULTURE IN NB/D.....</u>	<u>11</u>
<b>SGNB TASK C. REFINE THE PROJECT (S') DEFINITION (S) WITH POTENTIAL LOCATION, COST FACTORS AND MARKETING PLAN .....</b>	<b>12</b>
Figure 3.....	12
Chronology of Major Actions by TRTG: March 1 – May 31, 2002 .....	12
<u>TWO POTENTIAL TECHNOLOGIES FOR NB/D.....</u>	<u>12</u>
<u>ADVANCED MARINE TECHNOLOGIES AS A FISH WASTE SOLUTION, CON'T. ....</u>	<u>13</u>
Figure 4.....	13
ADVANCED MARINE TECHNOLOGIES.....	13
<i>Organic Gem Fertilizer</i> Fact Sheet.....	13
<u>FULL CIRCLE AND THE USE OF VERMICULTURE IN NB/D, CON'T. ....</u>	<u>14</u>
<b>RESULTS, CONCLUSIONS AND NEXT STEPS .....</b>	<b>14</b>
<b>CHARTS: EXHIBIT OF WORKING CHARTS PREPARED BY TRTG IN SGNB PHASE I</b>	

## INTRODUCTION

SGNB evolved from two civic efforts that began in the mid-1990s. The South Coast Heritage Trust sponsored regular meetings, coordinated by Hilary Downey, to inform concerned citizens about the principles of sustainability. The Regional Community Congress (RCC) hosted a meeting in the late 1990s that attracted more than a thousand citizens to discuss the regional economy, environment, education, health, business, AIDS, crime and other common issues. The RCC's Business Network, a subgroup of the RCC, focused on issues of education, lower business taxes and sustainability.

The **Sustainable Greater New Bedford** Committee started meeting regularly at the New Bedford Area Chamber of Commerce in late 1999. SGNB invited regional experts and businesses to describe alternatives for material use and reuse, water and energy consumption, waste reduction and recycling. SGNB determined that the work of the committee was job creation and economic growth through sustainable business practices. SGNB sought to:

- Increase the number of companies in the region that use pollution prevention to increase their efficiency and profitability
- Provide a source of technical assistance to individual companies
- Survey companies regarding waste and material flows with the idea of developing a Southeastern Massachusetts' virtual eco-industrial park, and
- Establish an integrated sustainable development strategy for the Greater New Bedford region.

SGNB, with approval from the Chamber's Board, proposed and found funding for a regional conference to address sustainable business practices. The Conference Mission was:

- To provide a compelling program for business leaders to learn how to become more efficient and competitive, and
- To present proven sustainable development practices to enhance the long-term health of their community, economy and environment.

**The Bottom Line of Green is Black<sup>1</sup>: Strategies for Creating Profitable, Environmentally Sound Businesses** conference was held in Dartmouth on September 28, 2000 and featured nationally and locally known speakers from business, government and academia. William McDonough, an internationally known architect and designer of sustainable buildings and processes, was the keynote speaker. It provided many examples of sustainable business practices.

The New Bedford Area Chamber of Commerce & NSTAR with UMASS and the City of New Bedford presented the conference. The Office of Sustainable Development/NOAA/U.S. Department of Commerce, The Upstream Foundation, Henry

---

<sup>1</sup> Tedd Saunders and Loretta McGovern. *The Bottom Line of Green is Black: Strategies for Creating Profitable and Environmentally Sound Businesses*. HarperCollins, 1995. Used with permission.

Crapo Foundation, PRECIX, INC. (formerly the Acushnet Rubber Co.), New Bedford Economic Development Council and Second Nature sponsored it. The Greater New Bedford Regional Refuse Management District, Executive Office of Environmental Affairs/Office of Technical Assistance, Sustainable Taunton, SRPEDD, U.S. EPA, and the Coalition for Buzzards Bay provided additional support. Approximately twenty local companies exhibited their services and technologies.

## **SGNB AND THE CHELSEA CENTER**

At the beginning of 2001, SGNB learned of the Chelsea Center for Recycling and Economic Development's grant program that supported model recycling-based community economic development programs. Their grant program closely matched SGNB's goals.

SGNB asked Marsha Gorden of The Resource Technologies Group (TRTG) in Cambridge to write a pre-proposal with the Committee's assistance. The pre-proposal was based on survey work in New Bedford and Dartmouth that had classified major businesses by SIC and identified waste streams and disposal practices. Three major waste streams from a set of eight were selected:

- Organic food wastes from local fish processors, institutions and restaurants
- Wood wastes including building materials and pallets, and
- Rubber processing wastes and used tires.

It was anticipated that job creation and economic growth could come from "generator on-site waste separation, hauler provided services, receiving site separation and processing and remanufacturing functions along with material distribution and transport staff requirements."<sup>2</sup>

SGNB chose the area within the Greater New Bedford Regional Refuse Management District including both the City of New Bedford and the Town of Dartmouth (NB/D) as the geographic focus. SGNB submitted a formal proposal to the Chelsea Center for Recycling and Economic Development in June 2001 to: "Increase economic development in the region through the transformation of waste streams into business opportunities which expand, increase or retain jobs while ensuring landfill capacity for future growth." It included four tasks:<sup>3</sup>

- A. Collect information on organic food, wood and rubber waste streams with descriptive flow diagrams to enable the selection of one stream for further analysis,
- B. Develop a waste reuse or reprocessing concept into a potential job-creating or job-expanding project with defined barriers and evaluated technology,

---

<sup>2</sup> M. Gorden (TRTG). Recycling-Based Community Economic Development Pre-Proposal from SGNB. The Chelsea Center for Recycling and Economic Development. April 4, 2001.

<sup>3</sup> Chart Two from Chelsea Center Proposal illustrates original concept of Organic Food Wastes. May 23, 2001.

- C. Refine the project definition including anticipated employment or job retention with potential location, cost factors and marketing plan, and
- D. Complete report with detailed flow diagram and prepare next steps.

In August 2001, the Greater New Bedford Regional Refuse Management District voted to provide funding of \$10,000, contingent upon SGNB receiving the Chelsea Center grant of \$25,000. Previously, the Chamber had agreed to provide in-kind services and TRTG had agreed to provide a pro-bono contribution.

The SGNB Committee was active during the summer with discussions on an alternative technology for processing local food wastes. The group heard a presentation by Bio-Dynamics LLC of West Concord, MA on a new Canadian technology evaluated by the University of Massachusetts Boston's Strategic EnviroTechnology Partnership (STEP) Program. This technology, Autothermal Thermophilic Aerobic Digestion (ATAD) is a carefully controlled, chemical process for fertilizer production. It is an alternative to traditional composting which produces a more valuable fertilizer rather than the humus-type soil amendment from composting. The proposing group is presently seeking another location and new financing.

## **SGNB TASK A. COLLECT INFORMATION ON ORGANIC FOOD, WOOD AND RUBBER WASTE STREAMS**

The SGNB award announcement from the Chelsea Center led to our startup meeting at the Chamber on September 7, 2001. Mayor Kalisz then formally announced the Chelsea Center and Greater New Bedford Regional Refuse Management District grants to the New Bedford Area Chamber of Commerce at a press conference on September 26, 2001. With these grants, SGNB was able to move ahead to learn more about the three targeted waste streams and find new opportunities for their recycle.

### **Fish Processing Wastes**

Figure 1, "Chronology of Major Actions by TRTG: September 1 – November 30, 2001" matches consultant work with Task A. At our September 18 meeting, the group traced waste materials in the environment to see how the interactions between wastewater treatment plants and landfills impacted their availability for reuse.<sup>4</sup> We knew that fish processing wastes, locally called "gurry"– the flesh, guts and bones, had contributed to New Bedford's need for a new wastewater treatment plant (WWTP) in the 1980s. The City's DPW Director of Operations at the treatment plant and the Assistant Superintendent of the Waste Water Division confirmed their continuing WWTP discharges. Their present gurry estimates of 40–50% of the total wastewater flow led to our examination of ongoing gurry collection and treatment processes. SGNB knew about the production of fish essence/fish flavorings in New Bedford and the collection of local gurry for the production of pet food in Boston, but they were both small quantities of gurry.

---

<sup>4</sup> See Chart Three, "SGNB: Possible Reuse Combinations."

Significantly, it was the possible conversion of these wastes at the WWTP to additional solid wastes at the landfill that had originally put them into our Chelsea Center proposal. The DPW estimated that an average fish processor discharged 10,000 gallons/day with suspended solids loadings of 55 lbs/day and BOD of 83 lbs/day. Considering that there are about 40 processing plants in New Bedford, the DPW estimated that about 70 million lbs/year are going to the WWTP. The local waste haulers also told us that gurry was going to the local landfills but were unable to quantify that amount. All gurry suspended solids discharges over 50 lbs/day to the WWTP are subject to surcharges from \$0.05--\$0.10/lb or \$100--\$200/ton above the cost of wastewater treatment. The same wastes going to a local landfill can cost up to \$100/ton plus transport and other costs. Two meetings with Lou Spencer of Advanced Marine Technologies

**Figure 1**  
**Chronology of Major Actions by TRTG: September 1 – November 30, 2001**

**Structure Fish Processing Sector**

Identify Key Players  
Visit Landfill + NB Transfer Station  
Check Landfill Regulations  
Visit NB WWTP  
Meet DPW: Assistant Superintendent on WW Pre-Treatment Program  
Meet Group of Fish Processors  
Identify/Meet Group of Waste Haulers  
Visit Local Waste Haulers  
Meet Advanced Marine Technologies (AMT)

Structure Remaining Food Sector

Identify Key Players  
Review + Plan Restaurant Survey on Food Scraps  
Visit UMD Cafeterias + Meet FoodService Co.  
Meet NB School + Hospital Officials  
Visit Local Food Service Distributor  
Distribute + Receive Food Survey Questionnaires  
Visit Dartmouth WWTP

Structure Rubber/Tire Sector

Identify Key Players  
Visit PRECIX, INC. (formerly the Acushnet Rubber Co.)  
Visit Acushnet Co. (Titleist)  
Visit F&B Tire Reprocessor  
Meet Carmen Chevie (Potential Tire Reprocessor)  
Checkout Mass. Beneficial Use Determination Process  
Identify other Mass. Rubber Processors to Compare Products  
Review other State/Provincial Recycling Programs

(AMT) by the end of December 2001, indicated that their ongoing enzymatic digestion of fish processing wastes to produce a high-grade fertilizer was a viable option to disposal for New Bedford's fish processors. SGNB began exploring their support needs as a major focus for Task B.<sup>5</sup>

### **Institutional and Restaurant Organic Food Scraps**

A review of the large New Bedford/Dartmouth generators of food scraps showed that while there were a hospital, several nursing homes, two jails, and many restaurants; the single largest producer was the University of Massachusetts at Dartmouth (UMD). With the UMD Facilities Director and SGNB Committee member Lee Nason's assistance, plus a student intern Jacques Darne, we visited the kitchens and cafeterias that serve about 5500 meals/day to understand more about the reuse possibilities.<sup>6</sup> At the November 1 Committee meeting, SGNB learned that food waste is not separated from other waste in the kitchens, dining areas and dormitories; nor is separation a requirement of the contract with Sodexo FoodService which manages the UMD cafeterias. SGNB also learned there would have to be contract modifications with Sodexo, labor retraining (specifically in the use of garbage grinders in the sinks), and additional space for recycling bins. Sodexo reported that the total waste quantity from the kitchen area including food scraps, paper, plastic, cans and bottles is approximately 200 gallons/day with another 90 gallons/day from a separate dining area. SGNB agreed to continue evaluating options at UMD for recycle along with the barriers, possibly leading to composting.

### **Scrap Rubber**

Scrap rubber in Southeastern Massachusetts is derived both from local manufacturers and used tires.<sup>7</sup> Of the approximately 5-6 million tires scrapped in Massachusetts each year, the southeastern part of the state gains about 1-2 million. This is scrap contaminated with metals and other materials that can be chipped and processed for recycle. The usefulness of scrap tires is measured by the size of its chips, shreds or crumb—the smaller, the better. Presently, used tires in NB/D are chipped to 2" which limits the reuse options to tire derived fuel (TDF) at waste to energy plants (when accepted to balance heat content) or some pulp mills, rough products for mostly marine use such as bumpers, or transport to J. P. Routhier at Littleton, MA. J. P. Routhier chips or shreds to 1" and also sells as TDF, lightweight fill material and reuse for a wider range of products.

Rubber scrap from Titleist and PRECIX, INC. (formerly the Acushnet Rubber Co.) can be cured (vulcanized) or not; made from a variety of natural and synthetic mixes; extruded, molded, or ground; colored or not; and present in varying quantities and qualities. Specific quantities vary from 500 lbs/week to 12 tons/week with values from \$0 to more than \$100/ton. Both companies closely monitor their byproducts and wastes with their disposal costs. Scrap can be finely chipped or crumbed for a wide range of products, when there is a nearby crumb rubber facility, as there is in many parts of the US, or even exported to other countries for their recycle. A PRECIX INC. (formerly the

---

<sup>5</sup> See Chart Four, "Fish Processing in New Bedford."

<sup>6</sup> See Chart Five, "Typical Large Scale Food Preparation."

<sup>7</sup> See Chart Six, "SGNB: Scrap Rubber + Tires."

Acushnet Rubber Co.) employee who handles the collection of scrap for landfill disposal has made a list of more than thirty uses for scrap, applicable if it were finely chipped. SGNB learned that when chipped, it could be used in paving material or as a base for playgrounds. The greatest market niche is in road construction. Lee Nason at UMD agreed to review paving specifications for agencies requiring a portion of recycled rubber and found that Florida DOT had detailed specifications. Since several of the parking lots at the University need repaving, she thought this would be an opportunity to introduce recycled material into the repaving process. We agreed to keep working on scrap rubber recycle options.

### **Wood Waste**

SGNB members reported on wood waste found in the form of scrapped pallets at many locations in the two communities. We planned to continue with wood waste as only a candidate for use in composting.

During Task A, SGNB had the opportunity of meeting several entrepreneur-developers of new technologies applicable for the selected food and rubber waste streams. One other entrepreneur the group met in November 2001 was David Mackley of Initia in West Wareham. His technology is a conversion process to produce ethanol from biomass feedstocks for use as an antioxidant in gasoline. One of his potential feedstock sources was organic material in landfills. Upon finishing the formulation, he planned to find a Southeastern Massachusetts location to test the use of wood chips.

### **Figure 2**

#### **Chronology of Major Actions by TRTG: December 1, 2001 – February 28, 2002**

##### Compare Fish Reprocessing Alternatives

Evaluate Other Fish Fertilizers including Protein Technology's Squanto's Secret (Gloucester)

Continue to Meet with Lou Spencer + Team (AMT)  
Visit AMT Production Facility for 'Organic Gem'  
Meet with NB DPW Pretreatment Program again

##### Examine Food Waste Composting

Review Options at Crapo Hill Landfill  
Visit Dartmouth Transfer Station  
Review Composting in Massachusetts + Nova Scotia  
Compare Composting with Digestion  
Meet with Dartmouth Executive Administrator

##### Study Rubber Supply Chain

Synthetic vs. Natural and Reuse Options  
Return to PRECIX INC. (formerly the Acushnet Rubber Co.)  
Evaluate Use of Crumb Rubber in Other States  
Meet with Bob Shatten on Crumb Rubber Project

### Industrial Ecology in NB/D

Meet with Joshua Tosteson and Leo Blomen of FullCircle/HydroGen LLC  
Review Nova Scotia and Burnside Industrial Park (Halifax) Recycling Programs  
Meet with New Bedford Economic Development Council

## **SGNB TASK B. DEVELOP A WASTE REUSE OR REPROCESSING CONCEPT INTO A POTENTIAL JOB-CREATING OR JOB-EXPANDING PROJECT**

### **Industrial Ecology and NB/D Waste Streams**

Figure 2. "Chronology of Major Actions by TRTG: December 1, 2001 – February 28, 2002" matches consultant work with Task B. Our next Committee meeting scheduled for January 11, 2002 included two items: A presentation by Joshua Tosteson of FullCircle/HydroGen (New York) and a decision by the Committee on prioritizing our three waste streams. He prepared an eco-industrial look at New Bedford/Dartmouth showing how quantities of food, rubber and wood wastes could all be collected and treated for their highest quality recycling use, either as material or energy inputs. Josh Tosteson's "Toward a Sustainable Greater New Bedford: A FullCircle Industrial Ecosystem Design" showed:

- A plasma arc furnace capable of converting rubber and other wastes to hydrogen for fuel cells,
- A nearby manufacturing site for producing fuel cells
- A vermicompost facility converting food and wood wastes into a major business opportunity and
- Greenhouses to accept the vermicompost worm castings along with waste heat and steam from the fuel cell plant.

Application of all these recycling options could result in a new range of products for market including electricity, organic produce, vermicompost fertilizer, and glass, steel and other metals as byproducts from the plasma arc furnace. SGNB was especially interested in the concept of vermiculture for the food scraps with the reported high product value of approximately \$250 per cubic yard of worm castings.

### **Selection of Priority Waste Streams**

We began this decision with the preparation of materials useful in making a priority choice of the three waste streams. As an example, we put together a Decision Matrix<sup>8</sup> showing different ways of configuring possible reuse solutions for the three streams:

- Organic Foods includes all organic waste from food processing, meal preparation and meal scraps
- Scrap Rubber includes all waste from natural and synthetic rubber processing and used tires, and

---

<sup>8</sup> See Chart Seven, "SGNB Decision Matrix: To Help Select Target Waste Stream"

- Scrap Wood includes wood products from construction and demolition and shipping pallets.

For each of the three sectors we considered the possible total quantity and two segments:

- Food: total, fish processing and institutional/restaurants
- Rubber: total, processing and tires; and
- Wood: total, construction/demolition and pallets.

This allowed us an opportunity to consider possible waste streams that might be future candidates for help. The matrix also showed major issues with both existing and new technology.<sup>9</sup>

After Josh Tosteson's presentation, SGNB began the decision process by considering the major criteria we could use for selection. First, we started with our goals: we wanted to provide new jobs and/or ensure continuity or expansion of present jobs, and we wanted to take materials out of the Crapo Hill Landfill. Next we considered the different types of projects. For example, we could work with an existing business on its expansion such as a tire reprocessor needing new chipping equipment for new products; we could help bring a new business to NB/D such as ATAD; or we could develop an opportunity to take our waste materials to another location such as Channel Fish in Boston where they are making pet food or to a potential new crumb rubber plant in Everett. Committee members considered the issue of scale and the opportunity to expand based on the size of the waste supply. It could be sufficient for NB/D, or the SouthCoast, the Commonwealth or New England. Timing is important in that we could begin right away with an existing company, or start in a year with the organization of a community-wide project such as composting, or take over two years to build an ATAD facility. Lastly, the members considered typical project characteristics such as location, financing for capital and operating costs, reliability of supply, tests and demonstrations of the technology and definition of markets and products.

SGNB had a very active discussion on this decision. It was directed toward identifying a target waste stream, but not precluding other endeavors in the other two waste streams. There were comments on the size of both the food and rubber sectors and their varying abilities to work on solving their waste problems. It was mentioned that the food businesses didn't have the resources to affect change, whereas the rubber processors are strong businesses that can work on their own. There were additional comments on the new Fort Rodman industrial pretreatment program regarding the increased pressure to separate fish solids from the wastewater discharge and the probability that these solids would then go to landfill.

---

<sup>9</sup> For example, the use of on-line kitchen disposers moves this waste stream from SW disposal to wastewater. Also, the use of foodservice prepared foods (outside of New Bedford/Dartmouth) decreases the quantities of locally generated food scraps for collection and further treatment.

The discussion then focused on the existing opportunity to assist a small local business (AMT/Organic Gem) producing nutraceuticals from fish resources with a fertilizer byproduct capable of expansion. SGNB clearly wanted the institutional food waste to come hand in hand with the fish processor.

At the conclusion, the SGNB Advisory Committee voted to give top priority to the “food resource sector” and second priority to the “rubber resource sector.” It seemed appropriate to drop wood from consideration as a new local ABC Disposal Services construction/demolition ‘waste-to-resource’ facility in New Bedford’s North End was nearing completion. We also agreed to provide business plan assistance to Lou Spencer’s Advanced Marine Technologies for the byproduct ‘Organic Gem’ fertilizer. The assistance included developing a local corporate profile, evaluating regulatory impacts on supply reliability and coordinating a local demonstration project.

There was a subsequent SGNB Committee meeting on January 25, 2002 with a presentation by Bob Shatten, the president of a new company, Super Cool LLC that is developing a Crumb Rubber plant in Everett, MA. This meeting provided information on the production of crumb rubber through cryogenic freezing and mechanical grinding, but it didn’t offer any immediate solutions for the NB/D rubber tonnage going to landfills. At present, their project is on hold as they search for new markets to match their crumb production and identify new sources of financing.

### **Advanced Marine Technologies as a Fish Waste Solution**

SGNB met with Lou Spencer and his AMT team including Jeff Young, his cofounder from Portland, Maine; Ira Perry, his operations man whom we had met earlier; Mark Perry, his financial advisor with previous City experience; and Chawner Hurd, his marketing and sales manager, who is also chairman of the Board of Selectmen in Lakeville; to discuss their goals, markets and needs for assistance. We began to understand ‘Organic Gem’s’ unique bio-stimulating properties, a result of their potentially patentable enzymatic process. They discussed their research needs and we suggested possible contacts for them with local agricultural groups. We planned to develop a corporate profile to help establish their business locally and regionally. Part of their profile included an “AMT Schematic”<sup>10</sup>

### **FullCircle and the Use of Vermiculture in NB/D**

As Josh Tosteson expressed interest in developing a business relationship with SGNB and also AMT, SGNB asked him back along with his associate companies to discuss his Eco-Industrial Plan and vermiculture in particular. Their team including Josh Tosteson and his FullCircle partner Paul Brant, Greg Bradley from B & B Worm Farms in Meeker Oklahoma, and Kelly Slocum of Bon Terra Vermi-Science in Vancouver, Washington came on February 28 to meet the SGNB Committee, hear our plans and describe their vermicomposting projects both in the US and in Africa. SGNB asked many questions about the process, its products and costs and there were many answers to consider. The team, and also AMT spent the day talking with the Committee members both formally and informally, visiting the AMT processing site and discussing scrap food recycling

---

<sup>10</sup> “AMT Schematic” appears as Chart Eight.

options for the SouthCoast. It was later suggested that it might be possible to use 'Organic Gem' as an accelerator for vermicomposting.

## **SGNB TASK C. REFINE THE PROJECT (S') DEFINITION (S) WITH POTENTIAL LOCATION, COST FACTORS AND MARKETING PLAN**

### **Figure 3 Chronology of Major Actions by TRTG: March 1 – May 31, 2002**

Prepare Materials for AMT  
AMT Team Resumes + Company Description  
AMT Fact Sheets + Charts + Project Description  
Review Foundation Grants  
Contact UMass Cranberry Research Station

Examine UMass Dartmouth + Dartmouth WWTP as VC sites  
Research information on VC projects + equipment  
Review applicability of WWTP composted sludge for VC  
Meet with UMD Facility Staff + Dartmouth DPW: WW staff  
Research availability of food collection bins  
Contact MA DEP, UML, UMA and Sodexo

Expand SGNB Committee  
Add members from Dartmouth Board of Health + MA DEP: Lakeville

Review NB Business Park as Possible Eco-Industrial Candidate

### **Two Potential Technologies for NB/D**

Figure 3, "Chronology of Actions by TRTG: March 1 – May 31, 2001" matches consultant work with Task C.

After these two SGNB Committee meetings that introduced AMT, a recycler of fish solids and FullCircle, a designer of vermicomposting projects, both of which fit with our goals, we met on March 8 to consider our next steps. We agreed we needed more specific information from both AMT and FullCircle on their SGNB interests and the recycle opportunities they saw. SGNB allocated more time for meetings with each. We asked for specific business information and organized the March 22 meeting for AMT and April 19 for Full Circle.

To more easily fit these two recycling options into the NB/D food sector, SGNB needed a diagram of the overall food sector including both fish processing and a potential institutional food scrap vermiculture project at UMass Dartmouth (UMD.) "Organic

Food Scraps – From Waste to Resource”<sup>11</sup> illustrated the projects and their actual local participants in these projects for discussion at our next Committee meeting on March 15.

**Advanced Marine Technologies as a Fish Waste Solution, con’t.**

On March 22, we met with the AMT team and reviewed their recent sales’ records and projections for the next several years. We also discussed potential barriers to their proposed expansion including limited catches, changes in fish species and new environmental regulations. Lou Spencer and Jeff Young, the founders, have extensive experience with both nutraceutical extractions and different fertilizer and other formulations. They also understand the physical, chemical and biological properties of their products. As a bio-stimulant, ‘Organic Gem’ outperforms non-organic fertilizers producing both plant and soil benefits with little or no nitrogen loss through soil leaching, an important issue on the SouthCoast. During the last three years they have tested ‘Organic Gem’ on a variety of plant species and collected excellent growth reports. Their markets range from beer hops and grapes to grass and turf to vegetables and berries. For additional information, see AMT’s web site: [www.organicgem.org](http://www.organicgem.org).

As part of our work establishing a local profile, SGNB introduced AMT to Mayor Kalisz who helped organize local fertilizer applications on city property. UMD also set up a test site comparing ‘Organic Gem’ with a non-organic fertilizer on their campus. New research is needed to show how ‘Organic Gem’ interacts with the soil to prevent the leaching of nitrogen. SGNB continues to search for research grants and demonstration projects, because as AMT expands their sales of Organic Gem, the city’s fish processors save disposal costs and Buzzards Bay gets cleaner. See Figure 4, “AMT: Organic Gem Fertilizer Fact Sheet.”

**Figure 4**  
**ADVANCED MARINE TECHNOLOGIES**  
***Organic Gem Fertilizer Fact Sheet***

**The Product.** Organic Gem is a certified-organic bio-stimulant made from fish processing scraps in New Bedford. It has low odor and is easily absorbed to increase plant yield and pest resistance

**The Company.** AMT was started by Lou Spencer of South Dartmouth, MA and Jeff Young of Portland, Maine. Ira Perry of New Bedford is also a partner and manages New Bedford operations. Mark Perry of New Bedford serves as financial advisor and Chawner Hurd, chairman of the Lakeville Board of Selectmen, is marketing director. It has 3 full-time employees and is presently upgrading about 7% of New Bedford’s processing waste into fertilizer. This low-charge or no-charge service to the fish processors eliminates either a \$100/ton landfill disposal cost or \$100/ton typical sewerage surcharge.

**Local Economic Impacts.** As New Bedford is AMT’s home base, it can expect about 20 -25 new, full-time employees plus a number of specialty haulers as AMT grows over

---

<sup>11</sup> “Organic Food Scraps – From Waste to Resource” is Chart Nine.

the next 5-7 years to serve all of the local fish processing industry. There will also be a gain in indirect engineering, welding and machining employment to build equipment for new AMT sites in other key international fish ports.

**Local Environmental Impacts.** A reduction in number of fish waste truckloads taken to the landfill and related BOD + Suspended Solids discharged into the wastewater treatment plant.

**Regional Economic–Environmental Impacts.** A reduction in nitrate loadings to Buzzards Bay leading to a cleaner, healthier and more productive recreation area.

Continuing our campaign to establish a local profile for AMT, the Chamber and SGNB planned to hold a Press Conference and announce a **Chamber of Commerce Award for Sustainability** to be given to Lou Spencer for Advanced Marine Technologies. At our next Committee meeting, SGNB received the Mayor’s agreement and set the award date for May 15. New Bedford’s knowledge of its own ‘Organic Gem’ fertilizer is growing and SGNB’s conversations with the Coalition for Buzzards Bay, the Southeastern Mass Agricultural Partnership, the UMass Cranberry Research Station and other groups can help enlarge AMT’s constituency.

#### **Full Circle and the Use of Vermiculture in NB/D, con’t.**

The FullCircle/BonTerra Vermi-Science team came to our April 19 Committee meeting for a discussion of their prospective NB/D business projects. During the interval between the AMT and FullCircle meetings, we continued to discuss vermicomposting at UMD’s cafeterias, but a second project had also become a candidate. The Dartmouth wastewater treatment plant, which handles predominantly residential sewerage, composts its sludge and contracts its sale at typically \$2.40 per cubic yard. Approximately 813 tons of dried sludge plus an amendment containing wood chips and brush produce over 9,000 cubic yards of screened, finished compost weighing between 3.5 and 4 million pounds. The FullCircle team estimated that adding the step of vermicomposting would increase the product value to \$225,000 as “worm castings have a market price of approximately \$250 per cubic yard.”<sup>12</sup> During this meeting day, the team visited both the cafeterias and the WWTP in order to meet with the respective facility managers and collect basic data. Within a few days FullCircle produced two pilot vermiculture proposals: one for the Facilities Director at UMD on food recycling and one for the Superintendent of the Dartmouth DPW on improving the value of their composted sludge.

## **RESULTS, CONCLUSIONS AND NEXT STEPS**

These proposals arriving in NB/D led SGNB to review what we had accomplished on Phase I over the year and how to build on our progress. The first item was employment – we could see new jobs from an expanding AMT and we could see benefits to the overall fishing industry as well. We discussed anticipated impacts on Crapo Hill and other local landfills – presently over 1000 tons per week of NB/D solid wastes go to other landfills

---

<sup>12</sup> “Vermiculture Waste Management: Draft Scope of Works” to Town of Dartmouth, Department of Public Works from FullCircle LLC, Bon Terra Vermi-Science, B&B Worms Farms, 26 April 2002.

when Crapo Hill reaches its permitted daily level of 400 tons. We need other waste-to-resource solutions such as how to make an active transfer of scrap rubber from our local manufacturers' landfill disposal to local reuse. There is also the possibility of conducting an eco-industrial review of byproducts and wastes at the New Bedford Business Park. We believe that our role in establishing relationships with businesses and our ability to bring outside groups into our Chamber of Commerce meetings contributed to SGNB's progress towards meeting our goals. But, most of all, it was the Chelsea Center that allowed this to happen and we thank them for this opportunity.

To conclude, The Phase I Chart, "Resource Linkages + Relationships"<sup>13</sup> shows seven waste streams that can be called resources. We know that four and probably five of them contribute to landfills, and that one interferes with New Bedford's NPDES permit. Only one and part of a second are being recycled. We see opportunities to increase that number of recycles, but there are certainly barriers that need careful examination and solutions. How to replace the use of disposers, how to train personnel to change their practices, how to prove new technologies, how to finance these options, and always how to market the new products are questions that need answers. We think we've found some solutions and we look forward to demonstrating them. Again, we thank the Chelsea Center for helping us understand the role that resource development can play towards economic development in New Bedford and Dartmouth, Massachusetts.

---

<sup>13</sup> Phase I Chart "Resource Linkages + Relationships" appears as Chart Ten.

## **Exhibit of Working Charts Prepared by TRTG in SGNB Phase I**

Chart One	Members of the New Bedford Area Chamber of Commerce Committee: SGNB
Chart Two	Organic Food Wastes
Chart Three	SGNB: Possible Reuse Combinations
Chart Four	Fish Processing in New Bedford
Chart Five	Typical Large Scale Food Preparation
Chart Six	SGNB: Scrap Rubber + Tires
Chart Seven	SGNB Decision Matrix: To Help Select Target Waste Stream
Chart Eight	AMT Schematic
Chart Nine	Organic food Scraps – From Waste to Resource
Chart Ten	Resource Linkages + Relationships

**CHART ONE**  
**SGNB: MAJOR PROJECT PARTNERS / ADVISORY COMMITTEE**

James H. Mathes, President (Advisory Committee)  
New Bedford Area Chamber of Commerce  
794 Purchase Street, P. O. Box 8827, New Bedford, MA 02742  
(508) 999-5231 (508) 999-5237 [jmathes@newbedfordchamber.com](mailto:jmathes@newbedfordchamber.com)  
Project Manager

Frederick M. Kalisz, Mayor, City of New Bedford  
133 William Street, New Bedford, MA 02740  
(508) 979-1410 (508) 991-6189 [FKalisz@www.ci.new-bedford.ma.us](mailto:FKalisz@www.ci.new-bedford.ma.us)  
City employees: Recycling Staff: Marissa Perry and Senior Planner: Raymond A. Khalife

Michael J. Gagné, Executive Administrator, Town of Dartmouth (Advisory Committee)  
P.O. Box 79399, Dartmouth, MA 027-0985  
(508) 999-0713 (508) 999-0739 [mgagne@town.dartmouth.ma.us](mailto:mgagne@town.dartmouth.ma.us)  
Link to town DPW and recycling staff

Robert J. Luongo, Executive Director  
New Bedford Economic Development Director (Advisory Committee)  
700 Pleasant Street, Suite 100, New Bedford, MA 02740  
(508) 991-3122 (508) 991-7372 [rluongo@nbedc.org](mailto:rluongo@nbedc.org)  
Link to Financial management for industrial and commercial development

Virginia Valiela, Executive Director & Hank Van Laarhoven, Director of Operations  
(Advisory Committee)  
Greater New Bedford Regional Refuse Management District  
300 Samuel Barnet Boulevard, New Bedford, MA 02745  
(508) 763-5924 (508) 763-8624 [valiela@meganet.net](mailto:valiela@meganet.net)  
Link to two-community landfill with knowledge of capacity, wastes and recycling

Stephen C. Smith, Executive Director (Advisory Committee)  
Southeastern Regional Planning & Economic Development District  
88 Broadway, Taunton, MA 02780-2557  
(508) 824-1367 (508) 823-1803 [Ssmith@srpedd.org](mailto:Ssmith@srpedd.org)  
Link to Southeastern region with overall economic development vision

John K. Bullard, Executive Director (Advisory Committee)  
UMASS Dartmouth – Family Business Center  
285 Old Westport Road, North Dartmouth, MA 02747  
(508) 999-8895 (508) 999-8813 [Jbullard@umassd.edu](mailto:Jbullard@umassd.edu)  
Link to University staff and local family farms

Lee Nason, Director Facilities (Advisory Committee)  
UMASS Dartmouth, 285 Old Westport Road, North Dartmouth, MA 02747-2300  
(508) 999-8000 Lnason@umassd.edu  
[Link to campus SGNB project sites and co-chair campus Sustainability Committee](#)

Susan Peterson & John Teal (Advisory Committee)  
Teal Ltd., 567 New Bedford Road, Rochester, MA 02770  
(508) 763-2390 (508) 763-2640 Sbptrsn@ma.ultranet.com  
Environmental Authors and Consultants

Carlos M. Cardoso, Plant Manager (Advisory Committee)  
Town of Dartmouth: Department of Public Works – Water Pollution Control Division  
759 Russells Mills Rd., S. Dartmouth, MA 02748  
(508) 999-0740 (508) 999-0762  
[Link to Dartmouth Wastewater Treatment Plant](#)

Lewis Spencer, Owner/Founder (Advisory Committee)  
Advanced Marine Technologies, 29 Beechwood Drive, S. Dartmouth, MA 02748  
(508) 991-6571 lspencer@meganet.net  
[Link to present SGNB project business](#)

Thomas G. Davis, Executive Director  
Greater New Bedford Industrial Foundation, 227 Union Street, New Bedford, MA  
(508) 992-2678 (508) 996-8461  
[Link to New Bedford Business Park](#)

Rickart A. Connole, Director: SE Massachusetts Agriculture Program (Advisory Committee)  
UMASSDartmouth – Southeastern Massachusetts Agricultural Program  
One State Bog Road, P. O. Box 569, East Wareham, MA 02538  
(508) 295-2212 (508) 295-6387  
[Link to local farms and Cranberry Research Station](#)

Jack Bailey, Director of Environmental Affairs, Health and Safety (Advisory Committee)  
PRECIX, INC. (formerly the Acushnet Rubber Company, Inc.)  
744 Belleville Avenue, P. O. Box 6916, New Bedford, MA 02742  
(508) 998-4000 (508) 998-4100 jbailey@acushnet.com  
[Link to local renewable rubber resources](#)

Marsha Gorden, Principal (Advisory Committee)  
The Resource Technologies Group, 2 Chauncy Street (#2) Cambridge, MA 02138  
(617) 868-8102 (617) 492-6250 Mgorden@sustainableresources.com  
Project Consultant

## **ADDITIONAL MEMBERS OF THE ADVISORY COMMITTEE**

Chuck Smiley, Dartmouth Real Estate Consultant, smilechuck@aol.com

Rick Frade, Frade's Disposal, Inc. Local Recycling Firm, r\_frade@hotmail.com

Mike Camera, A B C Disposal, Inc. Local Recycling Firm, mcamera832@rcn.com

Greg White, Ocean Cliff Corp. Local Fish/Seafood Processor oceanclf@ma.ultranet.com

Marissa Perry, NB Recycling Coordinator, mperry@www.ci.new-bedford.ma.us

Raymond Khalife, NB City Planner, Rkhalife@www.ci.new-bedford.ma.us

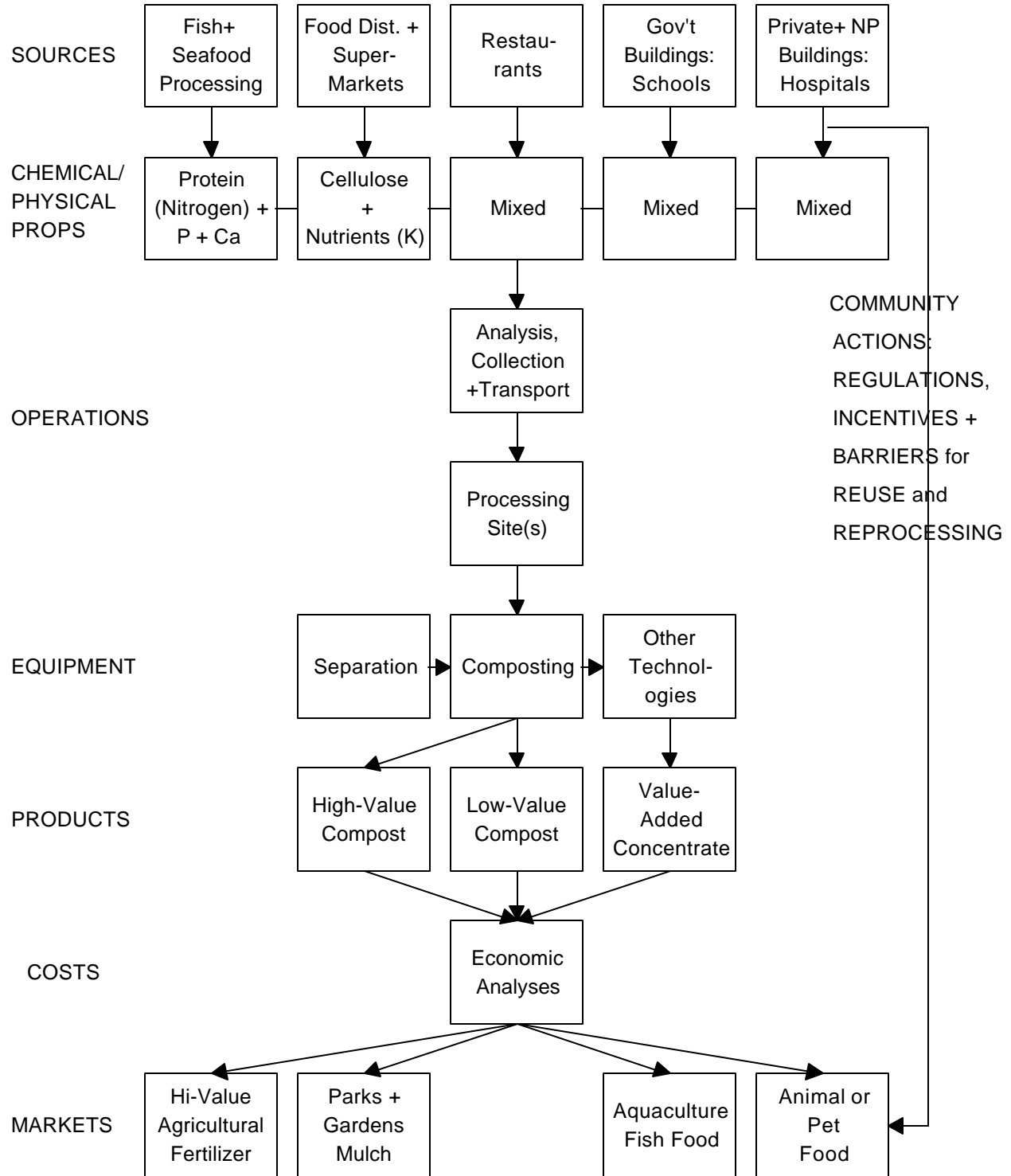
Vincent Furtado, NB DPW: Asst. Supt. Waste Water Division vinf@www.ci.new-bedford.ma.us

Tom Flanagan, Umass Boston, STEP, trflanagan@aol.com

Wendy Henderson, Dartmouth Board of Health, whenderson@town.dartmouth.ma.us

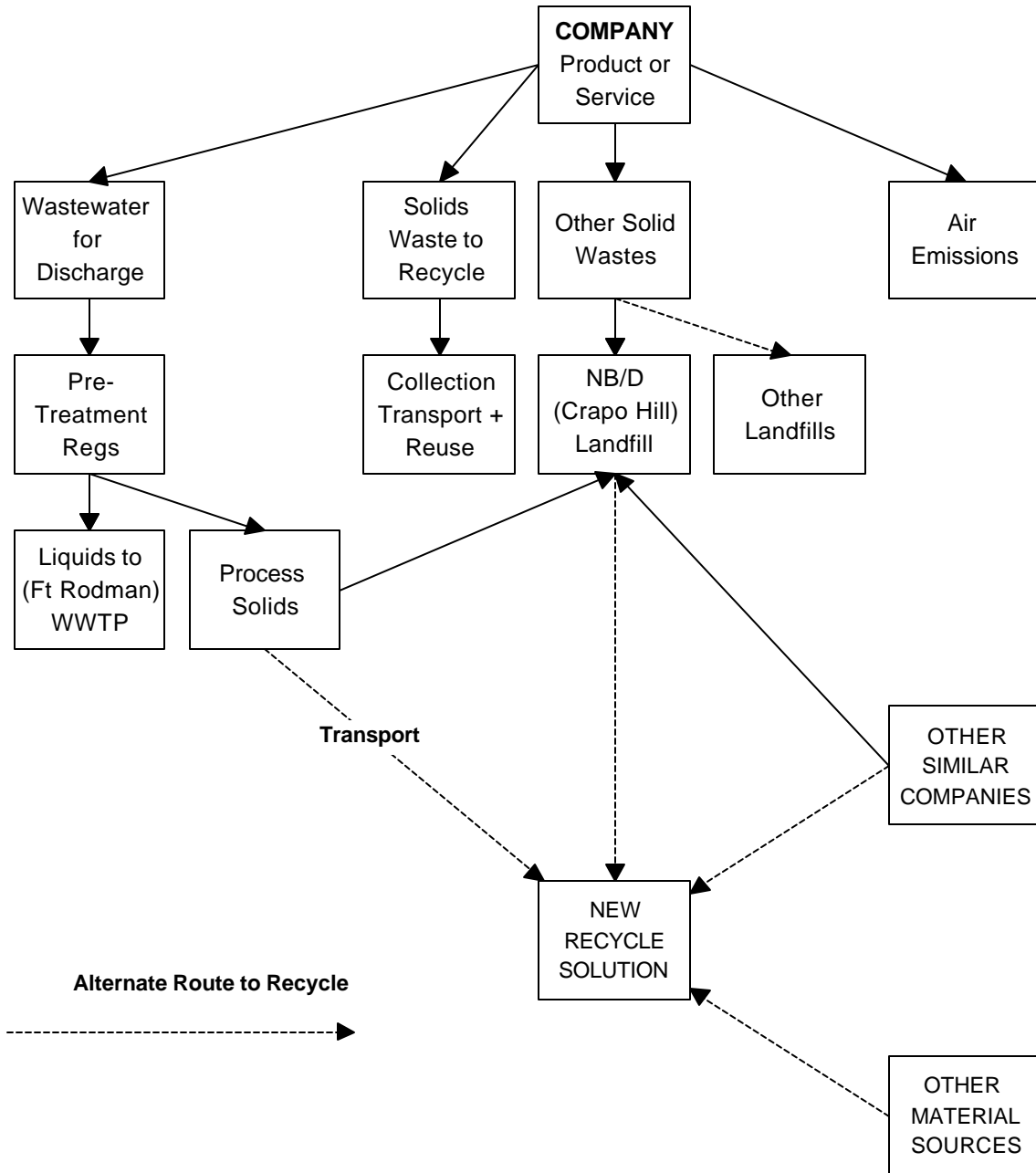
Edith DeMello, MA DEP: SE Region, Recycling Planner, edith.demello@state.ma.us

# CHART TWO ORGANIC FOOD WASTES

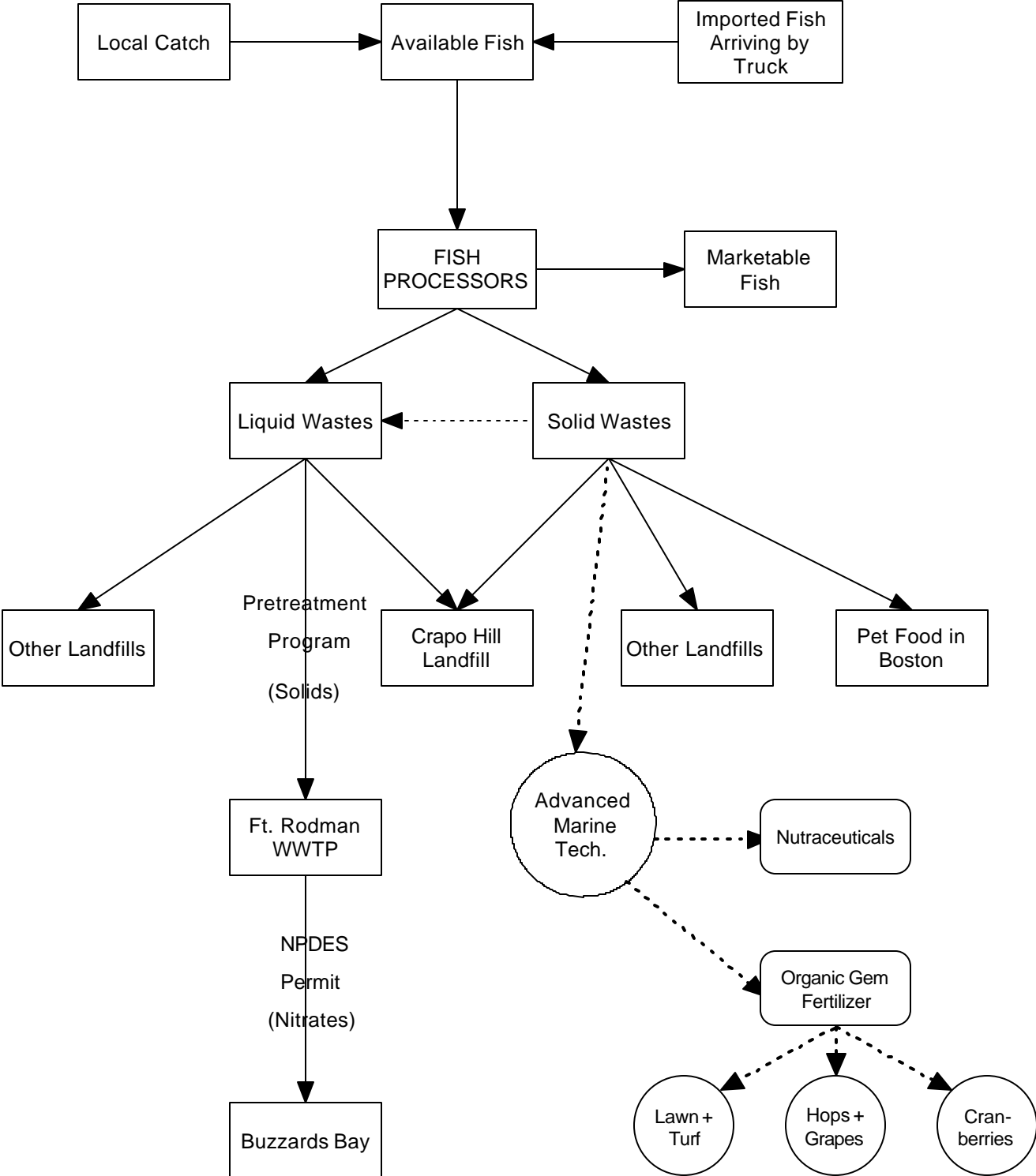


# CHART THREE

## SGNB: POSSIBLE REUSE COMBINATIONS

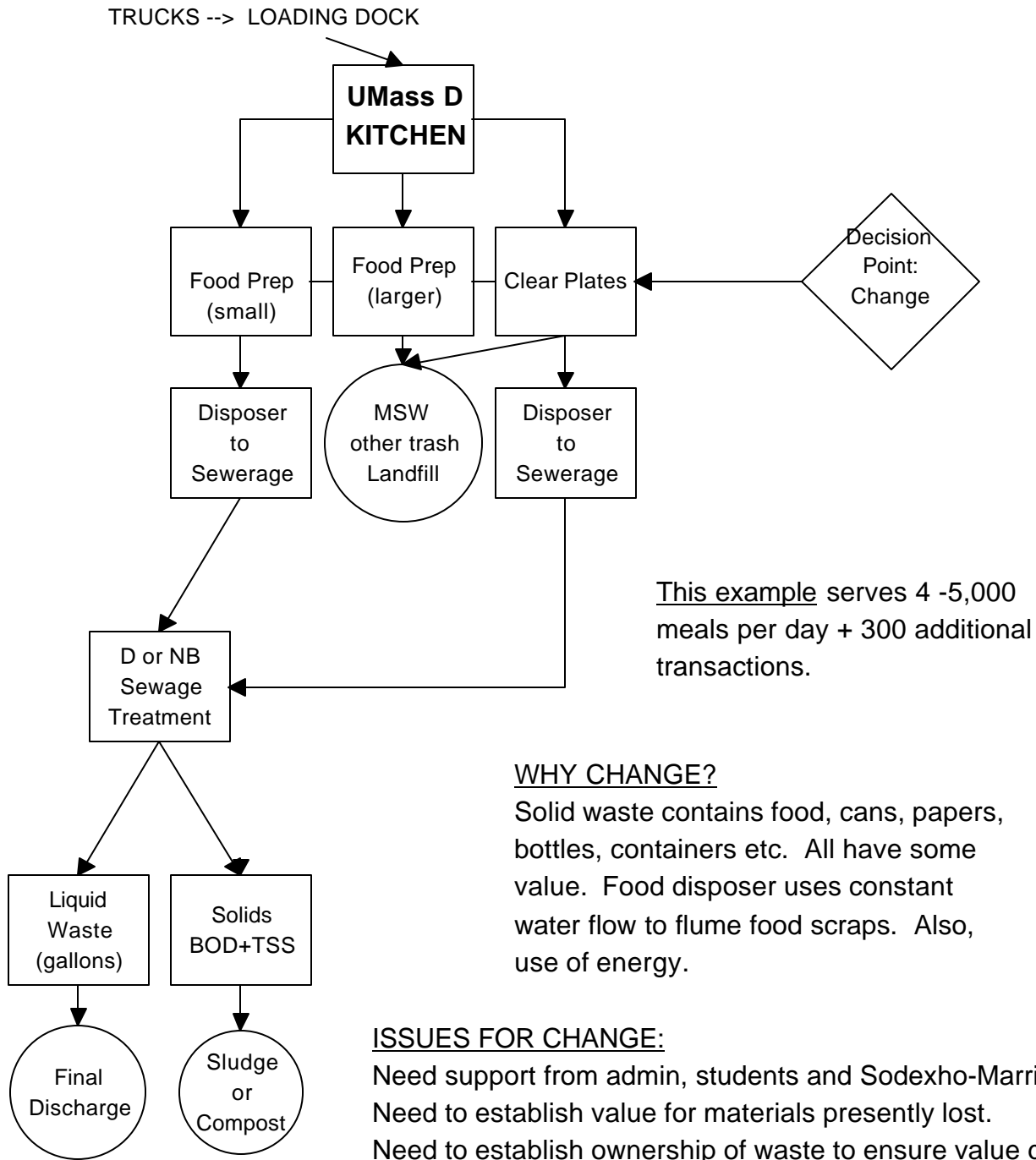


# CHART FOUR FISH PROCESSING IN NEW BEDFORD

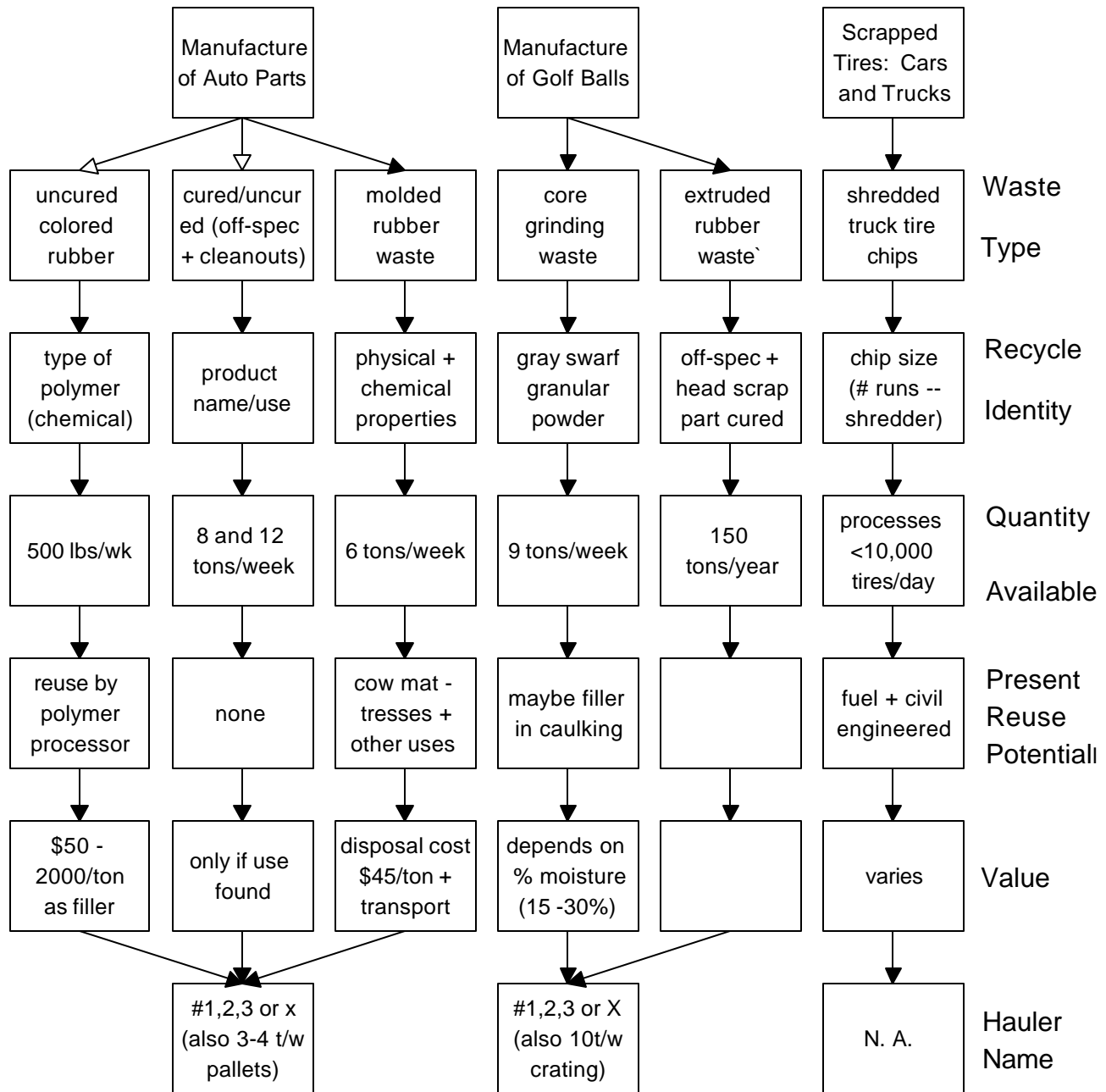


TRTG: 4/6/02

**CHART FIVE  
TYPICAL LARGE-SCALE FOOD PREPARATION**



**Chart Six SGNB: Scrap Rubber + Tires**



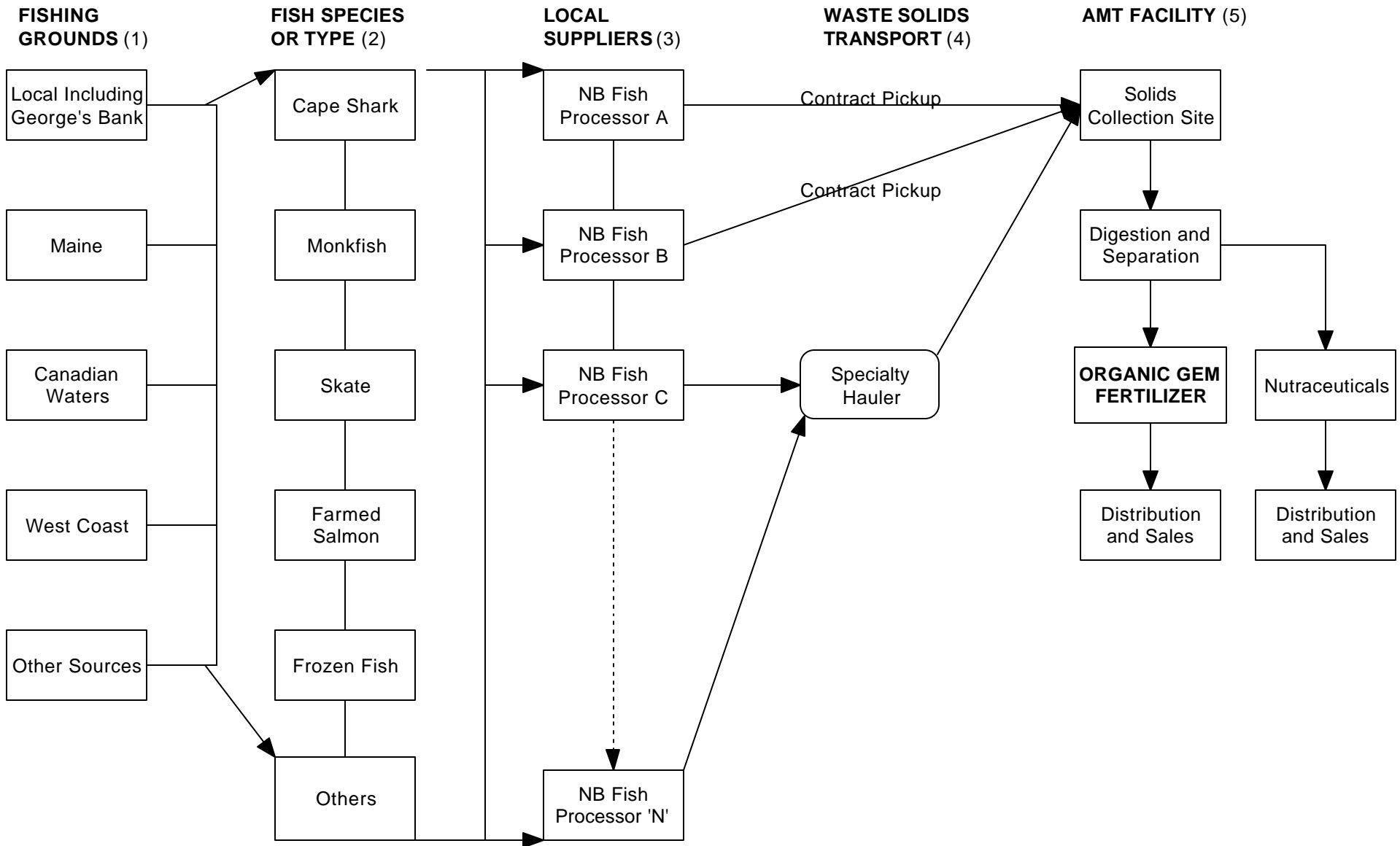
- Crumb Rubber products require sufficient quantities, business plans and \$ investment up front.
  - Fuel use requires pollution control.
  - Civil Eng. applications which include landfill, lightweight fill+ septic tanks, (also playgrounds) require MA DEP approval (BUD) and compete with asphalt in highways.
- Barriers to Reuse

CHART SEVEN

**SGNB Decision Matrix: To Help Select Target Waste Stream**

WASTE CATEGORY	FROM:	PRES. DISPOSAL	QUANT.	METRIC	EXISTING TECH	MAJOR ISSUES	NEW TECH	BY:	MAJOR ISSUES
<b>ORGANIC FOODS: Includes all organic waste from food processing, meal preparation and meal scraps</b>									
Total	NB/D	Nationally considered	5 --10% of all MSW		Composting <> 10%	Separation, collection are difficult (trash)	ATAD Vermicul.	Jim Coull Tosteson	Regional Scale Local/regional
Fish Proc. Scraps	Local fish proc. 30-40 co.	Landfill #2, STP some recycle to Channel Fish in Boston	Approx 70 x106 lbs/year total		STP, Collect with trash for MSW or for recycle	City planning new PT charges/demos	Enzyme Digestion	Lew Spencer	Local->regional Ready now
Instit/Rest Scraps	Schools, markets	Landfill #1, STP with disposers	Approx 5-10% by weight of each meal		Local/Regional composting	Use of disposers Rise of food services	Vermicul.		Needs eqmt, space + tech training
<b>SCRAP RUBBER: Includes all waste from natural and synthetic rubber processing and used tires.</b>									
Total	NB/D	State generates	5-6 x106 used tires/year		Chip/shred - recycle local/regional	State approval Highway lobby	Crumb R. Plasma F.	B.Shatten Tosteson	Financial Site, etc.
Processing Scrap	Acushnet, Titleist	Landfill #1, #2, some reuse, some recycle	Cured<>50 t/mon'01 Uncur<>34 t/mon'01 Swarf<>36 t/mon'01 PartCur<>13t/mon		Some chipping -->2" for recycle eg. F&B + waste exchanges	Limited markets Int'l quantities	Crumb R.	B.Shatten	Reuse by processors
Scrapped Tires	Local + statewide	Recycle, dump + stockpile	3-4 x106 tires in S. Coast available now		Chipping ->2" for recycle, fuel F&B Chip-> 1" Routhier	BUD process to ensure markets Offers more products	Chip 3/8" Crumb R. Plasma F.	C. Chevie B.Shatten Tosteson	Planning Stage Regional Scale Regional Scale
<b>SCRAP WOOD: Includes wood products from construction and demolition and shipping pallets.</b>									
Total	NB/D	Crapo Hill received	9608 t total ( D in 2000		Some compost, mix with other organics	City/town projects Issue of sew. sludge	Vermicul.	Tosteson + others	Local + regional in scale
Construct/Demol	Local	Some reuse, recycling, fuel	450 t/week		Chipping for recycle	Interest by local haulers (M. Camara)			
Pallets	Local	Some reuse, recycling	Eg. 4t/wk, 10t/wk		Reuse, chip, composting	Quality for reuse haulers			May be future candidate
<b>Notes with Costs</b>									
Food: Landfill #1 is CH, #2 is Fall River. Vermiculture is type of composting with worms Typical MSW disposal costs:							CH is \$60/ton, others are <\$90.		
Fish processors pay surcharge for solids >50 lb/d of \$0.05/lb for 50-150, \$0.07 for 150-250 and \$0.10 for >250. Recycling can range from -0.05 - +0.05.									
Rubber: Crumb is granulated rubber made in small mesh sizes to facilitate reuse. Curing is heat treatment to retain shape. Swarf is grinding waste.									
F Prepared by TRTG: Jan. 10, 2002.									

# CHART EIGHT- ADVANCED MARINE TECHNOLOGIES - TRTG: 4/6/02



1. Regulatory Impact: Fishing limited by international agreements, requires East/West Coasts.

2. Regulatory Impact: Takings limited by federal regulations. Enzymatic process for all fish species.

3. Regulatory Impact: City wastewater pre-treatment limits (\$) encourage solids separation.

4. Regulatory Impact: 'Organic' certification requires specialty hauler with appropriate equipment. (Participant)

5. Regulatory Impact: Summation of 1-4 impacts shows unique opportunity for technically-skilled, knowledge entrepreneurs.

# CHART NINE ORGANIC FOOD SCRAPS-- FROM WASTE TO RESOURCE

TRTG: 3/12/02

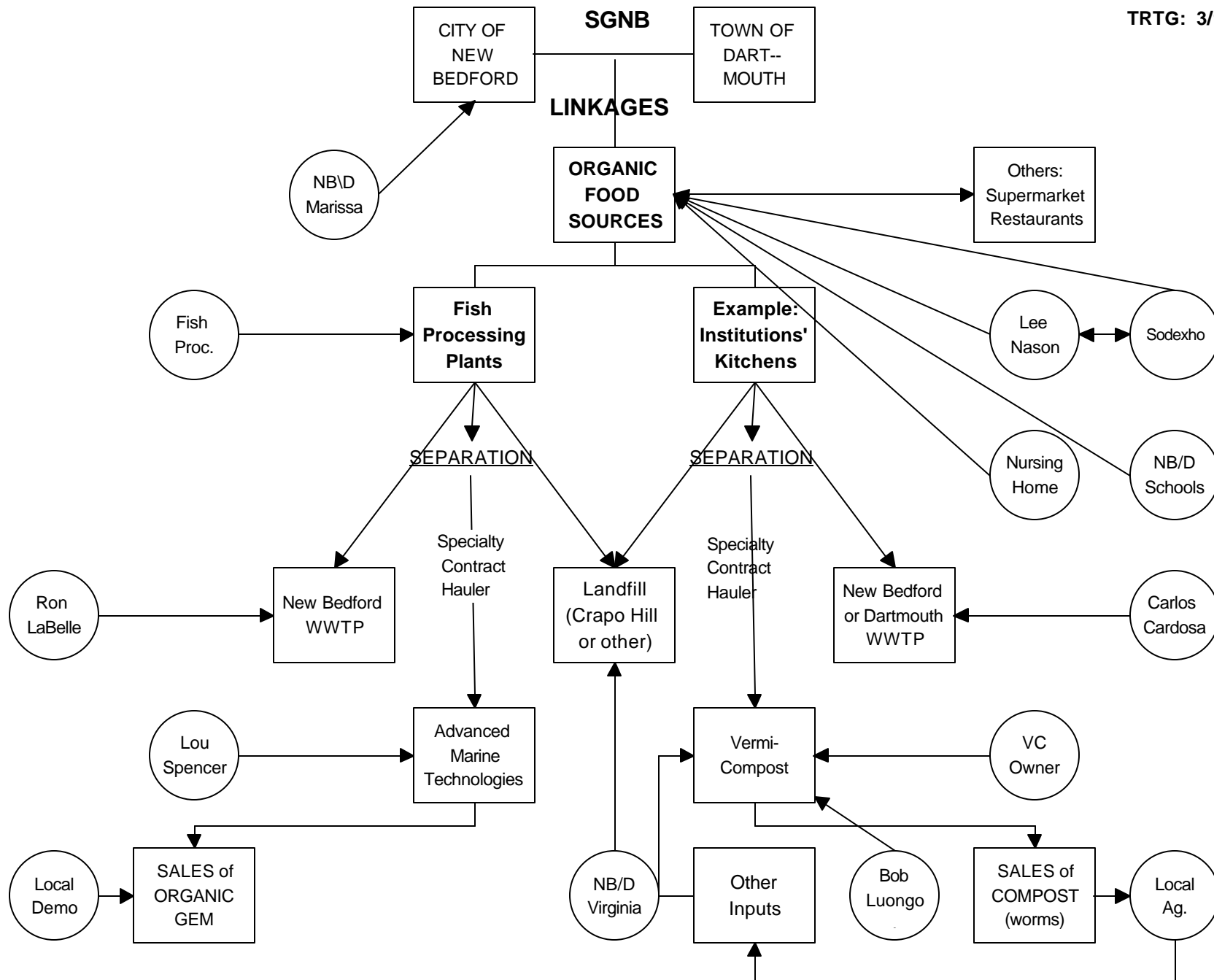
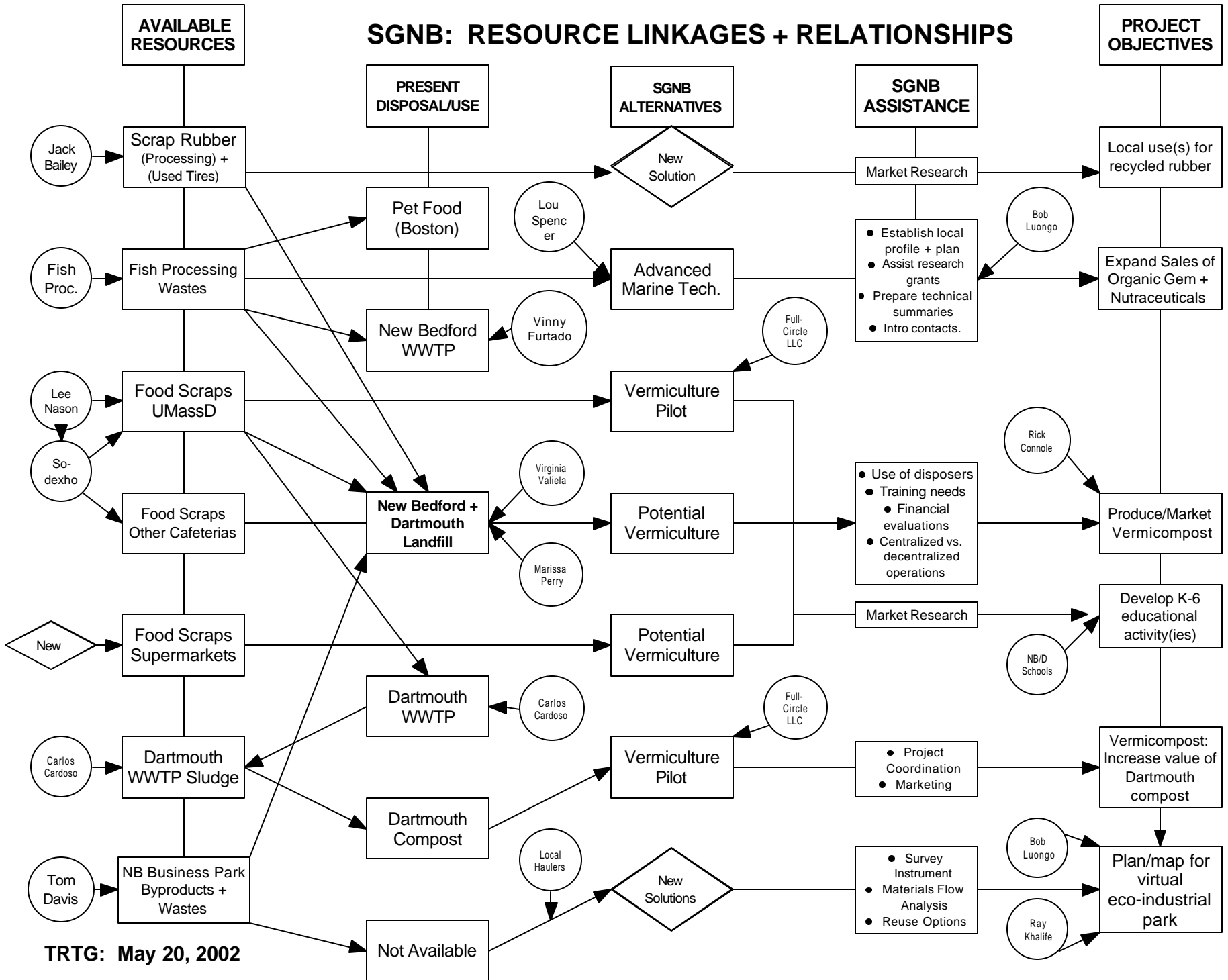


CHART TEN

SGNB: RESOURCE LINKAGES + RELATIONSHIPS



TRTG: May 20, 2002