ABSTRACT

EMERALD ENVIRONMENTAL, INC AND SUSTAINABILITY FOR EDUCATORS AND THE ENVIRONMENT: AN INTERNSHIP WITH PRIVATE INDUSTRY AND NON-PROFIT SECTORS

By Sarah E. Lane

Emerald Environmental Inc (Emerald) is a privately held environmental consulting firm specializing in industrial hygiene, environmental, and waste management. Sustainability for Educators and the Environment (SEE) is a non-profit organization that provides environmental education to northeast Ohio schools and practical application of sustainability principles. This report details an internship with Emerald and SEE, between May 2006 and November 2007. During this internship I had many duties ranging from day-to-day office tasks and major program development. Some major tasks included grant writing, hiring and supervising interns, and developing Emerald’s environmental management department. My goal for this internship was to experience different sectors of the environmental career field to determine what best suited my training and experience.
EMERALD ENVIRONMENTAL, INC AND SUSTAINABILITY FOR EDUCATORS AND THE ENVIRONMENT: AN INTERNSHIP WITH PRIVATE INDUSTRY AND NON-PROFIT SECTORS

An Internship Report

Submitted to the
Faculty of Miami University
in partial fulfillment of
the requirements for the degree of
Master of Environmental Science
Institute of Environmental Sciences

By
Sarah E. Lane
Miami University
Oxford, OH
2008

Advisor ____________________________
Dr. W. Michele Simmons
Reader _____________________________
Dr. Adolph Greenberg
Reader _____________________________
Dr. Thomas Klak
# TABLE OF CONTENTS

ABSTRACT ................................................................................................................................. i
TABLE OF CONTENTS ................................................................................................................ ii
TABLE OF FIGURES .................................................................................................................... iv
ACRONYM LIST ............................................................................................................................ v
ACRONYM LIST ............................................................................................................................ v
DEDICATION ................................................................................................................................. vi
ACKNOWLEDGEMENTS .............................................................................................................. vii

Section I: INTRODUCTION ........................................................................................................... 1
  Internship Details ...................................................................................................................... 1
  History and Background of Emerald Environmental ............................................................... 1
  Organizational Structure of Emerald Environmental ............................................................... 3
  Internship Description ............................................................................................................ 4

Section II: OVERVIEW OF INTERNSHIP ................................................................................... 5
  Work within Emerald Environmental ..................................................................................... 5
    Marketing and Community Outreach .................................................................................... 5
    Program Development – Environmental Management Systems Service Line ................. 6
    Consulting Duties .................................................................................................................. 6
  Work Within Upcyclers .......................................................................................................... 7
  Work Within SEE .................................................................................................................... 8
    SEE’s Start-up Phase .............................................................................................................. 8
    SEE Fundraising .................................................................................................................. 9
    Pilot Project – Wadsworth, Ohio ......................................................................................... 9
    Interns ................................................................................................................................ 10

Section III: DEVELOPMENT OF PRACTICAL APPLICATIONS .................................................. 14
  Practical Applications ............................................................................................................. 14
  Grant Process .......................................................................................................................... 14
  Program Development ........................................................................................................... 15
  Program Procedures .............................................................................................................. 16
    Reporting ............................................................................................................................. 16
    Correlating lessons to standards ......................................................................................... 16
    Hiring Practical Application Program Interns ..................................................................... 17
  Future Plans ............................................................................................................................ 18

Section IV: CONCLUSIONS .......................................................................................................... 19
  Fulfillment of Goals ................................................................................................................. 19
  Evaluation of Internship ......................................................................................................... 19
  Evaluation of IES .................................................................................................................... 20

APPENDIX A: JOB DESCRIPTION ............................................................................................... 22
APPENDIX B: OPFMA ARTICLE .................................................................................................. 24
APPENDIX C: IMPACT PIECES .................................................................................................. 26
APPENDIX D: MARKETING MATERIALS .................................................................................... 31
APPENDIX E: ISO PRESENTATION ........................................................................................... 32
APPENDIX F: TRUMBULL COUNTY SEPTIC POLLUTION PREVENTION PLAN .................. 45
APPENDIX G: PICTURES OF HHW COLLECTIONS ................................................................ 82
APPENDIX H: SURVEY ............................................................................................................... 83
# TABLE OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIGURE 1</td>
<td>Organizational Structure of Emerald Environmental, Inc.</td>
<td>3</td>
</tr>
<tr>
<td>FIGURE 2</td>
<td>Logo of Sustainability for Educators and the Environment</td>
<td>8</td>
</tr>
<tr>
<td>FIGURE 3</td>
<td>IES Core Courses and Usefulness to Internship</td>
<td>20</td>
</tr>
</tbody>
</table>
# ACRONYM LIST

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AML</td>
<td>Abandoned Mine Lands</td>
</tr>
<tr>
<td>ARP</td>
<td>Alum Reuse Program</td>
</tr>
<tr>
<td>CIS</td>
<td>Central Intermediate School</td>
</tr>
<tr>
<td>DMRM</td>
<td>Division of Mineral Resource Management</td>
</tr>
<tr>
<td>EEI</td>
<td>Emerald Environmental, Inc.</td>
</tr>
<tr>
<td>EES</td>
<td>Emerald Environmental Services</td>
</tr>
<tr>
<td>HAZWOPER</td>
<td>Hazardous Waste Operations and Emergency Response</td>
</tr>
<tr>
<td>HHW</td>
<td>Household Hazardous Waste</td>
</tr>
<tr>
<td>HSDS</td>
<td>Home Sewage Disposal System</td>
</tr>
<tr>
<td>IES</td>
<td>Institute of Environmental Sciences</td>
</tr>
<tr>
<td>IRS</td>
<td>Internal Revenue Service</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>LDP</td>
<td>Linked Deposit Program</td>
</tr>
<tr>
<td>MRF</td>
<td>Materials Recovery Facility</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
</tr>
<tr>
<td>ODNR</td>
<td>Ohio Department of Natural Resources</td>
</tr>
<tr>
<td>OEEF</td>
<td>Ohio Environmental Education Foundation</td>
</tr>
<tr>
<td>OEPA</td>
<td>Ohio Environmental Protection Agency</td>
</tr>
<tr>
<td>OHSAS</td>
<td>Occupational Health and Safety Assessment Series</td>
</tr>
<tr>
<td>OPFMA</td>
<td>Ohio Public Facilities Maintenance Association</td>
</tr>
<tr>
<td>OSBA</td>
<td>Ohio School Boards Association</td>
</tr>
<tr>
<td>OSFC</td>
<td>Ohio School Facilities Commission</td>
</tr>
<tr>
<td>RFP</td>
<td>Request for Proposal</td>
</tr>
<tr>
<td>RFQ</td>
<td>Request for Qualifications</td>
</tr>
<tr>
<td>RLF</td>
<td>Revolving Loan Fund</td>
</tr>
<tr>
<td>SEE</td>
<td>Sustainability for Educators and the Environment</td>
</tr>
<tr>
<td>SOQ</td>
<td>Statement of Qualifications</td>
</tr>
<tr>
<td>US EPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>WHS</td>
<td>Wadsworth High School</td>
</tr>
</tbody>
</table>
DEDICATION

This report is dedicated to:

--- My grandfather John Ruch, you thought I hung the moon and I thought the same of you.

--- My grandmother Ruth Lane, you wanted nothing for me but success, love, and to be a lady. Two out of three isn’t bad.

--- My uncle Michael Ruch, you always saw the good in people and taught me peace, justice and a love of James Taylor are the earmarks of a good society

--- My beloved Chloe Bojangles, we may have rescued you, but you rescued us right back.
First I would like to thank my advisor, Dr. Michele Simmons, for all her patience, advice, and understanding. Also, many thanks to the rest of my committee, Dr. Adolph Greenberg and Dr. Tom Klak, for all their help and insight.

I would also like to thank the staff at IES; Ms. Betty Haven and Ms. Christine Ingham - IES would cease to run without your dedication. Dr. Mark Boardman, Dr. Vincent Hand, and Dr. Sandi Woy-Hazleton thank you for sharing your experiences with me. While we did not always get along nor see eye to eye, I’ve learned patience and understanding from your unique leadership styles.

Dr. Eric Fitch at Marietta College – your advice, encouragement and belief that I could, in fact, be something great has motivated me beyond measure. Thank you for sending me to Miami, looking back it has made me a better person and a stronger environmentalist.

To Brian Grimm and Scott Hershberger of Emerald Environmental I am forever grateful for the opportunity to work at Emerald and SEE. While we may have our differences, I will always appreciate the risk you took on an intern with little chance for billable hours. Thank you.

To my dear friend Karla, I would not have made it through two years in Oxford without you there with me. Mere thanks are not enough for diligently seeking me a new assistantship when you knew I couldn’t do it on my own. You rescued me from campus housing and myself. Gaining your friendship was the best part of graduate school.

I owe a debt of gratitude to my family for all their support. Specifically, to my mother and father, Kathy and Mark, my sister, Emily, and my grandmother Phyllis - your love, encouragement, motivation, bribery, and cash donations are the only reasons I got through grad school and life in general. Family is forever.

Lastly, to Jonas, my best friend and alter-ego - without your love, humor, support, and frequent flyer miles this report would never have been finished, nor would I be the person I am today. Finding you and your kind heart was an unexpected blessing.

Thank you.
SECTION I: INTRODUCTION

INTERNSHIP DETAILS

As part of the requirements for a Master of Environmental Science (M.En), I completed a six month internship at Emerald Environmental, Inc. (EEI) and Sustainability for Educators and the Environment (SEE) beginning May 22, 2006. Presently (as of November 30, 2007) I still work in at both EEI and SEE. My position at Emerald Environmental is Program Development and Marketing Coordinator. At SEE my official title is Program Development and Internship Director.

HISTORY AND BACKGROUND OF EMERALD ENVIRONMENTAL

Emerald Environmental, Inc. was established by Brian Grimm and Scott Hershberger in Kent, Ohio in 1994 to serve clients in the greater northeastern Ohio area. In 1998 a second working office was opened in Akron to better serve its clients in the Summit County area. In 2003, a third office was opened in Cleveland. Each office is a fully operational environmental and industrial hygiene consulting entity, and provides design, production and field support to the others in order to meet project requirements. The firm's environmental/industrial hygiene consulting practice has centered on providing services, such as environmental site assessments, industrial hygiene, and hazardous waste management services to a wide range of regional governmental agencies, educational institutions, and private sector clients. Emerald Environmental has built its reputation on the ability to offer "real world", cost effective solutions.

The firm provides hazard assessment, remediation design, and management services to over 30 public and private entities such as the City of Cleveland, Akron Public Schools, Lorain City Schools, Summit County, General Motors, Portage County, the University of Akron, Hiram College, and Kent State University, among others. Emerald also possesses extensive experience in Ohio School Facilities Commission (OSFC) projects (i.e. renovation or demolition of school facilities) due to its participation in dozens of such projects.

In addition to its traditional consulting services, Emerald also assists its clients in the areas of waste characterization, transportation, disposal and remediation. As a licensed hazardous waste transporter, Emerald Environmental assists such clients as the City of Akron, the City of Cleveland, National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD) with hazardous waste transportation and disposal services. Emerald also possesses an inventory of remediation equipment including air diffusers, air strippers, air sparge units, soil vapor extraction units, oil/water separators, various pumps, roll-off trailers, dump trailers, vacuum trailers, cargo trailers, groundwater treatment trailers, dewatering boxes, sludge boxes and roll off boxes.

Emerald's professional staff has over two hundred years of combined experience in conducting both large and small projects for a variety of educational, industrial, institutional, and commercial clients and sites. Emerald's staff consists of Professional Geologists, Occupational Health and Safety Technologists, Registered Environmental Professionals, Certified Industrial
Hygienists, Certified Asbestos Hazard Evaluation/Abatement Specialists, Certified Asbestos Project Designers, Environmental Management Professionals, and Industrial Hygienists.

Emerald provides essential services such as:

- Industrial Hygiene Surveys and Monitoring
- Worker Safety Training
- Personal Protection Equipment Programs
- Health and Safety Plans
- Site Characterization Investigations
- Soil and Groundwater Investigations, Remediation, and Bioremediations
- Hazardous and Non-Hazardous Waste Transportation and Disposal
- Hazardous Waste Removal & Industrial Cleaning
- Hazardous Materials Storage and Management
- OSHA Compliance and Complaint Investigations
- Development, Implementation, & Management of Alternative Waste Management Programs
- Indoor Air Quality Investigations
- Underground Storage Tank Monitoring, Compliance, Closure, and Site Assessments
- Environmental Risk Assessments and Property Transaction Assessments (Phase I & II)
- Asbestos/Lead Hazard Evaluation, Air Monitoring, and Abatement Specifications
- Mold Investigations

Owners Scott Hershberger and Brian Grimm also hold a process patent for the conditioning and reuse of alum sludge – a byproduct of the drinking water treatment process – under the company name Upcyclers, Inc. This patented process is the only process (as of March 2007) that is Ohio EPA approved for land application of these sludges. This gives Emerald an edge when dealing with mine-scarred and other sites with compromised soils as conditioned alum sludge when used as a soil amendment enhances physical soil properties.

With the repeal of the state litter tax many solid waste districts lost a considerable portion of their budgets. To compensate for the lack of funding solid waste district educators were reassigned or laid off to ease budget pressures. Without the solid waste districts many schools were missing an integral part of their curriculum – environmental, and more specifically, waste management education. Emerald Environmental founder Brian Grimm saw this need and started the non-profit Sustainability for Educators and the Environment in mid-2006. More about the history, development, and purpose of Sustainability for Educators and the Environment (SEE) will be discussed in more detail later in this paper.
ORGANIZATIONAL STRUCTURE OF EMERALD ENVIRONMENTAL

Emerald Environmental, Inc (Emerald or EEI) is a multi-faceted organization encompassing two other companies – Emerald Environmental Services, Inc (Services or EES), and Upcyclers, Inc. – and a non-profit, Sustainability for Educators and the Environment (SEE) (refer to FIGURE 1).

The whole organization is very hierarchical and bureaucratic; the two principles, Mr. Grimm and Mr. Hershberger, make nearly all decisions and all work must be approved before it can be filed or given to the clients. Employees are carefully supervised by either Mr. Grimm or Mr. Hershberger depending on the department in which they’re working and meet frequently with their supervisor to review tasks and progress.

Emerald Environmental, Inc (Emerald) is the consulting arm of the company; this portion conducts asbestos surveys and completes abatement specifications as well as other industrial hygiene services (lead, mold, etc). Employees working on these types of projects report directly to Mr. Grimm. Emerald Environmental services can be further broken down into environmental services and remediation services; both branches report directly to Mr. Hershberger. The environmental branch conducts a wide range of environmental consulting services including, for example, storm water plans, Brownfield redevelopment, and phase I-II site assessments. The

FIGURE 1: Organizational Structure of Emerald Environmental, Inc.
remediation services division includes handling and disposal of hazardous wastes as well as the handling and disposal of universal and household hazardous wastes. The remediation division also runs the trucking side of Emerald Environmental.

The environmental management division is more horizontally organized (as opposed to the top-down hierarchy of the rest of the divisions). Employees working on projects in environmental management (e.g. developing and implementing ISO 14001 programs for clients) have more decision-making power and can work more independently. The same is true for employees working with Upcyclers. Previously Upcyclers conducted very little business, now new program development personnel are working on developing the Upcyclers image and client base.

Sustainability for Educators and the Environment (SEE) is nearly autonomous. While Mr. Grimm retains general oversight and visionary power over the organization, the SEE program development director typically handles all day to day tasks with little supervision or interference by Emerald management.

Within the community, SEE is not all that well known. Currently, SEE only works with three school districts, a private elementary-middle school, and one university. However, those schools and districts have only good things to say about SEE. In the near future, SEE will begin working within the Kent, Ohio community with the Standing Rock Cultural Arts and Who’s Your Mama Earth Day Festival in early April 2008.

**INTERNSHIP DESCRIPTION**

The nature of my work varies widely from developing new service areas for EEI to creating marketing pieces. As the Program Development Director for SEE, I oversee all day to day tasks, such as scheduling interns at schools, maintaining SEE’s budget and resources, as well as major initiatives like writing grants, maintaining relationships with schools and colleges/universities, hiring and training interns, and developing SEE curricula. Please refer to appendix A for a copy of my job description.
SECTION II: OVERVIEW OF INTERNSHIP

WORK WITHIN EMERALD ENVIRONMENTAL

During my internship at Emerald Environmental, I worked on a variety of projects including marketing, community outreach, program development, and grant writing. Initially my assigned tasks were slightly administrative; I created proposal templates and responded to requests for proposals (RFP) and/or requests for qualifications (RFQ). To make this process more streamlined I created directories of information required in most RFPs and RFQs and made overall templates to create a cohesive look for all proposals and Statements of Qualifications (SOQs) leaving the office. Before my work on this aspect of the proposal/bidding process, proposals and SOQs were hurriedly thrown together – they looked unprofessional and, at times, did not contain all the information requested by the client/future client.

MARKETING AND COMMUNITY OUTREACH

Once I proved my abilities in the organization and “branding” department, I was given more assignments in marketing and advertising. For example, because Emerald donated money to the Ohio Public Facilities Maintenance Association (OPFMA) and was giving a presentation at their annual conference, OPFMA asked Emerald to write an article giving background information on the topic we intended to present. Once Emerald decided we would be centering our presentation on the proper identification and disposal of universal waste, I wrote an article about the topic for the OPFMA newsletter. This article can be found in appendix B.

Emerald Environmental also uses items called “impact pieces” to promote their business and to inform customers about what the company can do for them. I created several of these impact pieces on different topics including Spill Prevention, Countermeasure and Control Plans (SPCC), Universal Waste, and Environmental Management Systems; please refer to appendix C for examples.

The task of ensuring Emerald stayed on the forefront of our customers’ minds and in the news also fell to me. I accomplished this task by joining community groups and finding ways to get Emerald’s name in the newspaper. Emerald Environmental became a supporter and friend of the Cuyahoga Valley National Park and its environmental education center. We also began supporting the Environmental Education Council of Ohio (EECO) – attending conferences and sponsoring their environmental education development initiatives. Because of these sponsorships Emerald was included in all literature and on the websites promoting these organizations. Furthermore, I wrote short press releases to local newspapers about Emerald’s contributions, which got positive attention for both the organizations and for the EEI. I also worked with one of the owners of the company to develop a contest to increase attendance at Kent State University Men’s Basketball games. This contest has since been implemented the last two seasons at Kent State University and has increased EEI’s presence on the campus resulting in more work with the university.

In November 2006 I prepared Emerald Environmental and Sustainability for Educators and the Environment (SEE) for the Ohio School Boards Association (OSBA) Capital Conference and
Tradeshow in Columbus, Ohio. A great many of Emerald’s clients are school districts, so I planned an appreciation luncheon during the conference to have an opportunity to get current clients and schools we would like to have as clients together to talk about what good work Emerald does in a non-formal setting. I also created the “take-away” or promotional items for use at the tradeshow (see appendix D for pictures of the can-cozy and the pen).

**PROGRAM DEVELOPMENT – ENVIRONMENTAL MANAGEMENT SYSTEMS SERVICE LINE**

More in line with my undergraduate degree in Environmental Studies from Marietta College and my coursework in Environmental Sciences at Miami University, I soon became responsible for the development of ISO/OHSAS programs within Emerald. ISO is the International Organization for Standardization and their 14000 series of rules deals with environmental management. Emerald’s owners want to become leaders in bringing ISO 14000 to northeast Ohio. It is my job to understand ISO 14000 standards and their general applicability to our clients. I also prepare briefings on ISO 14000 for clients and presentations for prospective clients. I do the same for the OHSAS (Occupational Health and Safety Assessment Series) 18001 standards. These standards are used by organizations to assess their risk associated with the health and safety of their workers/employees and to be assured those risks are minimized. Both ISO 14001 and OHSAS 18001

- Minimize risk to employees and environment;
- Improve existing management systems;
- Demonstrate diligence; and
- Gain assurance/certification.

By implementing ISO/OHSAS programs, Emerald Environmental clients can save money and have a more positive appearance to their clients and the general public. Developing an ISO/OHSAS department at Emerald requires me to assess our current employees and determine where we need more expertise as well as finding clients that need to implement an ISO/OHSAS program. For more information please see the presentation I created on ISO/OHSAS programs in appendix E.

**CONSULTING DUTIES**

When I’m not busy developing new program areas for Emerald or marketing/advertising, I also perform some true consulting. During this internship I wrote a septic pollution prevention plan for Trumbull County, Ohio. The purpose of the plan is to not only ensure the safety, quality, and capabilities of the some 26,000+ home sewage disposal systems (HSDS) in the county, but to also enroll in the Ohio EPA Revolving Loan Fund/Linked Deposit Program (RLF/LDP). This program allows counties and/or health departments to assist homeowners in upgrading or replacing existing HSDS or to connect to the sanitary sewer system. The RLF/LDP deposits money in local banks against which homeowners can borrow at lower interest rates. The septic pollution prevention plan describes the county demographics, types of systems in use, types of systems that should be installed in what locations, and determines the areas that are to be connected to the sanitary sewer system. For more details, please refer to the Plan in appendix F.
Emerald Environmental bid and won the contract to conduct three large-scale household hazardous waste (HHW) collections in Carroll, Columbiana, and Harrison Counties. Because I have my OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training I was assigned to work at two of those collections. The Carroll/Harrison/Columbiana Joint Solid Waste Management District sponsored the collections for area residents to properly dispose of their household hazardous wastes (like oil based paints, oil, solvents, pesticides, batteries, and other potentially harmful substances). Because the Solid Waste Management District conducts these collections every year the events were rather successful – we collected close to a ton of household hazardous wastes over three days. At these events I mostly off-loaded vehicles and segregated substances into pre-determined categories (e.g. acids, oils, paints, aerosols, batteries) due to my lack of experience in lab packing chemicals and my youthful strength. For pictures of the HHW Collections please see appendix G.

WORK WITHIN UPCYClers

Upcyclers, Inc. is the side of Emerald Environmental that holds the process patent for the conditioning and reuse of alum drinking water residuals. I was hired into Emerald/Upcyclers to develop the Alum Reuse Program (ARP). As such I function much like a project manager – coordinating visits to drinking water treatment facilities, collecting research, and finding money to offset costs associated with starting another conditioning site.

My role as Project Manager also assigns me the task of finding a research institution to conduct testing on the condition alum residual in different applications. To accomplish this task I created a resource binder for interested institutions to use as a springboard for research questions and important details of the patented process (due to the confidentiality of said resources, this information cannot be included here).

In October 2006 I conducted a survey of drinking water treatment plants in northeast Ohio. I designed the survey to determine which drinking water plants use alum in their treatment process, how the alum is disposed, and the costs associated with disposal. The survey, unfortunately, was not received well by the president of Emerald/Upcyclers and I had to change the survey from being a research tool to a sales tool. Of the 1,008 surveys sent out we received only 30 completed surveys. Due to the lack of adequate sample size, survey statistics would be unreliable and therefore were not calculated. The survey (as of May 2007) is in the process of being updated and is currently being used by the salespeople as a tool to better understand each plant’s inner workings and costs associated with alum residual disposal. Due to the confidential data included in the survey data, it is not included here, however, refer to appendix H for a copy of the survey.

One of the biggest tasks in my role as project development director/project manager is grant writing. To create/build another alum conditioning site and conduct necessary research start-up money is necessary. As of May 2007 I am in the process of writing a grant proposal for $500,000 to the Environmental Research and Education Foundation. This grant may make it possible to further study the use of condition alum residual on mine-impacted lands. K & R Conservation has contracted us to work with Ohio Department of Natural Resources Division of Mineral Resources Management Abandoned Mine Lands program (ODNR, DMRM, AML)
personnel to reclaim over 100 acres of deep mine impacted land in Guernsey County, Ohio. For background information on the K & R project see appendix I for a brief synopsis.

**WORK WITHIN SEE**

Sustainability for Educators and the Environment (SEE) is the non-profit side of Emerald Environmental. Presidents Brian Grimm and Scott Hershberger founded SEE when they saw a lack of practical application of environmental principles in schools, especially client schools. When I began at Emerald, SEE was barely functioning. We had no strategic plan, we weren’t recognized by the IRS as a non-profit (501(c)(3)), nor did we have any real teacher contacts, defined programs or goals, class activities, fundraising efforts, or grant proposals.

**SEE’S START-UP PHASE**

In June 2006 I began the IRS 501(c)(3) non-profit application process. Working with Emerald Environmental’s lawyers, we developed a compelling application and submitted to the IRS in early July 2006. We were pleasantly surprised when our application was granted and we became a fully recognized 501(c)(3) non-profit organization on August 5, 2006 without any reapplication and clarification as we were told to expect.

The next step in getting SEE up and running properly was to develop a strategic plan for the Organization. This plan outlines the goals of SEE and how we foresee SEE expanding. It also describes out contacts and resources available. I designed this plan to be updated quarterly with new resources, goals, and contacts, therefore it is an every changing document that will be useful for years to come. Please see a copy of the initial strategic plan in appendix J.

Developing a cohesive look and informational marketing pieces for SEE was the next essential task. To make a good impression on funders and on possible clients, SEE needed a classy and simple look. I created the SEE logo, below, and other marketing/fundraising pieces with those characteristics in mind.

![Logo of Sustainability for Educators and the Environment](image)

**FIGURE 2:** Logo of Sustainability for Educators and the Environment

(Please refer to appendix K for SEE letterhead, business cards, informational pieces, and fundraising cards.) In the process, I hired Public Design Co. to develop a website for SEE useful to donors, teachers, and school administrators. Please visit our website at [http://www.seeohio.net](http://www.seeohio.net).
**SEE Fundraising**

SEE also needed a fundraising plan to encourage donors to give. This fundraising plan includes utilizing the vendors servicing Emerald Environmental as potential donors. We separated the vendors into two groups – those we expected to give a substantial amount ($700+) and those we expected to give less than $500. The “big spenders”, as of May 2007, began receiving letters (see appendix L), a personal email and a phone call from either of the two Emerald Environmental presidents. Remaining vendor contacts were sent fundraising letters and a donation card. We will follow up with those contacts with an email to further encourage them to give.

To raise more significant funds SEE decided to prepare some universal programs for use at any school/district and use these programs as models for grant proposals. The two most important programs I created for SEE are *Waste Not, Want Not* and *Practical Applications: Interns, Students, and Schools Working Together for Positive Change*, both teach sustainability to kindergarten through twelfth grade students and also help schools look at their environmental footprint and determine a course of action to reduce that footprint. Both of these programs were used for grant applications to the very competitive Ohio EPA Office of Environmental Education Fund (OEEF). For the July 2006 grant ground SEE submitted the *Waste Not, Want Not* program with our collaborating schools in Wadsworth, Ohio and missed getting funded by one point. SEE allowed one of our collaborators to resubmit the *Waste Not, Want Not* grant to OEEF in January of 2007, while SEE applied to OEEF with the *Practical Applications* program. SEE, again, just missed the funding cut-off, but the *Waste Not, Want Not* program was funded for nearly $5,000. Meanwhile, I also submitted applications on behalf of SEE to the Captain Planet Environmental Education Foundation and the Brahmayer Foundations for funds to purchase vermiculture (worm composting) bins for classrooms and for salaries for interns and a formal educator respectively. Please see appendix M for copies of the above mentioned programs/grant proposals.

**Pilot Project – Wadsworth, Ohio**

*Waste Not, Want Not* and *Practical Applications* were developed for SEE’s pilot project in three schools in Wadsworth, Ohio. Scared Heart of Jesus Parish School (grades k-8), Wadsworth Central Intermediate School (grades 5-6), and Wadsworth High School (grades 9-12) participated in some aspect of both programs. We chose these schools because we had a contact at the University of Akron’s Career Center that spoke highly of our program to his friends and family members working in these schools. Subsequently, we had very excited teachers and principals within the schools; we felt if we had interested teachers our program would be more successful than if we were trying to force teachers to integrate SEE programs into their classrooms. Wadsworth is located in Medina County in the northeast section of Ohio. Medina County has a unique waste management system in which residents do not need to separate recyclables from the rest of their waste. All waste is taken to the Medina County Central Processing Facility (also called a materials recovery facility or MRF) where the recyclable materials (paper, glass, aluminum, plastic, etc) are removed from the waste stream through a series of sorting processes either by hand or by machine. Because this system does not require residents to actively recycle and because no formal or informal recycling education is available in the county, students are unaware of recycling and waste reduction making Wadsworth an excellent locale for the pilot project.
The Waste Not, Want Not program seeks to develop age-appropriate sustainability and recycling class activities in science, mathematics, and technology education aligned with Ohio’s Academic Content Standards for grades k-12. Students, teachers, college interns, and administrators will help tailor these activities based on class and student needs. Lessons used in classes:

- Describe renewable and non-renewable resources and their management;
- Analyze and interpret data from scientific investigations using appropriate mathematical skills to draw valid conclusions;
- Describe advances in physical science and the economic, social, ethical, and behavioral implications associated in such advances; and
- Stress writing, interpretation, and artistic skills by creating posters, display boards, and other creative media.

Classes and student groups also have the opportunity to participate in co-curricular sustainability themed activities over the course of the school year including field trips and Earth Day celebrations.

The Practical Applications program takes the Waste Not, Want Not program a step further by actually implementing sustainability principles in the school environment. The need for practical application of environmental and sustainability principles is essential now more than ever. It is vital for schools to become more sustainable to withstand the pressures of decreasing budgets but increasing costs of resources. While it is important for students to understand and appreciate nature and the land, it is just as important for students to learn to live sustainably. The Practical Applications program is necessary because no other organization or group in northeast Ohio seeks to institute real, positive change through teamwork among teachers, students, and administrators to make schools more sustainable. Composting, alternative fuel bussing, energy/water efficient fixtures, and recycling are all small ways to make the building more sustainable, and, in the long-term, save the school system money.

The Practical Applications program seeks to give kindergarten through twelfth grade students an opportunity to experience hands-on sustainability activities in their classrooms then apply that knowledge to a school-wide composting program. The program also seeks to give future educators experience, through college internships, with integrating environmental activities into the classroom – meeting Ohio Academic Content Standards in an innovative and hands-on way. By allowing for a paid internship, those college/university students that must work while attending classes will not be excluded from the experiential education opportunities. It is the overarching goal of the Practical Applications program that interns, students, teachers, and administrators work together to make their schools more sustainable in the long-term.

INTERNS

Northeast Ohio has a problem in that very few internship opportunities exist for college students to acquire school-based sustainability or environmental education experience. Also, internships for education, environmental science/studies and related majors are difficult to find. To find an acceptable solution to this problem I had to determine the scope or boundaries in which the
answer should lie; I determined that the internship should cater to students in northeast Ohio. Furthermore, it is important for interns to be enrolled in a college or university in a teacher, curriculum, environmental science/studies or related program of study. The goal of the SEE is to provide valuable sustainability education opportunities to students enrolled in a northeast Ohio schools k-university. The internship program for SEE also fosters a sense of community with the organization and area colleges/universities and k-12 schools.

To determine the best course of action a considerable amount of data was collected. This data included such information as other internship opportunities in the northeast Ohio area, salaries and cost of living for a typical college student, cost of traveling from area colleges to the SEE office as well as to participating schools, whether we could accommodate both commuter students and students living on campus, the value of internships in typical career paths taken by education and environmental science/studies majors, the need to follow procedures set by career centers at colleges/universities, and if an internship during the school year could fit into a typical student’s schedule.

I assumed I would experience some level of difficulty finding data on internships, cost of living, and the like, however, it posed much less of a problem than I anticipated. Through my contacts at The University of Akron and at Marietta College, I found most of the information I needed. The rest of the data I found either online at internship websites or career center websites for different colleges/universities or from personal experience (mostly information on cost of travel around northeast Ohio).

Once I found and analyzed the data pertaining to the internship logistics several alternative solutions to the internship problem arose:

1) Sponsor education and/or environmental science internships at other organizations in the northeast Ohio area;
2) Offer unpaid internships during the academic year;
3) Offer paid internships during the academic year;
4) Offer unpaid internships during the summer break;
5) Offer paid internships during the summer break; and
6) Offer no internships nor sponsor any internship at other organizations.

To find the best alternative, SEE’s President of the Board, Brian Grimm, and I created a set of criteria by which to judge our internship options. These criteria include:

- Does the option provide an internship we think will be acceptable to college students?
- Does the option provide practical experiences?
- Will the option fit within the SEE budget?
• Will the option be fair to college student participants? Will they feel the internship is worth their time?
• Does the option fit with the goals and plans of SEE?

Each alternative solution has benefits and drawbacks. Sponsoring an internship at another organization would free up a considerable amount of time in my schedule, however there are no other organizations in the northeast Ohio area that offers the same types of programs and therefore any internship would not contain the same types of experiences we feel are necessary. Offering unpaid internships during the academic year, we found, is more preferable to unpaid internships during the summer. Furthermore, we found that many students in the colleges and universities we spoke with required a substantial income throughout the year. While not paying interns would save SEE a considerable amount of money, we would not only be discriminating against lower-income students but students may not respond well and we would receive few applicants or applicants unwilling to put the time and effort required into the work. On the other hand, SEE could pay the interns for their work; the interns would have an incentive to perform high-quality work and show initiative. Lastly, any alternative that offers internships during the summer break could not be the preferred alternative as the interns need to teach lessons and work with administrators in K-12 schools during the academic year. Not offering an internship at all would hinder the goals of SEE and the established Waste Not, Want Not and Practical Applications programs.

After considering each alternative and how each fit the criteria SEE set forth, I decided the best solution is to offer a paid SEE internship during one semester of the academic year. My role as the Internship Coordinator required me to post the internship description (see appendix N) to all the colleges and universities in northeast Ohio including:

• Baldwin-Wallace College;
• Capital University, Cleveland Center;
• Case Western Reserve University;
• Cleveland State University;
• The College of Wooster;
• Hiram College;
• John Carroll University;
• Kent State University;
• Malone College;
• Mount Union College;
• Notre Dame College of Ohio;
• Oberlin College;
• University of Akron;
• Ursuline College;
• Walsh University; and
• Youngstown State University.

I also posted the internship description to the internship site Cleveland Intern.net (http://www.clevelandintern.net). Scheduling and conducting interviews also fell to me. I interviewed six (6) candidates for the position and hired two – Britni Neiling, graduate student in education at University of Akron and Rene Bernel, undergraduate student in education at Baldwin-Wallace College. Interns were selected on their ability to work independently, their interest in sustainability, and their teaching styles. I trained Ms. Neiling and Ms. Bernel during two workshops – going over sustainability themes and program expectations as well as their ideas for lesson plans and class activities. Ms. Neiling and Ms. Bernel were then introduced to the principals of the participating schools (Sacred Heart of Jesus, Central Intermediate School, and Wadsworth High School) as well as teachers and administrators to begin implementing class activities. I required a weekly report from each intern describing the lessons they conducted, the type and grade level of each class and the number of students in each class for my record keeping. By taking a hands-off management style and by allowing the interns to match the pace of each class and to tailor lessons to individual teachers’ syllabi, I feel the interns got to experience teaching in a real-world setting rather than in a contrived, micro-managed, artificial setting.

To monitor the implementation of the internship program after the first internship cycle was completed I surveyed the interns to solicit information like how they heard of the internship, the best and worst aspects of the internship, if we paid a fair salary, if they felt the internship was an asset to their future job hunting, and their thoughts on the nature of the experience. Because we hired only two interns the information was incomplete at best. When more internship cycles have been completed and the pool of data collected increases we will have a better idea of how the internship program is working and if major overhauls are necessary. Please see appendix N for a copy of the intern survey.
SECTION III: DEVELOPMENT OF PRACTICAL APPLICATIONS

PRACTICAL APPLICATIONS

During my internship, I was tasked with developing programs and writing grants for the non-profit, Sustainability for Educators and the Environment (SEE). Because we received mixed reviews of the Waste Not, Want Not program when we applied for grants, we decided we needed to renovate the program. Also, the short term goals of SEE were just being set and we found the Waste Not, Want Not program would not meet these goals. To this end, I developed the Practical Applications program and wrote a grant to the Ohio Environmental Protection Agency’s (OEPA) Office of Environmental Education Fund (OEEF). SEE was funded for this program in October 2007 with a grant of $48,472.

The Practical Applications: Students, Interns, Teachers, Schools Working Together for Positive Change program seeks to give grade kindergarten to twelfth grade students an opportunity to experience hands-on sustainability activities in their classrooms then apply that knowledge to a school-wide composting program. The program also seeks to give future educators experience, through college internships, in conducting environmental activities in the classroom – meeting Ohio Academic Content Standards in an innovative and hands-on way. By allowing for a paid internship, those college/university students who must work while attending classes will not be excluded from the experiential education opportunities. It is the overarching goal of this program that interns, students, teachers, and administrators work together to make their schools more sustainable in the long-term. Major activities in the Practical Applications program include: (1) Hiring four interns per semester (Spring 08, Fall 08, Spring 09, Fall 09, and Spring 10), (2) Using those interns to conduct hands-on sustainability class activities, and (3) Assisting in the application of those sustainability principles in a school-wide composting program. The overall cost for this program, including personnel salaries, supplies, travel, and equipment is $127,372 over two and a half years. Please refer to Section 2, Pilot Project – Wadsworth, Ohio for more detailed information about the Practical Applications program.

GRANT PROCESS

The OEEF grant process is outlined below. Please see Appendix O for forms, rubrics, and other grant process materials.

1) Applicants write and submit grant applications by deadline, typically two per year in mid-January and mid-July.

2) OEEF reads grant applications and awards discretionary points

3) OEEF sends grant applications to volunteer reviewers for comments and scoring

4) Approximately two months after the grant deadline (March or September) applicants are informed of their scoring from volunteer reviewers.
5) OEEF lists grant applications by score (highest to lowest) and selects the top applicants to attend a Second Round Council Meeting to defend their grant applications and answer questions from the Council.

6) Council votes on what applications will be sent to the OEPA director for final approval

7) OEPA director approves or disapproves grant applications and notifies applicants of their final standing.

PROGRAM DEVELOPMENT

I developed the *Practical Applications* program as a general program that could be easily modified to meet the requirements of many different schools and situations. For example, the composting portion of the grant could be changed to energy efficiency if that was what the school needed; instead of the grant paying for composting bins and garden rakes, it would pay for new light fixtures or weather-stripping. I felt the more flexible the program was in the beginning the more easily I would be able to modify it to meet the needs of differing grants and schools.

The *Practical Applications* program was also developed with the audience in mind. Understanding the needs, situation, and procedural constraints of the schools participating in the program is essential if the program is to be successful. For example, when developing the *Practical Applications* grant in July 2007 I found it necessary to include correlations to the Ohio Academic Content Standards (state standards on which students will be tested as part of the National No Child Left Behind Program) because teachers at Wadsworth Central Intermediate School (CIS) and Wadsworth High School (WHS) had concerns about lessons and activities conforming to state academic standards.

I first developed the *Practical Applications* program in late December 2006, early January 2007. The OEEF Council received this first draft of the grant poorly and SEE did not receive any grant funding. However, the OEEF Council reviewers gave helpful comments and suggestions about significant changes I could make to the program to ensure the program’s future success. These suggestions included, adding formal educators to the staff of SEE, further training of SEE interns, better correlations of lessons and activities to the state academic standards, and budget changes.

After the first version of the *Practical Applications* grant was denied I spent time talking with teachers, administrators, interns, and other participants in the program. The information I received from these informal surveys brought to light the same problems the OEEF Council had commented upon. The OEEF Council felt the program was mainly a way for SEE to pay for interns and they felt that the grant should not merely pay salaries for college students. Both the Council and the program participants thought the program needed less room for change. By that, I mean *Practical Applications* was slightly wishy-washy and did not have hard and fast objectives, leaving room for participants to pick and choose what they wanted to incorporate. By starting early on revisions to the first draft of the *Practical Applications* grant and by incorporating suggestions from the Council members and participants the second draft of the grant applications and subsequent program was much improved. I submitted the grant in July 2007. In late September 2007, OEEF sent the grant application scores and comments from the
volunteer reviewers. We were also notified that SEE’s grant application had been selected for debate at the OEEF Council meeting on September 29, 2007. During the OEEF Council meeting, I was asked many questions about the program, collaborators, supporters, and participants. After I answered all their questions, the OEEF Council voted unanimously to approve my application and send it to the OEPA director for approval. In late October 2007, SEE was notified that the OEPA Director approved out application for the full $48,472 amount.

PROGRAM PROCEDURES

Administrative procedures for finalizing OEEF grant funds fell to me. I received contracts from OEEF in early November 2007. After reviewing the contracts, I had SEE’s fiscal officer, Brian Grimm, sign the contracts and send them back to OEEF. Currently, (as of 30 November 2007) SEE had not yet received the grant funds. SEE will receive ninety percent (90%) of the awarded grant funds, approximately $43,625, by the end of 2007.

The budget for the Practical Applications program is quite large – nearly $130,000 – and only a small portion of that budget is provided by the OEEF grant. The rest of the money for the program comes from donations, sponsorships (mainly by Emerald Environmental) and from the SEE operating budget. It is essential that I remain very frugal with the money that OEEF provides as well as donations SEE’s supporters have given. I will continue to solicit donations from contacts to ensure SEE has enough money in its coffers to successfully complete the Practical Applications program.

It is also important to remember that any changes made to the Practical Applications budget must be submitted in writing to the OEEF grant administrator assigned to SEE’s program. If the change is merely a line-item change, for example, if I were to purchase less-expensive cameras, I would only need submit that minor change with my quarterly report. If I were to not purchase cameras at all and instead purchase a laptop computer, it would be mandatory for me to submit that change in writing thirty (30) days before the purchase for approval by SEE’s assigned OEEF grant administrator.

REPORTING

Because the grant period has yet to start (as of 30 November 2007) no quarterly reports have been prepared. These reports require synopses of the activities completed in that quarter, any minor budget modifications, how much of the OEEF provided funds have been spent, and any pictures, activities, or lessons that may have been produced or used. Please see Appendix O for a copy of the Grant Administration Folder outlining reporting requirements.

CORRELATING LESSONS TO STANDARDS

All lessons to be used in classrooms during the Practical Applications program must fit Ohio Academic Content Standards. As part of my duties, I am responsible for assuring the scientific accuracy of any lessons or class activities as well as correlating lessons to the Ohio Academic Content Standards. While I am not a teacher or educator by training, I do not find correlating lessons to state standards very difficult. My method of correlating is simply reading the lesson and thinking of extensions of that lesson that can fit the benchmarks listed in the
standards. Once I have determined under what benchmark the lesson falls, I can easily find an indicator for most grade levels that can be achieved or practiced through the lesson. I used this method to correlate the US EPA curriculum *Planet Protectors* to the Ohio Academic Content Standards. For example, the Planet Protectors curriculum meets the Grade 1 – Earth and Space Science Benchmark, Earth Systems #2 indicator. This indicator says students, at the end of Grade 1 should be able to explain that the supply of many resources is limited but the supply can be extended through careful use, decreased use, reusing and/or recycling. Please refer to Appendix P for a full copy of that correlation.

**Hiring Practical Application Program Interns**

The *Practical Applications* program requires me to interview and hire at least four (4) interns per semester (Fall and Spring semesters only). Interns will be hired for the *Practical Applications* program each semester between Spring 2008 and Spring 2010 semesters. Due to the informal nature of the SEE organization and my own leadership and management styles, I do not have specific hiring guidelines. I typically interview nearly all applicants unless from their resume they prove to be entirely unqualified or unacceptable candidates. When interviewing I give a brief overview of SEE’s history as well as of the job description. After the overview I ask if the applicant has any questions. After I answer the applicant’s questions we move on to discussing the applicant’s qualifications, resume, and interests. I always ask if the applicant can define sustainability and what aspect of sustainability they find most interesting. I also ask about the applicant’s time constraints and other responsibilities. I try to determine from the applicant’s answers and experiences what type of leadership they prefer – a heavy, handed, top-down leadership style or a more horizontal, collaborative leadership. If I cannot determine this preference from other answers I will ask, but I find most applicants cannot give a clear and honest answer to this question. Because I will be the supervisor I need to know if the candidate will be able to function well under my leadership and managerial style. After I answer any other questions the candidate may have I conclude the interview. Once I have made my decision as to who to hire I will send offer and rejection letters to the candidates, typically within two weeks.

Once I hire interns I must train them properly. A SEE Intern Handbook is currently (as of 30 November 2007) in development for use with Spring 2008 semester interns. The first day of training includes reviewing the handbook, procedures, and overall expectations of the interns. I provide them with an electronic template of the weekly report I require them to complete. I also give them an example weekly report so they can better understand how that report should look. I ask them to prepare for the next training session, the types of experiences they would like to gain from this internship. During the second training session I have a teacher or former intern on hand to answer any questions and to teach them to use the lessons, activities, and other materials SEE has on hand as well as online and library resources. I read over the interns desired experiences and decide to what schools I will assign them and to teams if necessary. The last day of training typically takes place in each intern’s respective school and with their mentor teacher in that school. I introduce the intern to their mentor teacher and ensure they can work out a schedule and both the teacher and intern are comfortable with one another. I give the teacher a brief description of what is expected of the intern and those things I do not expect the intern to complete, for example, grading assignments not assigned by the intern. Once the
interns have met their mentor teacher the interns are to independently complete their tasks and report back to me once per week.

**FUTURE PLANS**

The future plans of the *Practical Applications* program revolve around expansion in two key areas: (1) aspects of sustainability and (2) different schools/locations.

Thanks to the flexibility of the program, *Practical Applications* can easily be modified to meet differing needs of various schools. If, perhaps, a school already has a working recycling system, the program could be modified to include other aspects of sustainability. The school could use the same basic program to apply for grants to modify lighting or water fixtures or to upgrade busses to utilize alternative fuels. Also, schools that are currently participating in the *Practical Applications* program will already be familiar with it and will be comfortable branching out into other aspects of sustainability. While SEE understands it is necessary to move in small steps toward sustainability, SEE also knows even small changes can make a large impact on the footprint of schools and students on the environment.

I would like to see the *Practical Applications* program repeated in classrooms throughout northeast Ohio and the state. The need for sustainability education is essential to science and civics classes in more than just Wadsworth, Ohio. Schools should incorporate a program like *Practical Applications* in their buildings to not just be more sustainable but also to teach the students, in an experiential and hands-on way, about the importance of sustainability in their lives. The *Practical Applications* program is an easy way to begin meeting sustainability objectives in schools across the state and, eventually, throughout the country. SEE has begun working with the Environmental Education Council of Ohio (EECO) and hopes soon the *Practical Applications* program will be adopted by the group. If this happens, schools and informal education centers (nature centers, zoos, solid waste districts, etc) will not just have access to the program, but will have a well-known and established organization for support.
SECTION IV: CONCLUSIONS

FULFILLMENT OF GOALS

My goals for this internship were not to merely complete my degree, but also to gain insight into different career paths, for example private industry versus non-profit organizations, as well as to further develop my critical thinking and scientific analysis skills. To achieve these goals it was essential to find a position that allowed a great degree of freedom. Thankfully, Emerald Environmental and Sustainability for Educators and the Environment allowed for that experience. By running a non-profit with little direction and by working within a very structured consulting firm, I developed and honed skills for both being a leader and a teammate. Unfortunately, I was not assigned too many consulting projects; therefore, much of the hard scientific analysis I wished to experience was not available. My long-term goal now centers on finding opportunities to expand my scientific analysis skills.

EVALUATION OF INTERNSHIP

During my internship at Emerald Environmental (EEI), I gained valuable experience in a variety of areas including program development, proposal writing, report preparation, and grant management. The portion of my internship with Sustainability for Educators and the Environment (SEE) allowed me to experience the responsibility of supervising interns, marketing, grant writing, program development, budgeting, and building and maintaining a strong list of collaborators and contacts.

The overall experience with EEI and SEE was worthwhile and enjoyable. My experiences with two different industries allowed me to better understand what type of position my current skills were suited for and what positions I would need to further my skills to achieve. I feel my skill set best fits the needs of the SEE portion of my internship and find my attitude and personality work well within the less formal, more self-sufficient structure of a non-profit. My skill set is varied because I have a liberal arts undergraduate background and because I feel I’m a well-rounded individual. I find my skill set includes such items as: working independently, research, independent thinking, problem solving, working with college students, and organization. These skills are essential for anyone working with SEE – especially in my position as Development and Internship Director. I enjoyed working with a variety of projects and was never bored with nothing to complete. Also, because I’m so passionate about recycling, proper waste management, and going zero-waste, I felt like I was doing exactly what I love. Furthermore, by allowing me the freedom to run SEE nearly entirely autonomously my boss gave me the opportunity to make decisions and implement my ideas and programs. I prefer a more hands-off leadership approach so the autonomy was my favorite portion of the internship.

However, no job is perfect and at some points during the internships I disliked my job. The least enjoyable portion of the internship was the lack of experience in environmental fieldwork. For example, I anticipated the opportunity to perform Phase I Environmental Assessments. Unfortunately, those tasks were always assigned to other employees. Early on in the internship, it seemed I was delegated the tasks no one else wanted and served more as an assistant that a project team member. I scheduled meetings, took minutes, and sent weekly reminders of things
that needed to be completed. I, however, did not get to participate in the hard-science aspects of any team projects. While I did write a Quality Assurance Program Plan and a Septic Pollution Prevention Plan, the lack of field work was the biggest downside of the internship.

While early on in my internship I felt I was not making any major contributions to my company or non-profit, looking back I found several distinct changes in the organization inspired by my ideas and contributions. These changes include the creation of a new service line dedicated to environmental management systems, the addition of a waste broker onto our staff to find disposal options other than landfilling or incineration for our customer’s wastes, and buying recycled products and recycling wastes within the office.

**EVALUATION OF IES**

Many of my experiences at both Emerald Environmental and Sustainability for Educators and the Environment required me to use problem solving, report writing, and teamwork skills I honed while completing my coursework at Miami University. On the other hand, much of the core curriculum within the Institute of Environmental Sciences (IES), such as Methodology, Environmental Policy/Law, and others, were not as traditionally helpful. However, the ever-shifting schedules of the first semester core curriculum classes got me acclimated to the flexibility needed in the workplace.

<table>
<thead>
<tr>
<th>Course</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles and Applications of Environmental Science</td>
<td>Gave a broad understanding of different environmental topics; useful in developing new programs, lessons, and activities for SEE</td>
</tr>
<tr>
<td>Environmental Measurements</td>
<td>Gave experience in scientific analysis and report writing; useful for developing the Septic Pollution Prevention Plan document</td>
</tr>
<tr>
<td>Environmental Methodology</td>
<td>Provided a more detailed problem solving process; most useful in developing new programs</td>
</tr>
<tr>
<td>Environmental Statistics</td>
<td>Provided a refresher course on statistics; useful in grant writing and survey work</td>
</tr>
<tr>
<td>Environmental Policy &amp; Administration</td>
<td>Gave a general overview of government and background on environmental laws; infrequently used</td>
</tr>
<tr>
<td>Environmental Analysis &amp; Modeling</td>
<td>Provided in-depth statistical analysis models; will be most useful when conducting Phase II Environmental Site Assessments</td>
</tr>
<tr>
<td>Topic Seminar: Risk Assessment</td>
<td>Gave background on risk assessment and applications of risk assessment; infrequently used</td>
</tr>
<tr>
<td>Public Service Project/Student Team Project</td>
<td>Allowed team to develop a program/project suited to the client's needs as well as to develop strategies for program completion; very useful when developing programs and working as a member of a team</td>
</tr>
</tbody>
</table>

**FIGURE 3: IES Core Courses and Usefulness to Internship**
Overall, I feel I was well prepared for my internship thanks to my previous undergraduate courses and elective courses at Miami University such as Project Management, Public Budgeting, and Sustainable Regions. Project management gave me the requisite skills in project management software and time management. Public Budgeting taught me about different types of budgets and proper budgeting techniques useful when creating and following grant budgets. Sustainable Regions allowed me to critically look at a variety of sustainability topics and their applicability in differing situations; this was perhaps the most useful course as it made me fluent in sustainability topics essential to running a non-profit organization dedicated to sustainability. As with all programs, there is always room for improvement. By integrating classes that allow for practical experience such as grant writing and performing Phase I and Phase II Environmental Site Assessments, IES can prepare students for the day to day tasks they will perform in many internships.
APPENDIX A: JOB DESCRIPTION

Emerald Environmental, Inc.
Program Development Director and Marketing Coordinator
Job Description

- Development of Emerald’s alum residual program:
  1. Research funding and potential investor opportunities, including federal, state, or local waste management, innovative reuse, and water quality grants. Business plan competitions (college-supported, COSE, SBA, etc.), venture capital firms, and other business support entities should be researched as well. Prepare and submit business plan for grant funding, loans, and investment opportunities.
  2. Initiate, support, and sustain partnerships with municipal water authorities, plant managers, and soil blenders in securing alum conditioning and reuse establishments. Activities may include identifying blenders, establishing contacts at public water systems, arranging pilot site visits, responding to potential client requests and questions, coordinating meetings, drafting proposals and feasibility studies, and providing grant-writing support. Broader efforts may include developing partnerships with national environmental firms specializing in water system optimization, as well as researching coagulant use and sludge production at Ohio water treatment plants.

- Development of Emerald’s alternative use/reuse/recycling options:
  1. Keep abreast of news on subjects such as alternative use, reuse, recycling, alternative fuels, and other sustainability news. Further research into these topics is also necessary.
  2. Utilize said research to develop new programs for Emerald and for S.E.E. Some program possibilities include large scale composting for school districts and/or municipalities, conversion of trucks to run on biodiesel, creating power from animal manure. Programs should be sustainable.
  3. Initiate, support, and sustain partnerships with municipalities, institutions, small businesses, reuse/recycling establishments, etc.
  4. Research and solicit funding sources, such as grant opportunities and private corporation donations. Associated tasks involve writing and submitting grants, responding to funders with additional information and presentations, and ensuring that Emerald and/or S.E.E. is in compliance with ongoing grant financial reporting requirements. Research potential investor opportunities, including federal, state, or local waste management, innovative reuse, and water quality grants. Business plan competitions (college-supported, COSE, SBA, etc.), venture capital firms, and other business support entities should be researched as well. Prepare and submit business plan for grant funding, loans, and investment opportunities.

- Marketing:
  1. Coordinate with marketing agency on development and proof-reading of promotional materials, including website content and layout. Verify that work is completed; manage the marketing budget.
  2. Develop marketing materials as needed, including presentations, impact pieces, project profiles, articles, and SOQ components. Ensure that finished products are efficiently incorporated into active use and are available to all Emerald staff.
Sustainability for Educators and the Environment (SEE)
Program Development and Internship Director
Job Description

1. **Fundraising:** research and solicit funding sources, such as grant opportunities and private corporation donations. Associated tasks involve writing and submitting grants, responding to funders with additional information and presentations, and ensuring that SEE is in compliance with ongoing grant financial reporting requirements. Funding must be adequate for materials production, internship funding, and hiring of a full-time non-profit director.

2. **Outreach:** establish partnerships with schools and university internship services for SEE pilots and full-scale programs. Maintain online internship postings with area universities. Attend environmental education events to identify niches in which SEE can serve, identify potential funding sources, and market the organization. Prepare promotional materials and presentations; conduct environmental education introductions and seminars.

3. **Programming:** research and define SEE services and products; design internship program, promote internship opportunities, interview candidates, oversee intern activities, arrange programs with teachers through phone conferences and site visits, and evaluate interns.
APPENDIX B: OPFMA ARTICLE

Universal Waste Management:
Is Your Facility Properly Handling Universal Waste?

Are boxes of obsolete computers, spent batteries, or waste-lamps piling up in a back room or basement of your facility? Has a renovation or demolition project left you with piles of old light ballasts and mercury-containing thermostats? If so, your operation could be considered by the Ohio EPA to be a small quantity generator of hazardous wastes and subject to hazardous waste rules. To encourage recycling, Ohio EPA regulates certain wastes, called Universal Wastes (UW), differently than hazardous wastes even though these wastes may display certain toxicity characteristics. This allows facilities managers to avoid the high costs and hassles of disposal.

The four major types of UW are:

1) Lamps including incandescent, fluorescent, high intensity discharge, neon, mercury vapor, high-pressure sodium and metal halide lamps;

2) Pesticides that are either suspended and recalled under Section 6 of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), suspended or cancelled as part of a voluntary recall by the registrant, or collected in waste pesticide programs;

3) Mercury-containing thermostats; and

4) Discarded batteries.

According to the Universal Waste Rules (Ohio Administrative Code 3745-273) there are three types of UW management: handlers, transporters, and destination facilities. As a UW generator, you are considered a handler. You, or a trusted waste services provider like Emerald Environmental Services, can manage and dispose of these hidden hazards simply, safely, and inexpensively under the Universal Waste Rules.

You are required to follow some simple guidelines in the disposal of your universal waste. Lamp bulbs or tubes cannot be crushed. Handlers can remove mercury-containing ampoules from thermostats as long as the process prevents breakage and is done over a containment vessel in a well-ventilated and monitored area meeting OSHA specifications. Universal wastes must be, in general, handled without breakage and packaged in secure and compatible containers that are clearly labeled. Handlers can store UW on site for up to one year without written documentation.

Emerald Environmental Services, Inc. has helped many companies investigate, inventory and save money on hazardous waste disposal. Founded in 1994, Emerald first focused on environmental, industrial hygiene, and occupational safety consulting. Co-owners Brian Grimm and Scott Hershberger soon recognized their company’s waste management expertise would serve small businesses intimidated by environmental regulations. In response, Emerald created a Services branch to provide hazardous and non-hazardous waste transportation and management.
As a solutions-oriented company, Emerald conducts assessments of properties to identify environmental and universal waste concerns, develops a complete remediation strategy, and then cost-effectively implements the plan. Emerald can help you with your unique waste management needs and, when hazardous materials are involved, make sure you take full advantage of the savings afforded by the Universal Waste Rules.
APPENDIX C: IMPACT PIECES

Universal Waste

EMERALD ENVIRONMENTAL HAS DESIGNED A COMPREHENSIVE Universal Waste pickup and recycling program for Ohio public facilities, schools, and small businesses.

How does this affect me?
Due to demonstrated toxicity characteristics, Universal Wastes are considered hazardous wastes when disposed. Universal Waste guidelines provide an option that avoids the high costs and tracking hassles associated with most hazardous materials.

What can I do about it?
The innovative Emerald program includes, at very competitive rates, an inventory of your wastes, proper packaging of the materials, and transportation of wastes to approved destination facilities where recycling can occur.

What are the benefits of Emerald’s Program?
Emerald’s cost effective methods will remove your hazardous materials, provide you with proper documentation, and reduce your liability exposure. You can be secure in the knowledge that your wastes are professionally managed.

Wastes accepted under Universal Waste Rules:
- Batteries
- Computer Monitors and CPUs
- Keyboards
- Laptops
- Printers
- Scanners
- Computer Peripherals
- Lamps and Ballasts
- Capacitors
- High Intensity Discharge (HID)
- Mercury Containing Equipment
- Pesticides
- Rodenticides
- Herbicides
- Fungicides
SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLANS (SPCC)

The main purpose of the SPCC regulations is oil spill prevention, not merely reactive measures as described in most Spill Contingency Plans. Regulations now state certain types of facilities must create these SPCC Plans to prevent any discharge to navigable waters or adjoining shorelines.

WHO IS REGULATED BY THE SPCC RULE?

All facilities that meet three criteria: (1) it must be a non-transportation related facility, (2) it must have an aggregate aboveground storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons, and (3) there must be a reasonable expectation of a discharge into or upon navigable waters or adjoining shorelines.

WHO PREPARES THE PLAN?

Preparation of the SPCC Plan is the responsibility of the facility owner or operator, but it must be certified by a licensed Professional Engineer.

WHAT KINDS OF OIL ARE REGULATED UNDER THIS RULE?

The term oil includes any type of petroleum; fuel oil; sludge; oil refuse; oil mixed with other wastes; fats; oils/greases from animal, fish or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and other oils and greases, including synthetic and mineral oils.

WHAT DO I HAVE TO DO NOW?

If you meet the three criteria you, therefore, must comply with the SPCC Rule. Emerald Environmental’s staff of environmental professionals, environmental scientists, geologists, and certified industrial hygienists (CIH) can help you prepare and certify your plan. Emerald’s cost effective methods provide you with a practical SPCC plan and the security that comes with a reduction in liability exposure.

SOME IMPORTANT ELEMENTS OF AN SPCC PLAN

- Professional Engineer Certification
- Must follow sequence of 40 CFR 112.7
- Facility Diagram
- Oil Spill Predictions
- Facility Drainage
- Facility Inspections
- Site Security
- Bulk Storage Container Compliance

- Five-year Plan Review
- Management Approval
- Appropriate Secondary Containment or Diversionary Structures
- Loading/Unloading Requirements and Procedures for Tank Cars and Trucks
- Personnel Training
- Brittle Fracture Evaluations

EMERALD ENVIRONMENTAL, INC.

800-570-0690   www.emerald-environmental.com
Environmental Health & Safety Management Systems

What is ISO 14001?
ISO 14001 is the recognized international environmental management standard. It is a management tool used to establish a framework for organizations to cost-efficiently manage their significant environmental impacts. ISO 14001 helps protect human health and the environment while assisting organizations to achieve environmental and business goals.

What is OHSAS 18001?
OHSAS 18001 is an international occupational health and safety management system specification intended to help organizations control health and safety risks. OHSAS 18001 was developed to be compatible with ISO 9001 (Quality Management) and ISO 14001 (Environmental Management).

What are the Benefits of these Systems?

- Reduce costs (Workers’ Compensation and property insurance costs)
- Minimize risk to employees
- Protect assets
- Gain assurance
- Improve organization’s overall compliance and performance
- Move toward prevention vs. reaction
- Enhanced public image
- Demonstrate diligence

How can we implement these systems?
By working with a trusted environmental management consultant, implementing an integrated Environmental Health and Occupational Safety Management System can be a smooth and cost-effective process. Emerald Environmental will meet with you and explain the major elements and tasks in designing and shaping these management systems to your organizational needs. We can also help you identify key individuals in your organization who will form the basis of the internal management team. Our focus is on solutions to your environmental and occupational safety problems.

Emerald Environmental, Inc.
800-570-0690  www.emerald-environmental.com
Ohio DOT Pre-Qualified Environmental Site Assessments Phase I-II

Looking for a competent and cost-effective Ohio DOT pre-qualified environmental firm to join your team? Just because you are not Ohio Department of Transportation pre-qualified to conduct phase I-II environmental site assessments (ESAs) should not limit your ability to get the projects you want. Emerald Environmental, Inc. would like to join your team. We not only are Ohio DOT pre-qualified, but we also specialize in phase I-II ESAs and remedial projects.

What Can You Expect From Emerald Environmental?
Service. Teamwork. Trust. We are a solutions oriented company and committed to high standards of service. When you partner with Emerald you can be assured your needs and objectives will be met.

What Can Emerald Do For Me?
Emerald is Ohio DOT pre-qualified for Phase I-II ESAs, so you can include us on your team to get the Ohio DOT jobs you want without the hassle of getting yourself ESA I-II pre-qualified. We also specialize in industrial hygiene, environmental, and waste management. When Emerald is on your team you know you have a diverse group of professionals to solve your environmental problems.

Who Should I Contact to Partner With Emerald?
You can call our main office in Kent, Ohio at 1.800.570.0690 or email Scott Hershberger at shershberger@emerald-environmental.com. We will be glad to assist you in conducting ESAs for Ohio DOT jobs or other projects you need a trustworthy team member.

Some Services Emerald Provides:
- Asbestos and Lead Services
- Industrial Hygiene Monitoring
- OSHA Compliance Audits
- Microbiological Sampling
- Soil and Groundwater Assessments and Remediation
- Phase I-II Environmental Site Assessments
- Regulatory Compliance
- RCRA Compliance and Closure
- Remediation Project Design and Management
- Soil and Groundwater Contaminant Fate Modeling
- VAP and Brownfield Redevelopment
- Underground Storage Tank Assessments and Risk Based Corrective Action
- Air/Water Permitting, Title V, NPDES
- Licensed Hazardous Waste Transport
- Waste Sampling and Characterization
Small Business Hazardous Waste Transportation and Disposal

Emerald Environmental has designed a comprehensive Hazardous Waste and Universal Waste pickup and recycling program for small businesses to reduce their liability and ensure regulatory compliance. If you are not using a trusted waste management company for transportation and disposal, you may be at risk.

**WHAT ARE SOME OF MY LIABILITY ISSUES?**

If a representative of your business is in an accident while transporting hazardous materials, you are liable for the clean-up costs as well as property damage and personal injury. You could also be subject to fines for violating DOT rules, unless you are a permitted transporter. Also, most commercial insurance excludes pollution liability.

**WHAT ARE SOME TRANSPORTATION ISSUES?**

Vehicles carrying hazardous materials may need to be placarded, shippers and transporters must be trained, and materials packaged and secured according to law. Civil penalties up to $50,000 result from a violation, and increase to $100,000 if the violation leads to death, serious illness, severe injury, or substantial property destruction.

Also, the driver of any placarded vehicle must have a Commercial Drivers License (CDL) with a Hazmat Endorsement. A CDL requires multiple exams, testing fees, background check, and security assessment. OSHA and DOT requires specialized training for handlers and transporters.

**WHAT ARE SOME DISPOSAL AND DOCUMENTATION ISSUES?**

In a lawsuit, you need detailed records of what hazardous materials your business produced and where they have gone. If you are alleged to have engaged in disposal activities, what evidence will you have to refute the claims?

**WHAT ARE THE BENEFITS OF EMERALD’S PROGRAM?**

Emerald’s cost effective methods will remove your hazardous materials, provide you with proper documentation such as waste manifests, and reduce your liability exposure by handling and transporting your waste according to DOT and OSHA regulations. You can be secure in the knowledge that your wastes are professionally managed.
APPENDIX D: MARKETING MATERIALS

Can Cozy (front and back)

Pens
Kent State University

Benefits of EHS Management Systems and Enhanced Risk Management

Overview

- Enhanced Risk Management
  - Workers’ Compensation
  - Property Insurance
- Environmental Health and Safety Management Systems
  - ISO 14001
  - OHSAS 18001
- Implementation of EHS Systems
Enhanced Risk Management:
Influencing and Reducing Your Hard and Soft Costs

As a result of implementation of Environmental Health and Safety Management Systems you can reduce your costs associated with:
- Workers’ Compensation
- Property Loss Insurance

Workers’ Compensation Cost Control

- Proactive programs to prevent injuries / illnesses are the most effective way to control WC claims costs.
- But effective cost control also involves knowing:
  - how premiums are calculated / allocated
  - how fixed costs and projected losses are derived
  - the influence of actuarial projections
  - the reserving process
  - claims frequency and severity information and trends
  - claim cost information (paid out + reserved = total)
  - claim status (closed, open)
  - if coding errors exist (wrong site, wrong employee, etc.)
Workers’ Compensation Cost Control, continued

- Effective Claims Management involves:
  - training for managers/supervisors (procedures, incident investigation, etc.)
  - regular review/strategy meetings with the TPA;
  - utilizing state mechanisms for vocational rehabilitation, second injury funds, etc.
  - use of case managers
  - timely reporting to TPA (longer = more costly)
  - judicious use of denials, appeals and settlements

Property Insurance

- Can include fire, flood, wind, ice, etc.
- Can include property loss and business interruption.
- Typically involves both a broker and an insurer (and possibly a re-insurer)
- Premiums are typically based on a combination of property value and loss experience.
- Has become more costly post 9/11/01, post-Katrina, etc.
Property Insurance Cost Control

- Opportunities for controlling PI costs include:
  - understanding the premium calculation / allocation methodology;
  - regular communication with the insurer
  - timely attention insurer recommendations
  - reviews with the insurer to identify cost-effective risk-reduction actions
  - achieving Highly Protected Risk (HPR) classification
    - Physical improvements
    - Human element improvements

Potential Results

- Efforts to achieve HPR rating at all sites in North America alone, from 2002-2006 policy years, have produced:
  - ~$1.3MM in premium savings
  - >$300MM reduction in loss expectancy (supports business continuity)
Enhanced Risk Management:
Influencing and Reducing Your Hard and Soft Costs

What questions do you have that we have not addressed or answered?

Overview

☑ Enhanced Risk Management
  - Workers’ Compensation
  - Property Insurance
☐ Environmental Health and Safety Management Systems
  - Environmental: ISO 14001
  - Health and Safety: OHSAS 18001
☐ Implementation of EHS Systems
What is an EMS?

An environmental management system (EMS) is the part of your overall management structure that:

- assesses the immediate and long-term impacts of your organization's activities, products and services on the environment; and
- allocates resources, assigns responsibilities and requires continual evaluation / improvement of practices, procedures and processes to manage your identified impacts.

What is the ‘Environment’?

The surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interaction.

source: ISO 14001:2004 §3 Definitions
What is ISO 14001?

- *The* recognized international environmental management standard
- *Voluntary* (with exceptions) global standard for managing environmental issues
- *Management tool* to establish a framework (environmental management system) to manage the significant environmental impacts over which an organization can exert influence

Purpose of ISO 14001

- help protect human health and the environment
- maintain / improve the quality of the environment
- provide consistency in EMSs worldwide
- avoid potential trade barriers due to conflicting EMS standards
- assist organizations to achieve environmental and business goals
Benefits of ISO 14001

- Decrease costs
- Improved regulatory knowledge / compliance
- Improved overall environmental performance
- Move to prevention versus reaction
- Enhanced organizational knowledge / memory
- Outlast individuals / consistent performance
- Enhanced public image (KSU Point of Pride?)

Occupational Health and Safety:
OHSAS 18001

- OHSAS 18001 is an international occupational health and safety management system specification
  - Intended to help organizations control health and safety risks
  - Developed to be compatible with ISO 9001 (Quality Management) and ISO 14001 (Environmental Management)
How OHSAS 18001 Will Help You

- Reduce costs associated with Workers’ Compensation
- Minimize risk to employees
- Improve existing OH&S management systems
- Protect assets (human and material)
- Demonstrate diligence
- Gain assurance
- Support mission continuity

Overview

☑ Enhanced Risk Management
  - Workers’ Compensation
  - Property Insurance

☑ Environmental Health and Safety Management Systems
  - Environmental: ISO 14001
  - Health and Safety: OHSAS 18001

☐ Implementation of EHS Systems
Drivers for EMS Implementation

- Reduce Costs
- Compliance with laws and regulations
- Public image, media coverage
- Competition for students, grants, contributions
- Evolving standards
- Benefits of refocusing your environmental management efforts away from solely legal / technical issues and toward business / risk management issues
  - risk assessment / prioritization
  - pollution prevention
  - sustainability

Regulatory Compliance Demands

**AIR EMISSIONS**
- Permits - Operating/Construction
- Monitoring Periodic/Routine
- Record Keeping/Reporting/AP Forms
- Annual Compliance Certification
- Air Pollution Control Technology
- Significant Annual Permit Fees

**WASTE WATER**
- E.P.A. Waste Water
  - Waste Determination
  - Hauling/Disposal
  - DOT Transportation, Hazards, Manifests, Spills, Training
  - Record Keeping
  - Contingency Plan
  - Emergency Response
  - OSHA, Hazardous Waste
  - Spill Reporting

**PROCESS WATER**
- Waterworship Analysis
- Storm Water Permitting, Monitoring, Recordkeeping, Testing
- Wastewater Treatment Technology, Monitoring, Permitting, Permitting

**EMERGENCY RESPONSE**
- OSHA SPC / SWP
- OSHA BMP Plan (SWP)
- OSHA Emergency Plan
- OSHA Hazardous Waste
- OSPHA Waste Plan
- TSCA/PSD

**EMERGENCY RESPONSE PLANS**
- OSHA SPC Plan
- OSHA BMP Plan (SWP)
- OSHA Emergency Plan
- OSHA Hazardous Waste
- OSHA Waste Plan
- TSCA/PSD

**TRAINING**
- OSHA Hazard Communication
- OSHA Chem Hygiene
- OSHA HAZWOPER
- OSHA Process Saf Mgmt
- DOT HM-20 Haz Mat
- RCRA Training
- CWMB MMP
- CWMB SPC / SWP

**REPORTS/FEE**
- Annual Compliance, Fiscal
- HM-20 Permitting, Monitoring
- OSHA T2 Report
- AP Forms
- SARA Title 2
- DOT HM-20 Permitting
- Sewer Connection Permit
- WWTP Operator Certification
- Badgework

www.emerald-environmental.com
Environmental Challenges:
Potential Regulatory Challenges and Requirements for Universities

<table>
<thead>
<tr>
<th>Potential Challenges</th>
<th>Potential Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratories</td>
<td>Permitting</td>
</tr>
<tr>
<td>Nursing school</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Transportation systems</td>
<td>Inspections</td>
</tr>
<tr>
<td>Auto servicing/repair facilities</td>
<td>Recordkeeping</td>
</tr>
<tr>
<td>Power plants</td>
<td>Reporting</td>
</tr>
<tr>
<td>Storm water</td>
<td>Written plans</td>
</tr>
<tr>
<td>Waste generation</td>
<td>Training</td>
</tr>
<tr>
<td>Asbestos, lead paint, mercury, PCBs, etc.</td>
<td>Waste management</td>
</tr>
<tr>
<td>Grounds maintenance</td>
<td>Waste minimization</td>
</tr>
<tr>
<td>Incinerating wastes</td>
<td>Emergency response</td>
</tr>
<tr>
<td></td>
<td>Risk Management Planning</td>
</tr>
</tbody>
</table>

How can you ensure regulatory compliance and engender sustainability?

Implement Environmental and Occupational Health and Safety Management Systems

800-570-0690  www.emerald-environmental.com
Implementation Roadmap

- Select Steering Team and Implementation Team
- Initial training for both teams; awareness training and education for all stakeholders
- Gap analysis ➔ Full implementation plan
- Aspects and impacts identification
- Legal and other requirements identification
- Establish objectives, targets and EMPs
- Develop EMS manual and procedures
- Training on operational control procedures
- Internal auditing
- Management review

Certification Roadmap

- Select registrar and submit application (no charge)
- Build your EMS
  - Estimate for a manufacturing site = 1 person year
  - Costs vary by how much work is performed internally versus externally; estimate = $40-80K
  - Typical payback = <2 years
- Registrar’s certification actions (voluntary):
  - Stage 1 audit (site tour and document review) ($XXX)
  - Stage 2 audit (certification) ($XXX)
  - Periodic surveillance audits (6 months – 1 year)
  - Re-certification audit every 3 years
Management Systems
EMS and OH&SMS

What questions do you have that we have not addressed or answered?

800-570-0690  www.emerald-environmental.com

Our Focus Is On
SOLUTIONS

800-570-0690  www.emerald-environmental.com
APPENDIX F: TRUMBULL COUNTY SEPTIC POLLUTION PREVENTION PLAN

Trumbull County
Home Sewage Pollution Prevention Plan

April 2007

Prepared By:
Emerald Environmental, Inc

For:
The Trumbull County Health Department
Trumbull County, Ohio
Table of Contents

I. Introduction 3
   A. Purpose of the plan 3
   B. Home sewage pollution prevention concept 3
   C. Goals and objectives 3

II. County Description 4
    A. Location 4
    B. Natural Features
       1. Ecoregion 4
       2. Size 4
       3. Topography and Soils 5
       4. Water resources 5
    C. Land uses 5
    D. History of HSDS Installation in TC 5
    E. Sewer service areas and unsewered areas 8
    F. Water use 10
    G. Demographics/Socioeconomics 10
    H. State water quality standards/designated areas 11

III. Problem Definitions 11
    A. Characterization of existing household sewage disposal systems 11
       1. Number and types of household sewage disposal systems 11
       2. Public complaints about malfunctioning systems 12
       3. Estimated number of malfunctioning systems 12
    B. Impacts on water quality 12
    C. Current procedure for inspecting and replacing HSDS 12

IV. Goals and Objectives 13

V. Recommended Solutions 15
    A. Sanitary Sewers 15
       1. Areas currently sewered 15
       2. Areas programmed for sewers only by connection to an existing POTW 16
       3. Areas to be served by a POTW or by on-site non-discharging systems 16
    B. Upgrading household sewage disposal systems 17
    C. Funding mechanism for repair/replacement of failing systems 17

VI. Implementation of the Plan 20
    A. Identification and Inventory of HSDS 20
    B. Upgrading and/or Replacement of HSDS 21
    C. HSDS Education for Homeowners 21

VII. Evaluation of the Success of the Plan 21

VIII. References 22

IX. Appendices 24
    A. Three Major Watersheds in Trumbull County 24
    B. Consent Agreements 27
    C. Map of Sewer Service Areas* 28
    D. Map of Unsewered Areas of Concern* 29
    E. Trumbull County Demographics 31
    F. Number and Types of Sewage Systems in Trumbull County 33
    G. Procedure for Inspection and Replacement of HSDS (as of 3/2007) 36
    H. Sewage Planning Areas in Trumbull County* 37
    I. Proposed Procedure for Inspecting/Replacing HSDS 38
    J. Map of 20-Year Estimated Sewer Timeline and Service Area* 39

*Please visit http://planning.co.trumbull.oh.us for periodic updates to these maps
I. INTRODUCTION

A. Purpose of the Plan
The purpose of this plan is to outline a program for the identification, inventory, and correction of failing household sewage disposal systems in Trumbull County, Ohio.

Natural processes, like acid rain, and human activities, such as point and non-point source pollution, adversely affect the quality of surface water in Trumbull County. Point source pollution is the introduction of impurities into water from an identifiable, known location. For example, a point source could be a pipe from a power plant, business or wastewater treatment facility releasing water into a stream or river. Non-point source pollution (NPS) also involves the introduction of impurities into water, but from an unidentifiable or diffuse area. A major portion of the sediment, nutrients, acids, heavy metals, toxic chemicals and pathogens enter water resources through non-point source pollution. Specific examples of NPS polluters include runoff from parking lots and agricultural fields, household sewage disposal systems (HSDS), construction, mining, and home lawn and garden activities.

The Ohio Environmental Protection Agency’s (Ohio EPA) Ohio 2006 Integrated Water Quality Monitoring and Assessment Report indicates an upward trend in attaining all water quality standards (2006). Large rivers in Ohio are meeting water quality goals at a much higher percentage than smaller streams, which indicates that the most pervasive problems affecting Ohio’s aquatic resources are landscape scale, non-point source issues (Ohio EPA 2006).

B. Home Sewage Pollution Prevention Concept
The leaching and discharge of materials from household sewage disposal systems (HSDS) is one of the most common NPS pollution threats to water resource quality in and near areas not served by sanitary sewer systems.

C. Goals and Objectives
The goal of this plan is to protect, preserve, and restore water resource quality in Trumbull County watersheds through control of non-point source pollution from household sewage disposal systems (HSDS). To achieve these goals several objectives must be met:

1) Inspection and inventory of household and commercial sewage disposal systems in Trumbull County
2) Development of computer database of household and commercial sewage disposal systems to enable program staff to develop a preventative maintenance and inspection schedule
3) Initiation of a broad based educational campaign to inform homeowners, potential buyers, developers, and realtors of the importance of proper HSDS maintenance, pollution prevention, and local HSDS requirements.

4) Initiation of an educational and corrective action enforcement program to eliminate pollution from malfunctioning sewage systems

5) Enforcement of HSDS maintenance regulations to ensure the long-term success of the plan.

The Trumbull County Board of Health along with other collaborating agencies will carry out this plan.

II. County Description

A. Location
Trumbull County is located in northeastern Ohio bordered by Ashtabula, Geauga, Portage, and Mahoning Counties in Ohio and Crawford and Mercer Counties in Pennsylvania. Trumbull County is approximately equidistant from two major cities – Cleveland, Ohio and Pittsburgh, Pennsylvania.

B. Natural Features
1. Ecoregion
The state of Ohio is composed of five “ecoregions.” Ecoregions are land-surface areas that are grouped based on similarities in land use, potential natural vegetation, land surface form, and soils. These underlying factors determine the character of the watersheds and influence the way in which human impacts are exhibited. Trumbull County lies within the Erie Drift Plain ecoregion. Once largely covered by a maple-beech-birch forest, much of the Erie Drift Plain is now in farms, many associated with dairy operations. The Eastern Corn Belt Plains, which border the region on the west, are flatter, more fertile, and therefore more agricultural. Low rounded hills, scattered end moraines, kettles, and areas of wetlands, in contrast to the adjacent unglaciated ecoregions to the south, characterize the glaciated Erie Drift Plain.

2. Size
The total area of Trumbull County is approximately 635 square miles; surface water makes up only 18 square miles, or 3% of the total area.

3. Topography and Soils
Elevation ranges from approximately 800 feet to 1260 feet above sea level across Trumbull County. The southeastern portion of the county is decidedly hilly with shallow soils. Soils across the county belong to the Mahoning, Canfield, Rittman, and Chili series. Only 17% of the soils have slope
greater than 8%, which makes a majority of the land in Trumbull County prime for farmland. The seasonal high-water table is typically greater than four (4) feet below the surface, which allows for greater manageability and stability of the soil during wet weather.

4. Water Resources

Three major watersheds exist in Trumbull County: (1) Mahoning River Watershed, (2) Grand River Watershed, and (3) Pymatuning/Shanango Valley. The Mahoning River receives drainage from Mosquito Creek, Eagle Creek, Duck Creek, Squaw Creek and Meander Creek. The Grand River accepts drainage from Mill Creek, Swine Creek, Dead Brand, Mud Run, and Center Creek. The Shenango River receives drainage from Straton Creek, Pymatuning Creek, Sugar Creek, Little Yankee Creek, and Yankee Creek. See the Appendix A for maps of these three watersheds.

C. LAND USES

A majority of land in Trumbull County is rural and dedicated to agriculture or is forested. In recent years, the rate of agriculture land converted to residential development has increased. It is important to remember that these agricultural sites may not have sewage and water lines and therefore need extensions of those lines to ensure compliance with Trumbull County sewer initiatives set forth later in this plan.

Current proportional land use is presented in table 1.

TABLE 1

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>87500</td>
<td>22%</td>
</tr>
<tr>
<td>Forest</td>
<td>143700</td>
<td>36%</td>
</tr>
<tr>
<td>Farm</td>
<td>132000</td>
<td>33%</td>
</tr>
</tbody>
</table>

D. HISTORY OF HSDS INSTALLATION IN TRUMBULL COUNTY

The Trumbull County Health Department records date back only to 1985. Systems that pre-date 1985 are being identified mainly through nuisance complaint investigations and/or real estate transfer inspections. For the past four (4) years, identification of system components via the real estate program have identified the following types of home sewage disposal systems (HSDS):

Pre-1985

- Septic Tanks with a direct discharge
- Old, non-functioning aerators with direct discharge (Note: these systems have no filters or chlorinators)
• Septic tanks to gravel bed with an overflow discharge; filter beds have plugged up and direct channelization to discharge line has occurred

1985 – 2003
• On-lot systems, including septic tanks to a prescribed varying linear feet of trenches, and systems with perimeter drains to lower water tables
• Off-lot aerobic treatment units containing NSF-40 aerobic treatment units and chlorine contact tanks (Note: estimates pursuant to 2002 investigation conducted by the Ohio EPA and Ohio Department of Health show 42% of all systems installed from 1985 to 2003 are off-lot aerobic systems)

2003 – Present (April 2007)
• On-lot systems, including septic tanks to a prescribed varying linear feet of trenches, and systems with perimeter drains to lower water tables
• Aerobic treatment units use for repairs only for existing failing systems; may consist of trash trap, NSF-40 aerobic treatment unit, failsafe dosing chamber, sand filter and/or chlorination or ultraviolet disinfection device

As shown above, several different types of HSDS exist in Trumbull County. The main types of HSDS in the County are: septic tanks with direct discharge, aerator systems, septic tanks with filters or chlorination, and sand mound systems.

1) **Septic Tanks with Direct Discharge**
   In the septic tank with direct discharge system the wastewater tank separates out the large solids and partially decomposes the solids via anaerobic digestion. The water then moves to a soil filter where natural processes destroy remaining bacteria. The water is then directly discharged to a surface water body (such as a lake or stream).

2) **Aerator Systems**
   Aeration systems use bacteria that live only in the presence of air (aerobic). These types of systems are similar to a septic tank in that a wastewater or settling chamber separates out the large solids and partially decomposes them. After treatment in the first chamber, incoming wastewater forces effluent into a second chamber, through a pipe equipped with a filter or baffle. Next, fine bubbles of air are blown into the effluent, encouraging the growth of aerobic bacteria which feed on the organic nutrients and decompose them. The partially treated effluent then flows into a settling chamber. Bacteria fall to the bottom of the chamber where a sloping floor returns them to the first chamber to continue biodegradation. See figure one below for a schematic drawing of an aeration system.

   **FIGURE 1**
3) **Septic Tanks with Filters or Chlorination**

   This type of system generally operates in the same manner as a septic tank with direct discharge. The major difference between the two systems is that as the effluent is exiting the tank it is either filtered or chlorinated. The filter serves to remove solids before the effluent reaches a leach field. If chlorination is used, another chamber is installed that treats the effluent with waste treatment chlorine tablets or liquid, which disinfects the effluent of microorganisms. The treated water then is discharged to a leach field, irrigation system, or surface water body.

4) **Sand Mound Systems**

   In a mound system, specially selected sand is placed on top of the natural soil to help treat and dispose of septic tank effluent. The depth of the natural soil above a limiting layer determines the depth of sand. A limiting layer can be bedrock, a soil layer with a very low percolation rate, or seasonally high groundwater. The depth of sand added to the depth of the natural soil must equal the minimum 4 foot treatment depth required in Ohio.

   In a mound system, septic tank effluent is delivered to the mound with a pump in a dosing tank placed after the septic tank as shown in Figure 2. The mound itself is carefully constructed above ground.
It is estimated that approximately 26,000 home sewage disposal systems are in use in Trumbull County. A copy of the Trumbull County Health Department’s database with approximately 13,000 records (350+ pages) is available upon request.

More recently, The Trumbull County Health Department signed a consent agreement outlining the future use of HSDS in Trumbull County on September 1, 2006. The Trumbull County Board of Commissioners signed another consent agreement on January 12, 2007 outlining the areas of concern and the construction schedule for sanitary sewers in the County. Please see Appendix B for copies of these agreements.

E. SEWER SERVICE AREAS AND UNSEWERED AREAS

Refer to Appendix C for a map of sewer service areas and unsewered areas in Trumbull County. Refer to Appendix D for a map and summary of Ohio EPA unsewered areas of concern in Trumbull County.

Trumbull County Sanitary Engineers operates and maintains two wastewater treatment plants (WWTP) and several package plants throughout the County. See below for tables of WWTP and package plant details.

<table>
<thead>
<tr>
<th>Name</th>
<th>Average Daily Flow (millions of gallons)</th>
<th>Location (Township)</th>
<th>Number of Households Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mosquito Creek WWTP</td>
<td>4.2</td>
<td>Howland</td>
<td>5,000</td>
</tr>
<tr>
<td>Brookfield WWTP</td>
<td>1.3</td>
<td>Brookfield</td>
<td>1,200</td>
</tr>
</tbody>
</table>
The EPA Priority list is of the highest importance to the Trumbull County Health Department. The Trumbull County Commissioners have consented to sewer 11 of the areas on the EPA Priority List. See table below for unsewered areas of concern and the planned construction completion dates for sewer extensions to those areas. Please refer to Exhibit A in The Board of Commissioners Consent Order in Appendix B for a map of these unsewered areas of concern. Another map and summary of the Areas of Concern can be found in Appendix D.

**Table 3**

<table>
<thead>
<tr>
<th>Package Plants in Trumbull County, Ohio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Allman's</td>
</tr>
<tr>
<td>Bazetta</td>
</tr>
<tr>
<td>Logan Arms</td>
</tr>
<tr>
<td>Mecca</td>
</tr>
<tr>
<td>Newton Manor</td>
</tr>
<tr>
<td>Vienna</td>
</tr>
<tr>
<td>B&amp;K (Warren Water #3)</td>
</tr>
<tr>
<td>Fox Den</td>
</tr>
</tbody>
</table>

**Table 4**

<table>
<thead>
<tr>
<th>Unsewered Areas of Concern and Planned Sewer Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
</tr>
<tr>
<td>Lakeshore Drive</td>
</tr>
<tr>
<td>McClearly Jacoby - SR 305/East Central Bazetta Sewer</td>
</tr>
<tr>
<td>SW Bazetta interceptor</td>
</tr>
<tr>
<td>Brookfield Center</td>
</tr>
<tr>
<td>Meadowbrook</td>
</tr>
<tr>
<td>Belmont Ave/Little Squaw Creek</td>
</tr>
<tr>
<td>Kurmont Heights</td>
</tr>
<tr>
<td>Maplewood I</td>
</tr>
<tr>
<td>Maplewood II</td>
</tr>
<tr>
<td>Scott Street</td>
</tr>
<tr>
<td>Kinsman I</td>
</tr>
<tr>
<td>Kinsman II</td>
</tr>
</tbody>
</table>
F. WATER USE

Trumbull County is broken down into 19 water districts. Below is an excerpt from “The Water We Drink: A Cost Comparison of Water in Trumbull and Mahoning Counties.”

Residents of Trumbull County are provided water by means of one of two Water Service Agreements. In the first Service Agreement, the Trumbull County Sanitary Engineer buys water in bulk from another party and distributes the water through County owned, operated, and maintained lines, while charging their own water user fees. In the second Service agreement, the Trumbull County Sanitary Engineer authorizes another party to distribute, operate, maintain, and collect user fees for unincorporated areas. Under this agreement, the Trumbull County Sanitary Engineer can still remain the owner of the utility (Dyer 2003).

See table 2 for a listing of the major water districts in Trumbull County, what water source the district uses, and approximate number of residents in that district.

<table>
<thead>
<tr>
<th>Trumbull County Water Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water District</strong></td>
</tr>
<tr>
<td>Bazetta</td>
</tr>
<tr>
<td>Brookfield</td>
</tr>
<tr>
<td>Champion</td>
</tr>
<tr>
<td>Cortland</td>
</tr>
<tr>
<td>Girard</td>
</tr>
<tr>
<td>Howland</td>
</tr>
<tr>
<td>Hubbard</td>
</tr>
<tr>
<td>Lordstown</td>
</tr>
<tr>
<td>McDonald</td>
</tr>
<tr>
<td>Mineral Ridge</td>
</tr>
<tr>
<td>Newton Falls</td>
</tr>
<tr>
<td>Niles</td>
</tr>
<tr>
<td>Warren</td>
</tr>
<tr>
<td>West Farmington</td>
</tr>
</tbody>
</table>

G. Demographics and Socioeconomics

According to the U.S. Census Bureau the 2005 estimated population of Trumbull County is 219,296 people about a four percent (4%) decrease from the 1990 census. Trumbull County’s population is predominantly white, non-Hispanics with 90% of the population identifying as such. In 2004, just over 96,000 housing units were located in Trumbull County with an average of 2.5 people per household. Fifty-six percent (56%) of the civilian labor force is employed in mostly manufacturing, education, health and social services, and retail trade professions. The median household income is approximately $38,000 per year with nearly 8% of families falling below the poverty line. Twenty-six percent (26%) of families with single parents and 10% of individuals (no related children in the household) fall below the poverty line.
line. For more information on demographics and socioeconomics in Trumbull County please see Appendix E.

H. State Water Quality Standards/Designated Uses
The Ohio EPA has published, and periodically updates, the water quality standards and designated uses for each water body in the state. Based on field data, each stream segment is assigned “designated uses” for three main areas: aquatic habitat, water supply, and recreation. These designated uses characterize for what that particular water body is capable of being used. The water quality standard then set numerical criteria in order for that designated use to be maintained or achieved. The three watersheds in Trumbull County are predominantly designated for use as: warm water aquatic habitat, agricultural and industrial water supply, and primary contact recreation.

III. Problem definition

A. Characterization of Existing Household Sewage Disposal Systems

1. Number and Types of Household Sewage Disposal Systems
   See Appendix F for a table showing the number and types of existing sewage systems by location in Trumbull County.

2. Public Complaints about Malfunctioning Systems
   Under its nuisance abatement authority, the Trumbull County Health Department receives and responds to citizen complaints about nuisances produced by malfunctioning household sewage disposal systems. Sewage complaints are proportionate to the distribution of systems in use in each township. Estimates of total number of malfunctioning systems are partially based on sewage complaints received by the Health Department. Table 3 outlines sewage complaints as of December 6, 2006.
TABLE 3

Sewage Complaints Received by Health Department (12/06/06)

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage</td>
<td>24%</td>
</tr>
<tr>
<td>Raw Sewage</td>
<td>23%</td>
</tr>
<tr>
<td>Sewage Nuisance</td>
<td>6%</td>
</tr>
<tr>
<td>Sewage in Ditch</td>
<td>2%</td>
</tr>
<tr>
<td>Sewage Odors</td>
<td>2%</td>
</tr>
<tr>
<td>Septic</td>
<td>1%</td>
</tr>
<tr>
<td>Sewage Drainage</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>41%</td>
</tr>
</tbody>
</table>

3. Estimated Number of Malfunctioning Systems

Based on 2004 inspections, nearly 85% of all home sewage disposal systems in Trumbull County are either failing or malfunctioning. This means of the 921 systems in use in the County 783 systems do not meet Health Department Standards.

B. Impacts on Water Quality

Water quality monitoring data indicates that all or parts of the following Trumbull County watersheds are affected by non-point source pollution: Grand River Watershed, Shanango Watershed, and the Mahoning River Watershed. The most common forms of NPS pollution in these areas are agricultural lands, storm sewers, household sewage disposal systems, urban sources, and surface runoff.

C. Current Procedure for Inspecting and Replacing HSDS

The process by which HSDS are inspected in Trumbull County is a simple one. There are four ways a home will come under inspection. The first is if the homeowner applies for a permit to build an addition onto the home. Second, if a mobile home or a-frame home will be replaced with another mobile or a-frame home; the homeowner in this scenario will need to apply for a permit from the County which will alert the Health Department to the required inspection. Third, when a home- or property-owner requests a transfer of title (e.g. selling the home or property) the Health Department requires a HSDS inspection. Last, any written nuisance complaints about a HSDS sent to the Trumbull County Health Department will precipitate a formal inspection.

The corrective action procedure for failing systems identified by inspection or complaint will consist of education with a verbal notification giving a specific time limit for repair or replacement. For those
remaining in non-compliance, an official notice and order will be issued followed by hearings with the County prosecutors office, if necessary. Contractors registered with the Trumbull County Health Department must carry out household sewage disposal system repairs. System installation and repair permits are granted to property owners only after system design and installation criteria contained in Ohio Administrative Code rules 3701-29 and Trumbull County General Health District HSDS regulations are met.

After inspection the Health Department will either accept the HSDS on a performance basis and incorporate the system into the HSDS database for operation and maintenance permitting or the HSDS is deemed to be creating a public health nuisance, failed, and ordered to be replaced. Once replacement has occurred it is placed on annual PTO (permit to operate) process and entered into the database. Additionally, pursuant to Trumbull County’s Phase II Storm Water Plan the Health Department will supply this information to the Trumbull County planning commission on an annual basis to update their maps and other databases.

For a more complete picture of the procedure for inspection, installing and/or upgrading septic systems in Trumbull County, Ohio please refer to Appendix G.

IV. GOALS AND OBJECTIVES
Because a majority of water districts in the County utilize surface water, protecting the quality of that surface water is of the utmost importance. The goal of this plan is to protect, preserve, and restore water resource quality in Trumbull County watersheds through control of non-point source pollution from household sewage disposal systems. The goals and objectives of this plan are consistent with the Ohio NPS program objectives.

To accomplish the goal of this plan, several objectives must be met. These objectives are:

1) Inspection and inventory of household and commercial sewage disposal systems (H/CSDS) in Trumbull County
2) Development of a database of H/CSDS to enable Health Department staff to develop a preventative maintenance and inspection schedule
3) Initiation of a broad based educational campaign to inform homeowners, potential buyers, developers, and realtors of the importance of proper HSDS maintenance and pollution prevention
4) Initiation of an education and corrective action enforcement program to eliminate pollution from malfunctioning systems.
5) Enactment of HSDS maintenance and septic disposal regulations to ensure the long-term success of the Plan.

To meet objective 1, Trumbull County Health Department staff will complete an inventory and inspection of all HSDS in the County with priority given to those areas with the highest number of systems. Inventory and inspection will consist of homeowner interviews to solicit information about sewage system type (when no permit for the system is on file with the Department of Health), maintenance and repair history, and a visual inspection of the property and exposed components of the system, as well as dye testing in the event of visibly evident malfunctioning systems. The purpose of this inventory and inspection is to determine the number, location, history, age, and operational quality of the household sewage disposal systems in Trumbull County. The information obtained will be used to plan and implement the educational, corrective actions, and monitoring parts of this Plan.

Trumbull County Health Department has already begun working with the Trumbull County Storm Water Program and the Planning Commission to develop the inspection and inventory program.

The Health Department has already begun actions to meet the second objective of creating an electronic database of HSDS in Trumbull County. A database of approximately 13,000 records (350+ pages) already exists. This database outlines the type, location, and service history (if available) of known HSDS in the county.

Sampling of waterways in critical areas for bacteriological and chemical analysis will take place early in the implementation of the Plan in order to establish a baseline measurement of NPS impact. Subsequently, on semi-annual basis water samples will be collected from these waterways to determine an improved quality of water due to the implementation of the Plan. All results will be compared to all prior test results from other agencies, if available, to provide a historical perspective.

To meet the third objective of this Plan, the Trumbull County Health Department and collaborating agencies will conduct a series of seminars for prospective home buyers, contractors, realtors, and developers about the role of home site and HSDS selection and maintenance.

Corrective action enforcement is essential to the success of this Plan. Household sewage disposal systems identified as malfunctioning or failing in the inventory will be inspected, pumped, and, if necessary, repaired, upgraded or abandoned in accordance with Trumbull County Health Department regulations. Specifically, the corrective action procedure will consist of education with a verbal notification giving a specific time limit.
for corrective action. For those remaining in non-compliance, an official notice and order will be issued followed by hearings with the County’s prosecutor’s office if necessary.

The Department of Health recognizes that a significant portion of the residents of Trumbull County do not have the financial means to make extensive repairs or replacements to their HSDS. Therefore, the Health Department proposes to work with the Ohio EPA Division of Environmental and Financial Assistance to establish options for qualifying residents for system repairs or replacements.

V. Recommended Solutions
A. Sanitary Sewers
   Extension of sanitary sewerage is the ultimate solution to NPS pollution from home sewage in densely developed areas with a high prevalence of malfunctioning household sewage disposal systems.

1. Areas Currently Sewered
   Lands have been included in this category because an adequate collection system is in place to transfer those wastes and capacity exists at a POTW to accept and treat the wastes generated by the area. These areas are currently served with operational, sanitary sewers and/or county owned, operated, and maintained Package Plants. However, there may be undeveloped tracts of land and vacant lots subject to improvement.

   In these currently developed land all new development and construction will be required to connect and/or provide sanitary service to ensure that wastewater will be transported to and treated at an existing publicly owned treatment works (POTW). The cost to connect and/or develop the infrastructure shall be borne by the developer. Existing development that was not originally required to tie into sanitary sewer are required to connect as sanitary sewers become available and accessible, as determined by the Ohio EPA and/or the Trumbull county General Health District. Also, if a HSDS is failing or malfunctioning and the property is in a sewered area the property owner is required to connect to the sewer lines at his/her own cost to ensure all wastewater from that property is treated at an existing POTW.

2. Areas programmed for sewers only by connection to an existing POTW
   Lands have been included in this category because capacity exists (or can be added) at an existing POTW to accept and treat wastes generated by the area and demand exists to extend the lines to the area in question. These areas are projected to receive sewers, but are not yet sewered. These
transitional areas contain undeveloped tracks of land and vacant lots subject to improvement. Projected wastewater flow from these areas is accounted for within the system.

All new development is required to connect to an existing POTW; cost of connection shall be borne by the developer. Existing multi-family, commercial, industrial, institutional properties, major and minor subdivisions, as well as single family home HSDS within this area shall be required by the Ohio EPA and/or the Trumbull County Health Department to connect to the sanitary sewer as it becomes available. Again, all failing or malfunctioning systems will be required to immediately connect to an existing POTW at the cost of the property owner.

3. Areas that will be served by a POTW or by on-site, non-discharging systems

These areas may be served by either individual on-site, non-discharging systems or by new sanitary sewer infrastructure (if determined accessible and available) that connects and/or provides sanitary service to ensure that wastewater will be transported to and treated at the existing POTW. The decision to connect to a sanitary sewer system shall be made by the Trumbull County General Health District and/or the Ohio EPA, whomever has the authority. The cost to connect and/or develop the infrastructure shall be borne by the developer.

Existing HSDS or SPSDS/private wastewater treatment systems failing to operate may be replaced or upgraded as necessary provided the Trumbull County Health Department and/or the Ohio EPA finds a suitable treatment systems design and installation meeting state and local requirements. Existing off-lot discharging systems failing to operate may be replaced or upgraded with another off-lot discharging system, but only if no other feasible alternative exists and sanitary sewer service is not accessible. Existing commercial, industrial, or private businesses with an existing sewage system designed for a discharge may be expanded only if treated effluent is improved to ensure that there will be no net gain in pollutant loads discharged as a result of the proposed expansion.

Please see Appendix H for a map of these three types of areas in Trumbull County.

B. Upgrading Household Sewage Disposal Systems

Traditional household sewage disposal systems with on-lot discharge are the preferred type of upgrade or replacement system if sanitary sewer is not accessible. Aeration systems and systems discharging off-lot are alternatives considered only if on-lot systems are not feasible. Off-lot discharge is permitted only by variance from Board of Health regulations; no new off-lot systems are currently permitted in special sanitary districts (e.g. in areas adjacent to lakes or reservoirs). When on-lot discharging systems are not
feasible in these areas, holding tank permits may be granted by variance request as a last resort for the homeowner.

C. Funding Mechanisms for Repair/Replacement of Failing Systems
The Trumbull County Planning Commission, the Trumbull County Health Department and the Trumbull County Sanitary Engineer's Office collaborate on a regular basis concerning sanitary sewer issues and home sewage treatment systems (HSTS). Loans and grants are available based on a number of varied criteria to residents in Trumbull County for the repair or replacement of a HSTS or for connection to an existing sanitary sewer system. Gaps still remain in the funding options available to the residents of the County.

The Trumbull County Health Department is currently working on an application for participation in the Linked Deposit Program administered through the Ohio EPA Division of Environmental and Financial Assistance (DEFA). This program along with the 319 Program is a toll developed by the EPA to address failing or poorly maintained HSTSs. The Linked Deposit Program provides reduced interest rate loans to individuals in qualifying watersheds, county areas, or other locations for solutions to non-point source pollution problems. To do this, the EPA Water Pollution Control Loan Fund (WPCLF) invests funds, usually through certificates of deposit, with participating local lending institutions at rates of interest that are below market. In turn, the lenders then make loans to qualifying borrowers at interest rates that are lowered by the same amount as the interest rate reductions that the WPCLF takes on its investment. There are some notable stipulations for utilizing the Linked Deposit Program for repair or upgrade of HSTSs. Funds will be targeted to failing HSTSs that currently have a point of discharge, but with an upgrade or replacement will be non-discharging. A point of discharge means that the system has a discreet point at which the effluent from HSTS enters a storm sewer drain, public ditch, or discharges to the surfaces of the ground. These funding programs also cover failing non-discharging (or on-site) HSTSs that with an upgrade or replacement remain non-discharging. The Linked Deposit Program is also subject to credit and income requirements that the individual homeowner must meet.

This program may have limited impact in Trumbull County due to certain circumstances; mainly, less than 25 percent (25%) of the failed HSTSs identified in Trumbull County in 2005 were successfully converted from off-lot to functional on-lot discharging systems. Nonetheless, the Trumbull County Health Department is moving forward with the application process in order to increase the number of funding options available for the residents of Trumbull County.
It has been proposed that a Nuisance Abatement Fund be implemented in Trumbull County. This fund would be more inclusive and serve those homeowners that do not qualify for the loan and grant fund programs. The County would need to create a fund in order to implement HSTS repairs or replacement. The costs associated with the repair or replacement work would then be assessed on the homeowner’s property taxes similar to the process available for townships to carry out demolitions.

The United States Department of Agriculture (USDA) offers low-interest loan (1% interest) assistance for very low-income persons through the 504 Rural Housing Program for HSTS repair and replacement. However, most Trumbull County’s urbanized areas are outside the eligible program areas. To determine if a location is eligible for funding under this program the homeowner should contact Denise McCann, Rural Development Specialist, USDA at 330.830.7700. The homeowner must meet certain income requirements for participation in this program. The income levels of homeowners cannot exceed 50 percent (50%) of the County’s median household income. According to the U.S. Census Bureau, the median household income for Trumbull County is $38,298; therefore, homeowners’ annual income cannot be greater than $19,149 to be eligible for this program. The USDA, to determine eligibility, examines persons with less than perfect credit histories on an individual basis. A limited amount of grant funds are available for person aged 62 and over who do not have the proven ability to repay the low-interest loan. In addition, elderly persons should contact the District XI Area Agency on Aging for possible assistance through their various housing repair programs.

Trumbull County’s HOME Program have been utilized in the past to replace a HSTS as part of an overall rehabilitation of the home including other major components (roofing, electrical, siding, windows, etc). The current HOME policy is to replace/install HSTSSs for the houses being rehabilitated in a target area only when required by the Trumbull County Health Department. The Trumbull County Planning commission Board Members have stated that they do not wish to expand HOME funds on the repair or replacement of HSTSSs, rather the funds should be expended on housing rehabilitation activities as intended. There are a number of issues that complicate the use of these funds for septic system repair or replacement. The HOME Program has an expenditure threshold of $35,000 for the general rehabilitation of the house for things like a new roof, windows, electrical repairs, etc. If the costs for repairing or replacing a failing HSTS (identified by the Health Department) combined with the costs for the general rehabilitation work exceed the $35,000 threshold the house would be considered a “walk-away.” Trumbull County would not be able to rehabilitate the house through the HOME Program. However, the homeowner would then be required to repair or replace a failing HSTS without financial assistance from the County.
The Trumbull County Community Development Block Grant (CDBG) Program Formula funds can be utilized in the same manner as HOME funds. Housing rehabilitation activities is an eligible activity, however the entire housing unit would have to be brought up to Section 8 Rehabilitation Standards costing almost $45,000 per unit. Any funds programmed for Housing Rehabilitation and HSTS repairs or replacement will reduce the funds available for sanitary sewer construction and addressing the Unsewered Areas of Concern (as shown in the Septic Systems of Trumbull County, Ohio map in the Appendix of this Plan). The Emergency Housing Repair Activity Sanitary Lateral Assistance Program under the CDBG Formula Program covers costs for connecting low-income persons into an existing sewer line. The Sanitary Lateral Assistance Program was conducted in previous funding years and served less than ten residents. The Trumbull County Commissioners dedicate the majority of the CDBG Formula dollars toward the Unsewered Areas of Concern.

Since 2000, over 1.2 million dollars in CDBG Formula funds have been dedicated toward sanitary sewer projects. In addition to the Formula funds, almost 2.5 million dollars in CDBG Water and Sewer competitive funds have been awarded to Trumbull County for the construction of sanitary sewers in low-income Unsewered Areas of Concern. These funds are packaged with CDBG RLF, State Issue II (now State Issue I) Public Improvement Funds, USDA loans and grants, OEPA WPCL funds, congressional appropriations and local funds to complete, on average, one sanitary sewer project per year that serves low-income areas and alleviates the health and safety threat existing in those neighborhoods due to failing HSTs. Low-income homeowners receive financial assistance through the CDBG Formula and Water and Sewer grant programs in the form of lateral construction and tap-in fees provided by the County. It is crucial that the Commissioners continue to dedicate the CDBG Formula funds are used as leverage for all of the other competitive grant programs. The County is required to update the Community Assessment Strategy (CAS) each year that details hose the allocation is to be spent over the next several years. The current CAS has sanitary sewer projects in Unsewered Areas of Concern rates as the highest priority and scheduled for implementation through FY2011.

VI. Implementation of the Plan
A. Identification and Inventory of HSDS
As stated above, the process by which HSDS are inspected in Trumbull County is a simple one. There are four ways a home will come under inspection. The first is if the homeowner applies for a permit to build an addition onto the home. Second, if a mobile home or a-frame home will be replaced with a another mobile or a-frame home; the homeowner in this scenario will need to apply for a permit from the County which will alert the Health Department to the required inspection. Third, when a home- or property-owner requests a transfer of title (e.g. selling the home or property) the Health Department requires a
HSDS inspection. Last, any written nuisance complaints about a HSDS sent to the Trumbull County Health Department will precipitate a formal inspection.

The corrective action procedure for failing systems identified by inspection or complaint will consist of education with a verbal notification giving a specific time limit for repair or replacement. For those remaining in non-compliance, an official notice and order will be issued followed by hearings with the County prosecutors office, if necessary. Contractors registered with the Trumbull County Health Department must carry out household sewage disposal system repairs. System installation and repair permits are granted to property owners only after system design and installation criteria contained in Ohio Administrative Code rules 3701-29 and Trumbull County General Health District HSDS regulations are met.

If a HSDS is found to be failing, the system can be abandoned in favor of connection to the sanitary sewer or can be replaced or upgraded to a non-discharging system. It is preferable that homeowners connect to the sanitary sewer if it is available. Homeowners who will replace or upgrade to a non-discharging system or who will abandon their HSDS and connect to the sanitary sewer may qualify for participation in the Linked Deposit Program. If homeowners do, in fact, qualify the Health Department will issue said homeowner a Certificate of Qualification. This certificate is required at the time of Linked Deposit Loan Program application at participating banks. Those homeowners that choose to participate in the Linked Deposit Loan Program will be required to submit to operation and maintenance inspection requirements and all new HSDS and/or connection to sanitary sewer lines will be required to undergo a final inspection.

After inspection the Health Department will either accept the HSDS on a performance basis and incorporate the system into the HSDS database for operation and maintenance permitting or the HSDS is deemed to be creating a public health nuisance, failed, and ordered to be replaced. Once replacement has occurred it is placed on annual PTO (permit to operate) process and entered into the database. Additionally, pursuant to Trumbull County’s Phase II Storm Water Plan the Health Department will supply this information to the Trumbull County planning commission on an annual basis to update their maps and other databases.

For a more complete picture of the procedure for inspection, installing and/or upgrading septic systems in Trumbull County, Ohio please refer to Appendix I.
B. Upgrading and/or Replacement of HSDS
It is estimated that approximately 400 HSDS will be upgraded or replaced per year, while another 400 HSDS per year will be abandoned and a connection made to the sanitary sewer lines. Average costs for the replacement of leach field systems in Trumbull County range from approximately $9,000 to $14,000. To upgrade a off-lot HSDS to an on-lot HSDS the cost ranges from approximately $11,000 to $15,000. To abandon a system and connect to sanitary sewer lines or to upgrade an existing HSDS to a mound system costs between $20,000 and $25,000. Because these rates are higher than typical prices across Ohio (ranging from $5,000 to $7,000), Trumbull County would require four million dollars ($4,000,000) per year for a five year MOU term. It is understood that this initial MOU term can be extended if necessary.

C. HSDS Education for Homeowners
Upon initiating contact with a homeowner for an inspection, whether it be for a transfer of title, an application for a permit to build an addition, or due to a nuisance complaint, the homeowner will receive an educational handout concerning the process for inspection and permitting as well as current regulatory requirements. Homeowners will also be directed to the Trumbull County Board of Health website (http://www.tcbh.org) for more information.

Additionally, other HSDS related educational materials such as pollution prevention, stormwater awareness, and soil and water conservation are also available through the Trumbull County homepage at http://www.co.trumbull.oh.us).

VI. Evaluation of the Plan
The Trumbull County Home Sewage Pollution Prevention Plan will be evaluated on the following criteria:

1) An increased number of health department identified failing or malfunctioning HSDSs in the County
2) A calculable increase in water quality in the three (3) main watersheds in Trumbull County (Grand River watershed, Mahoning River Watershed, and the Pymatuning/Shanango Rivers Watershed).
3) An increased amount of available financial assistance to low-income households to replace or repair failing HSDSs.
VII. References


X. Appendices

A. Three Major Watersheds in Trumbull County

Grand River Watershed

MAJOR TRUMBULL COUNTY STREAMS:
1.) MILL CREEK    4.) MUD RUN
2.) SWINE CREEK   5.) CENTER CREEK
3.) DEAD BRANCH
Major Trumbull County Streams:
1. Mosquito Creek
2. Eagle Creek
3. Duck Creek
4. Meader Creek
5. Squaw Creek
Pymatuning/Shenango Watershed

MAJOR TRUMBULL COUNTY STREAMS:
1.) STRATON CREEK
2.) PYMATUNING CREEK
3.) SUGAR CREEK
4.) LITTLE YANKEE CREEK
5.) YANKEE CREEK
B. Consent Orders

Please see following documents for the consent orders.
C. Map of Septic Systems

[Image of a map showing septic systems in Trumbull County, Ohio. The map includes legend entries for septic systems, UAC septic systems, urbanized areas, and UAC septic systems with approximate counts.]
D. Map of Unsewered Areas of Concern and Summary

Septics & Unsewered Areas of Concern
Trumbull County, Ohio

NOTE: Septic Layer only has approx. 70% Accuracy.

Septics (29,095 known)
Unsewered Areas Of Concern (UAC)
UAC Septics approx. 3,885

Trumbull County assumes no legal responsibility for the information contained on this map. This information does not take the place of legal, printed maps, nor does it take the place of an engineered solution. The accuracy to determine actual locations, locations of septic systems, natural features, or other ancillary information is not guaranteed. The maps and supporting materials are not to be used for legal purposes or as a substitute for planning, engineering, or design decisions. While every effort has been made to ensure the accuracy, completeness, or adequacy of the data contained herein, none of the data contained herein is complete, the reader must be careful in the use of this data, or its misuse for any particular purposes. This data is subject to change and should be used in conjunction with the text. The map and supporting materials are transmitted for the purpose of illustrating general trends and features as they exist at the time of the survey. The map data does not include properties located on public or private roads or streets.

E. Demographics and Socioeconomics
Population by Township - Trumbull County, Ohio

Legend

Data Classes
- Total Persons
- 0 - 1765
- 1943 - 4021
- 6106 - 14304
- 19411 - 27717
- 46812 - 46832

Features
- Major Road
- Street
- Stream/Waterbody
- Stream/Waterbody

Items in gray text are not visible at this zoom level.

Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrix P1.
Income by Household in Trumbull County

**Income (in thousands of dollars)**

- < 10
- 10 to 14.9
- 15 to 24.9
- 25 to 34.9
- 35 to 49.9
- 50 to 74.9
- 75 to 99.9
- 100 to 149.9
- 150 to 199.9
- 200+

**Percentage of population**

- 0.0
- 5.0
- 10.0
- 15.0
- 20.0
- 25.0
### F. Number and Types of Known Sewage Systems (Dec. 11, 2006)

<table>
<thead>
<tr>
<th>System</th>
<th>Bazetta</th>
<th>Champion</th>
<th>Hartford</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>14</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>8</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Bazetta</strong></td>
<td><strong>40</strong></td>
<td></td>
<td><strong>Total Champion</strong></td>
</tr>
<tr>
<td><strong>Total Hartford</strong></td>
<td><strong>23</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System</th>
<th>Bloomfield</th>
<th>Farmington</th>
<th>Howland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>3</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>5</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Bloomfield</strong></td>
<td><strong>17</strong></td>
<td></td>
<td><strong>Total Farmington</strong></td>
</tr>
<tr>
<td><strong>Total Howland</strong></td>
<td><strong>14</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System</th>
<th>Braceville</th>
<th>Fowler</th>
<th>Hubbard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>24</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>2</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>22</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>10</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>On-lot</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Braceville</strong></td>
<td><strong>67</strong></td>
<td></td>
<td><strong>Total Fowler</strong></td>
</tr>
<tr>
<td><strong>Total Hubbard</strong></td>
<td><strong>57</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Bristol
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>1</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>11</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>9</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>6</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>9</td>
</tr>
<tr>
<td>On-lot</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Bristol</strong></td>
<td><strong>37</strong></td>
</tr>
</tbody>
</table>

### Greene
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>1</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>0</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>4</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>3</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Greene</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

### Johnston
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>1</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>2</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>3</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>10</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Johnston</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

### Brookfield
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>2</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>19</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>4</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>8</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>22</td>
</tr>
<tr>
<td>On-lot</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total Brookfield</strong></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>

### Gustavus
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>2</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>0</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>5</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>3</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Gustavus</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

### Kinsman
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>3</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>4</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>6</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>6</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Kinsman</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

### Liberty
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>1</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>6</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>10</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>14</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>8</td>
</tr>
<tr>
<td>On-lot</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Liberty</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

### Niles
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>0</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>1</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>0</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>0</td>
</tr>
<tr>
<td>On-lot</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Niles</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

### Weathersfield
<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td>0</td>
</tr>
<tr>
<td>Band-aid fix</td>
<td>1</td>
</tr>
<tr>
<td>Mound - modified</td>
<td>0</td>
</tr>
<tr>
<td>Off-lot aerobic</td>
<td>12</td>
</tr>
<tr>
<td>Off-lot repair/upgrade</td>
<td>11</td>
</tr>
<tr>
<td>On-lot leaching</td>
<td>24</td>
</tr>
<tr>
<td>On-lot pump</td>
<td>0</td>
</tr>
<tr>
<td>On-lot repair/upgrade</td>
<td>6</td>
</tr>
<tr>
<td>On-lot</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Weathersfield</strong></td>
<td><strong>56</strong></td>
</tr>
<tr>
<td>Location</td>
<td>Aeration</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Lordstown</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Southington</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Warren</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Mecca</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Vernon</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Newton Township</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Mesopotamia</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Vienna</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Systems</strong></td>
<td><strong>921</strong></td>
</tr>
</tbody>
</table>
G. Procedure for Inspection and Replacement of HSDS (as of 3/2007)

- **Real Estate Inspection**
  - Application and Fee Submitted

- **Home Additions and/or Replacements**
  - Application and Paperwork Submitted

- **Sewage Nuisance Complaint**
  - Written Complaint Submitted
  - Homeowner contacts installer who has determined failure of system
  - Homeowner submits application, paperwork, and fee
  - System fails; disapproval letter and forms sent for upgrade
  - Homeowner submits additional needed paperwork
  - R.S. makes appointment for dye test, inspection of system components and sends reports
  - System passes—complaint file closed or file approval letter and PTO Issued
  - R.S. inspects property, determines specs for new system and prelim spec form sent out
  - Installer stakes system according to specs, submits drawing of layout and inspection conducted by R.S.
  - Staking approved, PTI is ready for issuance to installer, permit fee is paid and PTI is issued
  - Installer submits paperwork for final installation inspection and R.S. inspects
  - PTI—Permit to Install
  - PTO—Permit to Operate
  - R.S.—Registered Sanitarian (Inspector)

*Please note that the timeframes on the above vary depending upon timeliness of submission of paperwork and workload of inspector. Most inspections are conducted within 7-10 business days upon receipt of request*
H. Sewage Planning Areas in Trumbull County
1. Proposed Procedure for Inspecting/Replacing HSDS

**Real Estate Inspection**
Application and Fee Submitted

**Home Additions and/or Replacements**
Application and Paperwork Submitted

**Sewage Nuisance Complaint**
Written Complaint Submitted

Homeowner contacts installer who has determined failure of system

Homeowner submits application, paperwork, and fee

System fails; disapproval letter and forms sent for upgrade

R.S. makes appointment for dye test, inspection of system components and sends reports

R.S. inspects property, determines specs for new system and prelim spec form sent out

Installer stakes system according to specs, submits drawing of layout and inspection conducted by R.S.

Health Department awards, if applicable, certificate of qualification to homeowner for use in application to linked deposit fund loans at participating bank(s)

System passes—complaint file closed or file approval letter and PTO Issued

Staking approved, PTI is ready for issuance to installer, permit fee is paid and PTI is issued

Installer submits paperwork for final installation inspection and R.S. inspects

PTI—Permit to Install
PTO—Permit to Operate
R.S.—Registered Sanitarian (Inspector)

Please note that the timeframes on the above vary depending upon timeliness of submission of paperwork and workload of inspector. Most inspections are conducted within 7-10 business days upon receipt of request
J. Map of 20-Year Estimated Sewer Timeline and Service Area

Trumbull County assumes no legal responsibility for the information contained on this map. This information does not factor the presence of brand new maps, nor does it factor the presence of any land use data or surveying of properties. It does not reflect the status of sewer connections, nor does it replace existing registered addresses or street names. The Trumbull County Planning Commission (TCP) makes no warranties or representations of any kind, express or implied, in connection with the information contained herein. While much of the data contained herein is obtained from public records, its official record of the public office or agency from which they were compiled or from the original source has not been verified. TCP neither makes no warranty, express or implied, of any kind, for the accuracy or completeness, reliability or availability of any information herein, nor are they responsible for any loss, injury or damage of any kind, including, but not limited to, any loss of profits or injury arising from the use of this map or data contained herein. Sources: Trumbull County Planning Commission, 2010.

PREPARED BY: Proven Engineering, pending. This project was initiated by the Joint Sewer Committee and the Sewer Committee of the Village of Trumbull. The proposed plans were submitted to the Village of South Bass Island. All questions about this project should be directed to the Trumbull County Sanitary Engineer. (440) 896-5500. Revised: April 2007.

Prepared by: Proven Engineering, Inc.
APPENDIX G: PICTURES OF HHW COLLECTIONS
APPENDIX H: SURVEY

September 22, 2006
To Whom It May Concern:

Emerald Environmental, Inc., is presenting at the Northeast Ohio District Meeting of the American Water Works Association - Ohio Chapter and would like your input. Please complete the following survey and fax it back to our office at 330-677-1567 by October 20th, 2006. The information gathered from this survey will be shared at the District Meeting on October 26th.

Thank you.

RESIDUALS MANAGEMENT SURVEY

1) What is the age of your water treatment plant? ____________________________

2) What is the source of your water supply? ________________________________

3) What is the date of the most recent upgrade to the water treatment plant? ____________

4) Do you utilize alum as the primary coagulant in the treatment process? Yes_____ No_____
   a) If yes, how do you dispose of the alum sludge? __________________________
   b) What amount of alum sludge is produced per day? _______________________
   c) Do you use other additives such as ferric chloride, potassium permanganate or lime? Yes_____ No_____ 
   If yes, what types of additives? ____________________________

5) Do you use mechanical dewatering prior to disposal of the residual sludge? Yes_____ No_____ 
   a) If yes, is lime added? _____________________
   b) Are polymers or other additives introduced to the sludge? Yes_____ No_____ 
   If yes, what polymers or additives? __________________________
   c) How much water is discharged during press operation? ____________________
   d) What is the annual O&M cost for the mechanical dewatering equipment? __________
   e) What is the annual capital cost and term for the mechanical dewatering equipment? __________________________

6) If the residuals are disposed or reused, how are they disposed and what are the annual costs?
   Disposed:
   How______________________________ Cost____________________
   Reused:
   How______________________________ Cost____________________

Please fax the completed survey to 330-677-1567 by October 20, 2006
Survey results will be shared at the District Meeting on October 26th.
Thank you for your assistance.
APPENDIX I: SYNOPSIS OF ALUM PROGRAM

Upcyclers, Inc.
Alum Reuse Program

Background

A United States Environmental Protection Agency ruling requires all water treatment plants to have an approved sludge management plan; that includes the management of alum residual sludge. In many cases only two management/disposal options are available: (1) Off-site solidification and landfill disposal or (2) On-site solidification and landfill disposal. Both of these options merely discard a useful by-product of the water treatment process.

There is now another option: Upcyclers, Inc., holds a patent for the conditioning and beneficial reuse of alum water treatment residuals (ATWR). The patent, leased to Emerald Environmental Services, Inc., (herein EES), allows ATWR from water treatment plants to be conditioned in such a way that it can be blended with topsoil to create a marketable landscaping material.

Further, EES has developed a patented process that enables the production of a landscaping material with ATWR that does not inhibit bio-available phosphorus. The alternative use of ATWR, involves blending this material in selected ratios with other materials that maximizes the beneficial properties of ATWR and provides enhanced nutrient levels in a blended soil, and enhances physical soil properties in blended soils.

Land Reclamation and Habitat Creation

Brownfields, sand and gravel operations, mining operations and other impacted sites need cost-effective, scientifically and environmentally sound options for reclamation. The patented Upcyclers process provides a solution for these difficult sites. The application of ATWR conditioned through the Upcyclers process may inhibit acid mine drainage and other contaminants thereby supporting the growth of vegetation and reducing sediment runoff. The use of this product does not require the practice of utilizing soil from adjacent lands for reclamation; rather the conditioned ATWR can be blended with composts and soils. By utilizing leaves and yard clippings from municipal collections, a considerable amount of waste is diverted from landfills and reused as a resource.

The use of ATWR blended with soils and composts creates useful land reclamation resources that provide superior water and soil quality. This directly impacts habitat creation for game animals, migratory birds and other wildlife. Such a program may be revolutionary for mine and impacted site owners.

Proposed Field Test Project

Given the above information, Upcyclers and EES are proposing a two year program to study the effects of conditioned alum residual material in a strip mine impacted site in Guernsey County,
Ohio. It is the intent of Upcyclers and EES to involve an Ohio based University to provide soil testing services as part of the project.

The proposed test is on two ten acre sites. The test involves trucking 24,000 tons of conditioned alum from sites in Cleveland and Kent, Ohio to the site. The test material will cover the site with a six inch (6”) cover of blended materials. One site will be a topsoil/conditioned ATWR blended material. The second site will be covered with a similar mix, lime filter cake added to the blended material. {Does this last sentence make sense?}

Upcyclers and EES are seeking partners to deflect the following costs: transportation, testing, plant material, soil preparation and other associated costs. This research will provide the answers to two critical questions:

(1) Will the land application of conditioned ATWR allow for sustained plant growth?
(2) Will alum and lime filter cake work as a liming substitute for the distressed soils on a site with a Ph of 3?
APPENDIX J: SEE’S STRATEGIC PLAN

Our Vision

Sustainability is “the ability of current generations to meet their needs without compromising the ability of future generations to meet their own needs.” Waste reduction and recycling are key components of sustainability that need special attention in northeast Ohio. Sustainability for Educators and the Environment (SEE) seeks to educate students in northeast Ohio about sustainability principles and to support the practical application of these principles in schools and communities. By establishing a network of schools across nineteen counties, S.E.E. can provide sustainability workshops for students and coordinate reuse and recycling programs. S.E.E. offers curricula tailored to varying student ages and teacher needs bringing knowledge and practical applications of sustainability principles to the community. Motivating environmental clubs and recycling programs, helping schools turn trash into cash, and promoting the use of recyclable and recycled products to close the reuse loop are also major components of S.E.E.’s ultimate vision.

Goal and Objectives

Sustainability for Educators and the Environment seeks to promote and provide environmental education, specifically waste reduction and recycling education, to northeast Ohio schools. To achieve this goal the following objectives must be met:

- **Educational Programs** …
  - Collect lesson plans and educational materials and place in a database for use by educators and interns
  - Create general, larger-scale programs for implementation in schools and districts
  - Provide workshops to educators and administrators on environmental themes
  - Provide quality, paid, college internships to promote the further environmental education of college students as they prepare lessons and programs for k-12 students

- **Sustainable Waste Management Initiatives** …
  - Work with school administrators and facilities personnel in support or initiation of district recycling or waste reduction programs
  - Support and motivate student environmental clubs that are addressing waste management in an environment-friendly manner
  - Raise awareness about recyclable materials and reuse options
• **Grant Writing**
  
  o Provide grant proposal and report writing assistance to schools and districts as needed

See Appendix A for descriptions of current and proposed future activities.

**Keys to Success**

• Sustainability for Educators and the Environment must engage and be responsive to teachers, school administrators, local partners, and, most of all, the students.

• S.E.E. must serve the community through knowledgeable programs and practical applications pertinent to the stakeholders involved.

• The organization must be responsible for maintaining a high-quality learning experience in an inclusive and experimental atmosphere, and to support local efforts to improve sustainability practices over the long-term.

• The first priority of S.E.E. must be its intended audience; the agency must be patient through gradual expansion, solicit and incorporate constructive feedback, and cooperate with partners who share its mission. The ultimate outcome will be a cycling set of sustainability workshops that reaches all students in Northeast Ohio sometime prior to high school graduation, as well as self-sufficient recycling programs and increased use of recycled materials at the 192 Northeast Ohio school districts.

**Resources**

As of 25 June 2006, S.E.E. has the following resources (an * indicates a donated resource)

• **Personnel**
  
  o Brian Grimm, President*
  
  o Scott Hershberger, Vice President*
  
  o Sandy Hershberger, Treasurer*
  
  o Jill Grimm, Secretary*
  
  o Sarah Lane, Development and Internship Director*

• **Equipment**
  
  o One Dell Inspiron 2200 Notebook Computer*
  
  o Internet and server space*
  
  o Office space (including copy, phone, and fax abilities)*
• Office furniture*

• Cash and Investments
  o $0

• Stationary and Supplies
  o Two (2) reams (1000 sheets) first page personalized letterhead*
  o Two (2) reams (1000 sheets) second page personalized letterhead*
  o 500 personalized envelopes*
  o Five (5) reams (2500 sheets) white copy paper*
  o Miscellaneous office supplies*

• Marketing Supplies
  o 500 donation cards*
  o 500 information sheets*
  o 500 program packets*
  o Website*

• Skills and Expertise
  o Brian Grimm – J.D. Case Western Reserve School of Law; B.S. Kent State University; 15 years in environmental consulting field
  o Scott Hershberger – B.S. Kent State University; Geologist; Industrial Hygienist; 15+ years in environmental consulting field
  o Sandy Hershberger –
  o Jill Grimm –
  o Sarah Lane – M.En. Institute of Environmental Sciences, Miami University; B.A. Marietta College; graphic design skills; ~2 years in solid waste field

• Contacts
  o Please see Appendix D for list of essential S.E.E. contacts
Situational Analysis

In conducting a situational analysis S.E.E. outlines the following strengths, weaknesses, opportunities, and threats.

Strengths

S.E.E. has many strengths. First, the board of directors contains respected community business leaders with strong connections in the northeast Ohio community. These connections are essential to the success of S.E.E. Second, S.E.E. is flexible and able to change with the needs of the communities served because S.E.E. has no constricting program goals. This flexibility allows S.E.E. to create programs relevant to the needs of the schools and districts served rather than forcing them into a specific project that they may not need or want. Third, S.E.E. has talented and dedicated individuals with a range of expertise from teaching to consulting, geology to law, solid waste management to geography. Fourth, S.E.E. feels its mission of practical application of sustainable waste management initiatives is a unique twist on the typical sustainable or environmentally based non-profits in the area.

Weaknesses

While S.E.E. has many strengths, many weaknesses also exist. First, S.E.E. depends upon its founding, for-profit corporation for much of its start-up funds. Second, because the founding, for-profit corporation mostly donates S.E.E.’s directorate there is not much diversity on the board. Third, other non-profit groups and Solid Waste Management Districts (SWMD) may view S.E.E. as a repeat or copy of their own initiatives. Unfortunately, this may cause tension between S.E.E. and other groups when working together toward their common goals would be more preferable and beneficial to the community. Fourth, while S.E.E.’s directorate is well intentioned and has expertise in many necessary subject areas, the directorate is not highly experienced in running non-profit corporations. Thankfully, the directorate has experience running for-profit corporations and can use that knowledge to properly manage S.E.E.

Opportunities

Opportunities for S.E.E. abound in the northeast Ohio community. The vast amount of school institutions in the area serves as a major opportunity for growth. There are 192 districts in 19 counties in northeast Ohio; this gives S.E.E. 192 opportunities for implementing sustainable waste management initiatives, enhancing environmental education, and strengthening communities.

The following outlines the market segmentation of schools in the Northeast Ohio region, spanning 19 counties including Ashland, Ashtabula, Carroll, Columbiana, Cuyahoga, Geauga, Harrison, Holmes, Jefferson, Lake, Lorain, Medina, Mahoning, Portage, Stark, Summit, Trumbull, Tuscarawas, and Wayne:

- **Elementary and Middle Schools (Grades K-8th)** – Across the 186 public school districts there is a broad range in system size. Harrison County has only 6 elementary schools, while Cuyahoga County has 306 (Ohio Educational Directory 2006).
• **HIGH SCHOOLS (GRADES 9-12)** – Similar to elementary schools, there are a diversity of public high school situations throughout Northeast Ohio. A county may have only two high schools (Holmes), or numerous schools or even campuses with programs separated into distinct buildings. On average, 20% of a district’s schools are high schools in comparison to the number of elementary schools.

• **JOINT VOCATIONAL SCHOOL DISTRICTS (JVSDs) AND TECHNICAL CENTERS** – There are 41 such schools in Northeast Ohio (Ohio Educational Directory 2006), including nursing preparatory programs and adult education centers. There are 4 counties that do not have JVSDs within county lines, but may partner with neighboring counties in supporting these facilities.

• **COMMUNITY SCHOOLS** – Also known as charter schools, Ohio’s community schools are public, non-profit educational institutions that are independent of traditional districts and are sponsored by an authorized entity approved by the State Board of Education. There are 124 community schools in Northeast Ohio (Ohio Educational Directory 2006); these are nonsectarian institutions that receive state and federal funding.

• **PRIVATE SCHOOLS** – There are three hundred and seventy-nine (379) private schools, including religious-affiliated academies and Montessori schools (Ohio Educational Directory 2006). A few counties only have only private elementary schools, while others have a range of private educational opportunities from pre-school to adult programs.

• **HOME AND NON-CHARTERED SCHOOLS** – Some families choose to educate their children at home and separate from traditional school systems, public or private. Dependable records on home schools and “08 Schools” are not readily available. Home-schooling families must only submit an annual notice of intent to the local superintendent; non-chartered schools must file an annual report with the Ohio department of Education and with the treasurer of the local board of education.

Please refer to Appendix B for a list of schools and school districts (by county).

Various grant opportunities also exist for S.E.E. Federal grants through the Department of Natural Resources (DNR) or the Environmental Protection Agency (EPA) are available to S.E.E. National and International non-governmental grantmakers, such as The Captain Planet Foundation and The Dell Corporation. State and local grant opportunities are too numerous to mention here; please see Appendix C for a listing of local and state grantmakers.

Current trends in northeast Ohio show that schools are looking for innovative lessons that also fulfill the Ohio Academic Content Standards set by the State of Ohio School Board. S.E.E. can take this opportunity to incorporate environmentally and sustainability themed lessons that meet the Content Standards into programs in area schools. Also, by creating and collecting environmentally themed lessons and allowing educators access to these lessons, S.E.E. creates a unique niche in the community as a definitive source of environmental education materials.

S.E.E. can turn its strengths into opportunities for growth. First, because our board members are well-respected business leaders they have contacts and pull in their communities.
S.E.E. can use these contacts and respect to find funding, support, and volunteers. Second, because S.E.E. is flexible and able to change with the changing needs the communities, S.E.E. can target schools and districts that are in a state of flux and accommodate the needs of that institution. Third, since the directorate has expertise in several academic areas S.E.E. can find innovative ways to incorporate waste reduction, environmental, and sustainability principles in more than just the science classroom. Government/Civics, English, Geography, and History classes can all include aspects of sustainability while still meeting the Ohio Content Standards.

Threats

A major threat to the success of S.E.E. could be S.E.E.’s dependence on its founding, for-profit corporation. While having personnel, space, and supplies donated to S.E.E. is absolutely necessary for S.E.E.’s growth, it may give funders and grantmakers a reason to overlook S.E.E. for funding. It may also be difficult in the future for S.E.E. to operate autonomously if it does not make a reputation for itself independent of the founding corporation.

Another threat to S.E.E.’s success is the possibility that S.E.E. is not unique enough in its mission and goals. There are other groups in northeast Ohio that dedicate themselves to environmental and sustainability education. Grantmakers may view S.E.E. as merely a repeat of other efforts in the area.

While the directorate has extensive experience running a for-profit corporation, the intricacies of starting and managing non-profit corporations are not areas of expertise for any of the directors/board members.

A major obstacle facing S.E.E. are educators who merely teach those things covered on required standardized tests (called “teaching the test”). Sustainability education has not been identified as a portion of these standardized tests. On the other hand, sustainability lessons can be used to supplement “teaching the test” by highlighting or expounding on topics covered on the required tests.

General Strategies

Strategies for the success of S.E.E. include:

- Attain 501(c)(3) status by January 2007
- Write at least three (3) grants per year and receive at least two (2) grants per year for 2007, 2008, and 2009
- Create a contact list or network of teachers interested in sustainability and environmental education in the 192 districts in northeast Ohio
- Offer two (2) to three (3) internships per academic year (fall or spring semesters) to college students majoring in education or science (biology, chemistry, etc) in Northeastern Ohio
• Provide grant proposal writing assistance to area schools and school districts for sustainability or environmental education grants
APPENDIX K: SEE IDENTITY MATERIALS

SEE Letterhead
SEE Business Cards

Sarah Lane
P.O. Box 1953
Kent, Ohio 44240
Phone: 330-842-2364
Fax: 330-677-1567
slane@emerald-environmental.com

Sustainability for Educators and the Environment

Brian Grimm
P.O. Box 1953
Kent, Ohio 44240
Phone: 330-842-2351
Fax: 330-677-1567
bgrimm@emerald-environmental.com

Sustainability for Educators and the Environment
teachers, interns, students, schools: we’re looking for you.

www.seeohio.net

SEE Fundraising Card

HOW YOU CAN HELP …

Talk to teachers and administrators at your local school district - tell them you want your community enhanced by environmental education and sustainable waste management. Give a donation to SEE - because we are a non-profit organization, all your donations are tax deductible. Become a Platinum Sponsor by giving $750; your logo will be placed on all promotional material including the S.E.E. website and you will receive the bi-monthly S.E.E. e-newsletter. Other levels of sponsorship include: Gold Sponsor ($500 - logo on website only and e-newsletter) and Silver Sponsor ($250 - e-newsletter only). By supporting S.E.E. you are supporting your children, your community, and your environment. Please contact us or visit our website for more information or to find other ways you can help.

P.O. Box 1953 · Kent, Ohio · Phone: 330.842.2364 · Fax: 330.677.1567 · www.seeohio.net

We would like to thank you for your generous donation. Large or small, your gift helps your students, your community, and your environment.

Name: ____________________________

Company: ____________________________

Address: ____________________________

City, State ZIP: ____________________________

Phone: ____________________________

Email: ____________________________

Donation Amount:  
- Platinum  
- Silver  
- Gold  
- Other $________

95
APPENDIX L: FUNDRAISING LETTER

DATE

NAME

COMPANY

STREET ADDRESS

CITY, STATE ZIP

Dear NAME,

Last year Brian Grimm and Scott Hershberger, the founders of Emerald Environmental, Inc., started Sustainability for Educators and the Environment (S.E.E.) to give back to the communities that have made their business so successful. They envision all schools in northeast Ohio having the opportunity to engage students in sustainability education and encourage students and teachers to bring about real change at their schools by implementing energy, water, or waste reduction programs. Not only do these programs support sustainability and environmental stewardship, they can also save schools money in the long run.

S.E.E. does not just teach environmental theories; rather, we seek to empower students and teachers with basic, workable principles they can use to save money and the earth’s natural resources. When students see their movement toward sustainability as successful, they will more than likely apply these principles to their everyday lives, thus making sustainability a lifelong process. By establishing a network of schools across nineteen counties, S.E.E. can provide sustainability workshops for students and coordinate reuse and recycling programs, water and energy reduction upgrades to school facilities, and retrofitting bus fleets to run on alternative fuels.

Now, you have the unique opportunity to become an early supporter of S.E.E. and bring sustainability education to communities all over the northeast Ohio area. By making a donation to S.E.E. you’re supporting your children, your community, and your environment. And, because S.E.E. is a 501(c)(3) tax-exempt organization, your donation is tax-deductible. No donation is too small, but we’re asking for donations of $700 to $1000 to ensure the future success of S.E.E. You will receive periodic updates on the impact S.E.E. makes on the northeast Ohio community as well as a logo link to your company on our webpage thanks to your support.

Thank you, in advance, for your generosity. Please feel free to contact us with any questions you may have.

Thank you,

NAME
APPENDIX M: GRANT APPLICATIONS

Waste Not, Want Not:

Establishing Sustainability Education and Recycling Programs for Two Wadsworth Area Schools

Ohio Environmental Education Fund

Grant Application # F-07G-033

Sustainability for Educators and the Environment (S.E.E.)

P.O. Box 1953 · Kent, Ohio 44240 · 330.842.2364 · slane@emerald-environmental.com
Project Summary

Project Need:

Medina County has a unique waste management system. In this system, residents do not need to separate recyclables from the rest of their waste, rather, all waste is taken to the Medina County Central Processing Facility where the recyclable materials (paper, glass, aluminum, plastic, etc) are removed from the waste stream through a series of sorting processes either by hand or by machine. Because this system does not require residents to actively recycle and because no formal or informal recycling education is available in the county, students are unaware of recycling and waste reduction. Because recycling at a residential level in Medina County would work against the established waste management system, recycling at the school level and educating students about waste reduction is the best option.

Project Objective(s):

We will develop age-appropriate sustainability and recycling class activities in science, mathematics, and technology education aligned with Ohio’s Academic Content Standards for grades k-12. Students, teachers, college interns, and administrators will tailor these activities based on class and student needs at Sacred Heart Parish School and Wadsworth High School. By the end of the project nearly 1,500 students will have experienced at least two (2) class activities involving sustainability themes. Classes and student groups will also have the opportunity to participate in co-curricular sustainability themed activities over the course of the school year including field trips and an Earth Day celebration. School-wide paper recycling programs in both Sacred Heart Parish School and Wadsworth High School will be established and plastics recycling will be researched to determine feasibility. By recycling paper, this program seeks to reduce the amount of waste sent to the landfill from Sacred Heart Parish School and Wadsworth High School by at least twenty percent (20%).

Overall Cost:

OEEF Grant Funds Requested:  $24,896
Matching Amount:  $5,200

Major Activities:

Interns and S.E.E. staff will collect sustainability lessons and activities for k-12. Interns and teachers will be grouped to modify these lessons to meet the needs of specific classes. Both teachers and interns will present these lessons throughout the year. Field trips to the Medina County Central Processing Facility, Akron Global Polymer Academy, and M&G Plastics will also be offered to students and student groups. To further enhance the sustainability curriculum, co-curricular activities will be offered to students such as community service days, t-shirt contests, picnics, and earth day celebrations. Semi-permanent display boards will be created in
both schools on sustainability topics. These boards incorporate passive learning into the active learning model employed by the other activities (class lessons/activities, field trips, and co-curricular activities).

Paper recycling programs will also be established at both schools. This program will allow students to put their waste reduction lessons to good use. Finding community partners to sponsor the school by recycling in their offices and business around Wadsworth and donating the money earned from recycling to either school.

Key Personnel:

Sustainability for Educators and the Environment – Sustainability for Educators and the Environment (SEE) seeks to educate students in Northeastern Ohio about sustainability principles and to support the practical application of these principles in schools and communities. S.E.E. offers programs tailored to varying student ages and teacher needs bringing knowledge and practical applications of sustainability principles to the community. Motivating environmental clubs and recycling programs, helping schools turn trash into cash, and promoting the use of recyclable and recycled products to close the reuse loop are also major components of S.E.E.’s ultimate vision. The Waste Not, Want Not program is the model program for S.E.E. Not only does it meet the underlying goals of S.E.E. by supporting the practical application of sustainability principles, but it also involves sustainability education and community outreach.

Personnel – The project’s key personnel at S.E.E. include Sarah Lane and Brian Grimm. Ms. Lane’s background is focused on environmental and solid waste management as well as organizational leadership. Mr. Grimm’s expertise in law and the environmental consulting and waste management fields provide S.E.E. with a strong base of knowledge and practical experience. Also, S.E.E.’s many contacts throughout the Northeastern Ohio community allow for an even greater range of expertise. The project’s key personnel at Sacred Heart Parish School, Tracey Arnone and Kathleen Egan, both have science education backgrounds. Mrs. Egan is the junior high science educator and has been a faculty member since 1979. She participated in the Akron Global Polymer Academy’s Summer Institute for Teachers at The University of Akron in 2005 and will participate again in 2006. Personnel at Wadsworth High School include Brian Williams, principal, and Mark Lange, head of the science department. Mr. Williams has nearly 10 years experience in school administration and Mr. Lange has taught biology and physics at WHS for 35 years. The support network in Wadsworth is extensive and well qualified, from local and county government, to representatives from local environmental and plastic industries. The level of collaboration for a common cause is high.

Project Description

In collaboration with its partners in Medina and Summit Counties Sustainability for Educators and the Environment (SEE) will begin a program to educate students at Sacred Heart Parish School (k-8) and Wadsworth High School (9-12), through the schools’ curriculum and enrichment activities, about recycling need and processes. Part of this educational process will
include school-wide recycling projects, to include paper and/or plastics. Outreach activities will include some or all of the following:

- A school or student group field trip to M&G polymers and/or Little Tykes, to the Polymer Science Institute at The University of Akron, and to the Medina County Central Processing Facility.

- Use of the Buddy System (an older student partners with a primary student as a helper) at Sacred Heart Parish School to increase awareness of the recycling project.

- Extension of recycling concepts to Sacred Heart Parish community, Wadsworth High School community, and to the Wadsworth community at large.

- A recycling themed t-shirt design contest

- Creation of a video for the Wadsworth local cable T.V. and display boards for an Earth Day Celebration as part of the schools’ Language Arts and Science curriculum

- An end-of-the-year Polymer Picnic at Sacred Heart Parish School where students share what they’ve learned about polymers and recycling with their families and community.

Interns from area colleges and universities will also be employed to assist teachers at Wadsworth High School and Sacred Heart Parish School in implementing sustainability education and environmental or recycling themed activities in the classroom. Not only will these interns provide a helping hand to the teachers, but also the internship itself will uphold the experiential learning efforts of many college programs.

**Objectives, Activities, and Outcome Measurement**

**Objective #1:**

Over a one-year period we will develop age-appropriate sustainability and recycling class activities in science, mathematics, and technology education aligned with Ohio’s Academic Content Standards for grades k-12. Students, teachers, college interns, and administrators will help tailor these activities based on class and student needs.

**Activities:**

In the beginning of the school year SEE interns and the project director will compile lessons on sustainability, recycling, and other environmental themes via online resources, library holdings, and personal holdings. Chosen lessons will be focused on experiential learning in small groups, scientific inquiry, and problem solving skills. After this process, interns will be grouped with teachers at Sacred Heart Parish School and Wadsworth High School to determine activities form the collection appropriate for their respective classes. The teacher, to ensure scientific validity and adherence to Ohio’s Academic Content Standards, must first approve all activities and lessons used in classes. Interns will also work with teachers to modify the teachers’ existing lesson plans to incorporate sustainability themes and to ensure a sense of continuity throughout the year. Interns and teachers will then schedule times for the intern to
present lessons in class or to talk to co-curricular groups such as the ELP group (advanced students) at Sacred Heart Parish School or to the science and community service clubs at Wadsworth High School. Lessons used in classes and with student groups will:

- Describe renewable and non-renewable resources and their management
- Analyze and interpret data from scientific investigations using appropriate mathematical skills to draw valid conclusions
- Describe advances in physical science and their economic and social implications, along with the ethical and behavioral issues implicit in such advances
- Stress writing, interpretation, and artistic skills by creating posters, display boards, and, in the case of Sacred Heart Parish School, Wadsworth Community Cable News Reports and a video to be played on the Wadsworth Community Cable Channel.

All lessons and activities collected will be placed in an online database housed on the S.E.E. website and made available to the general public. Because S.E.E. staff will maintain the database, future projects, new lessons and activities can be added with ease and can be modified depending on changes to Ohio’s Academic Content Standards. S.E.E. staff will present information on the database and the mission of S.E.E. as part of an alternative session in the Emerald Environmental, Inc. Hospitality Suite at the Ohio School Board Association’s Trade Show in November 2006. This will ensure a larger audience hearing about and utilizing the sustainability education database.

**Outcome Measurements/Evaluation:**

**Number of Lessons/Activities Collected**

The initial outcome will be measured by quantity, quality, and theme of lessons and activities collected. The number of lessons/activities per age group, to be considered very successful by project director, should be between 5 and 10 different lessons/activities. The number of lessons per topic (general sustainability, general recycling, paper recycling, plastic recycling, waste reduction) should also be between 5 and 10 lessons of varying age groups. This will allow educators to choose from a variety of lessons for their students and to find lessons that best suit their students' needs.

Long-term effects of collecting a large number of lessons/activities are found in the online database. The database can be used by many different people and will offer a form that educators can submit to S.E.E. giving new ideas for lessons/activities. This will keep the database current and continuously growing. Also, the database will help more than just the educators in Wadsworth. Anyone can use the online database for general sustainability, recycling, or waste reduction lessons/activities. By having a larger number of materials on the site, the site can cater to more people in differing situations.

**Quality of Lessons/Activities Collected**

The quality of lessons will initially be measured by
• Meeting or exceeding Ohio Academic Content Standards
• Meeting or exceeding standards set by teachers and schools
• Student input (enjoyable, informative, etc)
• Utilize hands-on, inquiry-based learning whenever possible.

Educators, interns, and S.E.E. staff will all have a part of determining the quality of lessons/activities to be included on in the database. Lessons that do not meet, at the very least, Ohio's Academic Content Standards, will not be included in the database.

• Teachers in future classes will measure long-term effects. Students should be able to:
  • Recall activities from previous grades,
  • Apply knowledge gleaned from previous grades, and
  • Build on the knowledge gleaned from previous grades.

Successful lessons will be those that are easy to recall and build upon and are useful to other topics in science, mathematics, technology education, language arts, and/or history.

**Objective #2:**

By the end of the project nearly 1,500 students will have experienced at least two (2) class activities involving recycling, waste-reduction, or other sustainability themes. Classes and student groups will also have the opportunity to participate in co-curricular sustainability themed activities over the course of the school year including field trips and an Earth Day celebration.

**Activities:**

Interns will work with teachers to prepare, modify, and implement sustainability themed lessons in classrooms and student groups. Interns will actively assist teachers and presenting lessons and activities to students. These lessons will draw upon knowledge of both intern and teacher, as well as the teacher’s existing lesson plans and any field trips the class may have taken to the Medina County Central Processing Facility, the Akron Global Polymer Academy, or to M&G Plastics. Lessons will, as always, be scientifically valid and encourage hands-on, inquiry-based activities.

Waste Not, Want Not offers additional Hands-on learning and real-world experiences in the form of field trips to the Medina County Central Processing Facility and The Akron Global Polymer Academy (AGPA), and in the case of Sacred Heart Parish School, a trip to M&G Plastics. Wadsworth High School will schedule a trip to the Medina County Central Processing Facility for at least two grades for the month of October or November depending on tour availability. These tours will spur lessons and hands-on activities on technology and recycling seen at the Facility in follow-up lessons in science classes at the High School. The trip to AGPA will allow students to see professional laboratories and to participate in hands-on activities.
Interested students may be selected to work with AGPA on research projects at the Academy. These research projects, for students interested in science and technology, will provide them with job and college related experience while still developing their sustainability and recycling education. Sacred Heart Parish School will schedule and carry out a trip for 7th and 8th graders to the Akron Global Polymer Academy in September for hands-on activities on the importance of polymers and polymer recycling in everyday life. Seventh and eighth grade students will also have the opportunity to attend a tour of M&G Polymers, a plastics company in Wadsworth, to see first hand the production of certain plastics and to use that experience in later hands-on classroom activities. All students at Sacred Heart Parish School will have the opportunity to visit and tour the Medina County Central Processing Facility as well and enjoy follow-up activities in the classroom.

Co-curricular activities are also a facet of the Waste Not, Want Not project. By coordinating activities throughout the year, students can keep their excitement for recycling and sustainability high. At Wadsworth High School two major co-curricular activities are included and at Sacred Heart Parish School a third activity is included in this project. Teachers and administrators can gauge student interests and culture once school starts to coordinate additional activities.

Both schools will organize recycling t-shirt design contests. These contests will encourage students to conduct personal research into recycling as well as engage them in artistic and creative endeavors. The t-shirt contests will be held around January after the winter break in the end of December. This gets students right back into sustainability and recycling education after several weeks off from school. T-shirts will be distributed to students at a deeply discounted cost to ensure a hardship is not placed on students and so that more students will participate in the program.

Both schools will also coordinate an Earth Day Celebration for the end of April. This week-long celebration may include waste-free lunch days, where students are encouraged to bring lunches in reusable containers and not take more food than they will eat from the cafeteria line. This activity shows students just how much waste is produced from an ordinary activity and how that waste can be reduced by simple, low-cost solutions. Speakers from local government and industry will be asked to classes and assemblies. Community service projects will also be coordinated like clean up days in local parks and neighborhoods. Display boards on sustainability and recycling will be placed throughout both schools featuring pictures taken by students and faculty. These boards allow students to, again, apply sustainability themes to language arts, writing, and art thus creating a well-rounded environmental education experience. Sacred Heart Parish School also plans on creating a video to play on the local Wadsworth Community Channel. The school currently produces newscasts that air to the school each week and they have the capability of producing a video on recycling and other sustainability themes for the entire Wadsworth Community.

Sacred Heart Parish School will also conduct a Polymer Picnic for students, staff, and families. This picnic will focus on the importance of plastics and plastic recycling in our everyday lives. Students will present information in a fun, informative, and interactive way to
engage their community in recycling education. Speakers from the Akron Global Polymer Academy and from local industry and government will also attend. The purpose of the picnic is to bring the theory of sustainability education to a practical level while entertaining and informing the community.

**Outcome Measurements/Evaluation:**

To determine the initial outcome of this project, the number of lessons interns and teachers present to students will be used to determine the actual number of students who participated in the lesson/activity. S.E.E. staff and educators at both schools will participate in this measurement.

Initial success shall also be measured by the reception of field trips and co-curricular activities by students and educators. Simple, short surveys will be produced and given to students near the end of the year after all sustainability activities have been completed. If the sustainability activities have been received well by the students they will indicate as such on their surveys. Teachers will receive short surveys from S.E.E. staff to determine their reactions to sustainability lessons, field trips and co-curricular activities.

Initial success of the project also includes the measurement of the quality of field trips and co-curricular activities by students and educators. The quality of trips/activities will initially be measured by

- Meeting or exceeding Ohio Academic Content Standards (if applicable to co-curricular activity)
- Meeting or exceeding standards set by teachers, schools, and administrators
- Student input (enjoyable, informative, etc.)
- Utilize hands-on, inquiry-based learning whenever possible.

Long-term effects of this project should be an increased number of students experiencing sustainability lessons/activities. A spreadsheet will be developed for easy use by administrators to track the number of lessons/activities and number of students experiencing that lesson/activity. The number of lessons/activities should increase by 10% for the next several years until all students have at least 2 sustainability lessons per academic year.

Long-term effects will also be measured by how well the field trips and co-curricular activities are received by students in the future. Informal, oral discussions on field trips and activities will be utilized by teachers to determine the effectiveness of the trips/activities. Also, in the future, certain field trips and co-curricular activities are found to be repeated year after year and become traditions at the schools, the trip/activity will be considered successful.

Lastly, teachers in future classes will measure long-term effects. Students should be able to:

- Recall activities and field trips from previous grades
• Apply knowledge gleaned from previous grades, and

• Build on the knowledge gleaned from previous grades

Successful field trips and activities will be those that are easy to recall and build upon and are useful to other topics in science, mathematics, technology education, language arts, and/or history. Educators will make these measurements periodically as they see fit.

Objective 3:

During the same one-year period school-wide paper recycling programs in both Sacred Heart Parish School and Wadsworth High School will be established and plastics recycling will be researched to determine feasibility. By recycling paper, this program seeks to reduce the amount of waste sent to the landfill from Sacred Heart Parish School and Wadsworth High School by at least twenty percent (20%).

Activities:

Formal contact with ABITIBI Consolidated will be made to determine timing and placement of paper recycling receptacles at each of the schools through their Paper Retriever Program (www.paperretriever.com). This program provides pick-up paper recycling service to schools, libraries, and other locations as a way to provide recycling and extra income. ABITIBI Paper Retriever Program places, at no cost, a 1-2 cubic yard receptacle at participating locations, empties the receptacle of paper on a regular basis, and pays the participant a set price per ton of paper. This program is actually a fundraiser for many schools in the northeast Ohio area. Small, classroom sized containers (typically 5-8 gallon waste baskets) will be purchased for each classroom and office in both schools to ensure adequate and convenient access to recycling.

After the receptacles have been placed at the schools (usually in a visible location in parking lots), coordination with the janitorial staff to properly handle the paper recycling must be completed. Student involvement in the physical act of recycling, removing the classroom bins to the pick-up location, will be encouraged to keep students involved in the hands-on act of recycling and to keep extra work from piling up on janitorial staff. A currently established buddy system at Sacred Heart Parish School, where older students are paired with younger students, will be utilized in the removal of the classroom bins to the pick-up location.

Before the recycling program starts, S.E.E. staff and other volunteers will conduct a simple waste assessment at both schools. The data collected will be utilized as a baseline to determine the success of the recycling program. The post-recycling waste assessment will be conducted near the end of the school year. This assessment will use the tonnage records from ABITIBI Paper Retriever receipts and the number of waste pick-ups per month or quarter to determine a reduction in waste at both schools. High school students may be involved in this process to encourage critical thinking, inquiry-based learning, and mathematical skills.

Through the ABITIBI Paper Retriever Program, community businesses are encouraged to act as a sponsor to a school or other organization by recycling their paper. All income generated by the business’s paper recycling will be automatically given to the sponsored school or organization. It is the hope of this project to find at least one business to act as a sponsor for
each of the schools. This would increase the amount of money coming into the school to be used on sustainability education, community service, recycling program upkeep (replacing worn out bins, etc), or to donate to worthy causes. The use of the funds gained through the ABITIBI Paper Retriever Program would be decided by school administration, teacher, and student input. By the end of October, two businesses (one for Sacred Heart Parish School and one for Wadsworth High School) should be identified.

The Project Director, along with teachers and administrators from both schools will determine feasibility of plastic recycling at the schools. Utilizing the project’s connection to M&G Plastics, the City of Wadsworth Service Department, and Medina County Engineers Office and Solid Waste District, plastic recycling may be a possibility to reduce the amount of waste sent to the waste stream and to encourage active recycling at the schools.

**Outcome measurements/evaluation**

The measurement of waste reduction will, initially, be measured by the simple waste assessments preformed by S.E.E. staff. These assessments will look at type of waste, amount of waste, and recycling options. By comparing pre-recycling program and after one school year waste assessments, one can determine if the amount of waste sent to the landfill was reduced.

The initial measurement of establishing business partners will be done by the mere number of businesses willing and/or able to sponsor the recycling program at either or both schools by recycling their paper through the ABITIBI PaperRetriever Program. The greater the number of interested and willing businesses the more successful this project will be.

The initial success of the program will also be measured by the outcome of the feasibility study on plastic recycling at Sacred Heart Parish School and/or Wadsworth High School. This study should allow administrators to make an intelligent and informed choice to pursue further plastics recycling. Basic items to be included in the study would be:

- Cost-effectiveness
- Enough physical space to store the plastics for recycling
- Enthusiasm for the project among faculty, staff, and students (especially janitorial staff)
- Is not creating a problem of overlap with Medina County Solid Waste District efforts

Long-term effects of waste reduction can be measure by utilizing the documentation sent from ABITIBI outlining the amount of paper collected and recycled and the total number of garbage dumpster pick-ups for the school year. If the number of garbage dumpster pick-ups are fewer, that indicates a trend toward waste reduction. If the garbage dumpster pick-ups remain stable, that indicates that while people are recycling paper, they’re still creating the same amount of waste. Analysis of these numbers can give school administrators and S.E.E. staff general ideas about the waste and recycling trends at both schools.
Administrators will measure long-term effects of establishing business partners. They will determine if having certain business sponsors would be more beneficial than others (for example, an office that creates considerable amounts of paper waste and a restaurant that creates very little). Also, community members can drop off paper at any ABITIBI PaperRetriever recycling receptacle, so finding locations in more populated or more frequented areas would give the schools a better chance at recycling more and getting more money to support their sustainability education programs. The number of business partners will obviously be an indicator of the success of the program; more partners will mean a more successful program.

Long-term effects of the feasibility of plastic recycling at Sacred Heart Parish School and/or Wadsworth High School will be measured by the initial outcome measurements plus the effects of the plastics recycling program if it is chosen to take place.

Continuation and Replication Plan

When the grant period ends, the project will continue indefinitely.

With an online database of sustainability and recycling lessons and activities in hand, educators can pick and choose the materials most appropriate for their students’ needs. In the future, if teachers would like interns for short periods of time, many college students can take credit hours in their major department and not require payment for 4-6 week internships. Monies collected from the recycling program will be used to take field trips and to supplement in-class sustainability learning, therefore negating the need for additional grant funding. Activities and lessons will remain, as always, focused on sustainability, inquiry-based, hands-on learning and will meet Ohio’s Academic Content Standards.

As teachers modify lessons and activities or develop new lessons they are encouraged to submit those lessons to S.E.E. to be included on electronic database.

The Waste Not, Want Not model is not, in any way, only applicable to Wadsworth Ohio. The model can be used in any k-12 school in Ohio. Other states may also be able to use this model if their academic standards are similar to Ohio’s Academic Content Standards. The database will exist entirely on the internet such that anyone will be able to access the sustainability materials. The project merely needs to have community support, funding, and dedicated teachers to be successful. The model can also be easily scaled down to fit the funding requirements of most any school district. The number of field trips can be cut back or more speakers could come to classes to present the same type of hands-on learning students would see on field trips.

Because of the amount of collaboration and networking processes involved in the project, disseminating results, as well as providing regular updates and progress reports, can be accomplished in the following ways;

- Using Wadsworth Community Cable and local print media (The Trading Post and the Sun-Banner Pride)
- Using Sacred Heart Parish groups and church bulleting
• Using Wadsworth High School PTA, other groups (boosters, alumni, etc), and website

• Using academic networks designed for teachers and administrators (National Association of Science Teachers, Ohio School Board Association, etc)

• By using the Akron Global Polymer Science Academy and The College of Arts and Sciences Careers Program (for interns) at The University of Akron.

Plans are already in motion for S.E.E. to present information about the Waste Not, Want Not model at the Ohio School Board Association Annual Conference in November 2006. S.E.E. has the opportunity to speak at an alternative session held in the Emerald Environmental Hospitality Suite on our vision and our projects.
### A.1. Salary or Wages

<table>
<thead>
<tr>
<th>Name</th>
<th>Calculation</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarah Lane (Fiscal Agent)</td>
<td>24 hours x $25</td>
<td>$600.00</td>
<td></td>
<td>$600.00</td>
</tr>
<tr>
<td>To Be Hired (Interns 4)</td>
<td>8.9% of $3500</td>
<td>$3,340.00</td>
<td></td>
<td>$340.00</td>
</tr>
</tbody>
</table>

**A.1. Salary or Wages Sub-Total:** $3,940.00

**Admin:** $18.00

**Match:** $950.00

### A.3. Stipends

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 Teachers, 1 day @ $50.00/day (Multiple)</td>
<td>$1,750.00</td>
<td></td>
<td>$50.00</td>
</tr>
</tbody>
</table>

**A.3. Stipends Sub-Total:** $1,750.00

**Admin:** $0.00

**Match:** $0.00

**A. PERSONNEL SUB-TOTAL:** $5,690.00

**Admin:** $18.00

**Match:** $968.00

### B.1. Supplies

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Quantity: 0)</td>
<td>$0.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>100% Recycled Paper (reams) (Quantity: 20)</td>
<td>$146.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Classroom Display Boards: Velcro Tape (rolls) (Quantity: 5)</td>
<td>$45.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Classroom Recycling Displays: Clips (bags) (Quantity: 10)</td>
<td>$45.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Classroom Recycling Displays: Tabboards (Quantity: 20)</td>
<td>$250.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Earth Day Display Boards: Digital Cameras (Quantity: 5)</td>
<td>$750.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Earth Day Display Boards: Photo Booth Printer Ink Cartridges (Quantity: 6)</td>
<td>$210.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Earth Day Display Boards: Photo Booth Printers (Quantity: 2)</td>
<td>$300.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Polymer Picnic - Sacred Heart Parish Schools Snack (per person) (Quantity 500)</td>
<td>$500.00</td>
<td></td>
<td>$5.00</td>
</tr>
<tr>
<td>Recycling Bins for Classrooms (Quantity 80)</td>
<td>$720.00</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>T-shirt Contests T-shirts for Sacred Heart Parish School (Quantity: 320)</td>
<td>$1,920.00</td>
<td></td>
<td>$64.00</td>
</tr>
<tr>
<td>T-shirt Contests T-shirts for Wadsworth High School (Quantity 1200)</td>
<td>$5,000.00</td>
<td></td>
<td>$3,600.00</td>
</tr>
</tbody>
</table>

**B.1. Supplies Sub-Total:** $10,710.00

**Admin:** $4,240.00
<table>
<thead>
<tr>
<th>B.3. Printing</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Boards for Each Day Celebration (Rate: 1)</td>
<td>$300.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Polymer Plant at Sacred Heart Parish Schools Advertising to Community (Yr ical) (Rate: 600 copies @ 5 cents = $36.00)</td>
<td>$36.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>B.3. Printing Sub-Total:</strong></td>
<td><strong>$336.00</strong></td>
<td><strong>$0.00</strong></td>
<td><strong>$0.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B.4. Other Costs</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Trip to Akron Global Polymer Academy from Sacred Heart Parish School Bussing (Direct Costs, Rates: 3 Busses @ $100/bus)</td>
<td>$300.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Field Trip to Akron Global Polymer Academy: Bussing (Direct Costs, Rates: 4 Busses @ $300/bus)</td>
<td>$1,200.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Field Trip to MDPlastics from Sacred Heart Parish School: Bussing (Direct Costs, Rates: 2 Busses @ $359/bus)</td>
<td>$600.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Field Trip to Medina County Central Processing Facility from Sacred Heart Parish School: Bussing (Direct Costs, Rates: 9 Busses @ $300/bus)</td>
<td>$2,700.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Field Trip to Medina County Central Processing Facility from Wooster High School: Bussing (Direct Costs, Rates: 10 Busses @ $300/bus)</td>
<td>$3,000.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Waste Assessments (2) at Sacred Heart Parish School (Direct Costs, Rates: 8 hours + bags + gloves + step ladders)</td>
<td>$80.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Waste Assessments (2) at Wooster High School (Direct Costs, Rates + 4 hours work + bags + gloves + step ladders)</td>
<td>$80.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>B.4. Other Costs Sub-Total:</strong></td>
<td><strong>$8,260.00</strong></td>
<td><strong>$0.00</strong></td>
<td><strong>$0.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. NON-PERSONNEL SUB-TOTAL:</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income to be Generated from Project</td>
<td>$19,305.00</td>
<td>$0.00</td>
<td>$4,240.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. CONTRACTUAL SUB-TOTAL:</th>
<th>Amount</th>
<th>Admin</th>
<th>Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total OEF Grant Funds:</td>
<td>$24,896.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Admin Amount:</td>
<td>$18.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Income to be Generated:</td>
<td>$1,580.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Matching Funds:</td>
<td>$6,700.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Project Budget:</td>
<td>$31,506.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PRACTICAL APPLICATIONS:
Interns, Students, and Schools Working Together for Positive Change

Ohio Environmental Education Fund
Grant Application # F-08G-016
Executive Summary

**Project Need:**
The need for practical application of environmental and sustainability principles is essential now more than ever. It is vital for schools to become more sustainable to withstand the pressures of decreasing budgets but increasing costs of resources. While it is important for students to understand and appreciate nature and the land, it is just as important for students to learn to live sustainably. We know of no other sustainability program that seeks to institute real, positive change through teamwork among teachers, students, and administrators to make schools more sustainable. Composting, alternative fuel bussing, energy/water efficient fixtures, and recycling are all small ways to make the building more sustainable and, in the long-term, save the school system money.

**Overall Objectives:**
The Practical Applications program seeks to give grade 5-12 students an opportunity to experience hands-on sustainability activities in their classrooms then apply that knowledge to a school-wide composting program. The program also seeks to give future educators experience, through college internships, in conducting environmental activities in the classroom – meeting Ohio Academic Content Standards in an innovative and hands-on way. By allowing for a paid internship, those college/university students that must work while attending classes will not be excluded from the experiential education opportunities. It is the overarching goal of this program that interns, students, teachers, and administrators work together to make their schools more sustainable in the long-term.

**Overall Cost:**
Overall cost for this program is $127,372. Approximately 62% of that cost is matching funds, so the requested amount is $48,472.

**Major Activities:**
Major activities in the Practical Applications program include: (1) Hiring four interns per semester (Spring 08, Fall 08, Spring 09, Fall 09, and Spring 10), (2) Using those interns to conduct hands-on sustainability class activities, and (3) Assisting in the application of those sustainability principles in a school-wide composting program.

**Key Personnel:**
The key personnel in this program are Sarah Lane and Brian Grimm. Ms. Lane will supervise and work with the interns to ensure scientific accuracy and conformation to state Academic Standards. She has extensive experience working with college students and holds a master’s degree in environmental management. Mr. Grimm will be the fiscal officer for all program funds and will provide expertise in the application of sustainability principles. Mr. Grimm has worked in the field of environmental consulting and co-owns Emerald Environmental, a principal supporter of Sustainability for Educators and the Environment.

Project Description

**Audience Need:**
Our audience is three fold: (1) college and university students, (2) k-12 students, and (3) northeast Ohio schools.

Very few internship opportunities exist for college students to acquire school-based sustainability or environmental education experience. Some internship programs that once served this need have been
cancelled due to lack of funding. Most notably, solid waste districts lost large portions of their budgets due to the elimination of the litter tax – in many cases, the educators were re-assigned and internship program cancelled. Also, an increasing number of college students must work part-time while taking courses to supplement their lower-incomes. Because these students must work, extra time to take volunteer internships and gain valuable sustainability education experience is at a minimum. Our Practical Applications program offers college and university students majoring in education, environmental sciences/studies, and other degree programs an opportunity to gain these valuable learning experiences outside the college classroom and to be paid for their work. Please see the letter of support from a former SEE intern.

While other forms of environmental education are integral to the well-rounded character of the state’s k-12 students, sustainability education and the practical application of those principles seems to be lacking. It is important for students to learn about environmental topics like wildlife and stream health, but it is essential for them to put those principles into action. Our Practical Applications program not only teaches sustainability principles in the 5-12 classroom drawing from the many existing environmental education curricula programs, but supports a grassroots effort by students, teachers, and administrators to create positive change in the school building – the sustainability theme of this program the next two to three years is composting food scraps. We know of no other programs offering practical application of sustainability principles to schools in northeast Ohio.

Funding for education and school buildings is always very tight. The Ohio School Facilities Commission only offers one program to help school districts implement “green” or sustainable features in building renovations. While several school districts in northeast Ohio have participated in this program, there are many more that could benefit from the savings that the practical application of sustainability principles affords, mainly through the reduction of waste hauling costs. As schools implement composting programs and embrace recycling, alternative fuels, more and more money will be saved. Our Practical Applications program understands the budgetary restrictions in many schools and encourages a grassroots effort by students and staff to fundraise for small, but important changes in their schools. Also, with S.E.E.’s partner Emerald Environmental, we have strong relationships with many of the business managers and superintendents of school districts in northeast Ohio to help ease the way for these grassroots movements to instill change within the system.

Sustainability for Educators and the Environment (SEE) seeks to educate students in northeast Ohio about sustainability principles and to support the practical application of these principles in schools and communities. S.E.E.’s ultimate vision is three fold (1) offering internships to future environmental/sustainability educators, (2) helping tailor pre-existing lessons and activities to varying student ages and teacher needs, while (3) bringing knowledge and practical applications of sustainability principles to the community. Motivating environmental clubs and recycling programs, helping schools turn trash into cash, and promoting the use of recyclable and recycled products to close the reuse loop are also major components of S.E.E.’s ultimate vision. Clearly, by implementing the Practical Applications program S.E.E. will be furthering its own purpose and vision – encouraging environmental education professionals and practical application of sustainability principles being the foremost goals.

Qualifications of Organization and Key Personnel:

**Sustainability for Educators and the Environment** – Sustainability for Educators and the Environment (SEE) seeks to educate students in Northeastern Ohio about sustainability principles and to support the practical application of these principles in schools and communities. S.E.E. offers programs tailored to varying student ages and teacher needs bringing knowledge and practical applications of sustainability principles to the community. Motivating environmental clubs and recycling programs, helping schools turn trash into cash, and promoting the use of recyclable and recycled products to close the reuse loop are also major components of S.E.E.’s ultimate vision. The Practical Applications program is the model program for S.E.E. Not only does it meet the underlying goals of S.E.E. by supporting the practical application of
sustainability principles, but it also involves sustainability education for 5-12 students and future environmental education professionals, as well as community outreach.

**Personnel** – The project’s key personnel include Sarah Lane and Brian Grimm. Ms. Lane’s background is focused on environmental and solid waste management as well as organizational leadership, earning both a bachelor’s degree in Environmental Studies and a masters degree in Environmental Sciences/Environmental Management. She worked with the Clermont County (Ohio) Office of Environmental Quality to develop and implement a recycling public awareness campaign, during which she coordinated the attempt to break the world's longest line of aluminum cans at New Richmond Elementary School (New Richmond, Ohio). Ms. Lane also has extensive experience working with college students in her previous work in residence life at both Miami University and Marietta College.

Mr. Grimm’s expertise in law and the environmental consulting and waste management fields provide S.E.E. with a strong base of knowledge and practical experience. Mr. Grimm is co-owner of one of S.E.E.’s major supporters, Emerald Environmental, Inc. and provides a strong business sense and more than 10 years of experience in the environmental field. He has worked for over 100 school districts and offers internships to Kent State University Geology students to promote experiential education for future environmental professionals. Mr. Grimm sits on the KSU College of Arts and Sciences Advisory Board and served on the Board of Trustees for Amigos de las Americas – Kent Chapter (http://www.amigoslink.org). Mr. Grimm brings to S.E.E. many contacts throughout the Northeastern Ohio community, including school district business managers and superintendents, allowing for an even greater range of available expertise.
Objectives, Activities, and Outcome Measurement

Objective 1:

Over a 30-month period, we will provide twenty (20) internships to college and university students in northeast Ohio majoring in education, environmental studies, or other natural sciences. These interns will provide assistance in presenting sustainability lessons to 5th-12th grade students in area schools. Interns will draw from existing environmental and/or sustainability themed curricula as much as possible, tailoring these lessons to current events, class topics, and student needs. By the end of the Practical Applications program 12 college/university students will have gained professional experience in environmental/sustainability education. This portion of the Practical Applications program addresses both Education Reform and Career Development as it offers useful experience to future teachers in presenting environmental/sustainability curricula and because all lessons will be aligned with Ohio’s Academic Content standards for science, social studies, mathematics, language arts, and technology education. OEEF Preferred Characteristics met with this objective include:

- Interns become life-long learners and can assess their own progress
- Develop and use inquiry skills
- Take major responsibility for their own learning
- Work effectively with others
- Are aware and use their multiple intelligences
- Collaborative implementation of learning experiences
- Learning experiences use resources and sites outside the college classroom

Activities

- Advertise internship position for the Spring 2008 semester (1/08 to 5/08) in northeast Ohio colleges’ and universities’ education departments, natural science departments, and any career development centers. Intern description will also be advertised on the website ClevelandIntern.net. Target schools include:
  - Baldwin-Wallace College
  - Capital University, Cleveland Center
  - Case Western Reserve University
  - Cleveland State University
  - The College of Wooster
  - Hiram College
  - John Carroll University
  - Kent State University
  - Malone College
  - Mount Union College
  - Notre Dame College of Ohio
  - Oberlin College
  - University of Akron
  - Ursuline College
  - Walsh University
  - Youngstown State University
  - Dates: Nov 07 to Jan 07
  - Percent of Budget: 0%

- Interview and hire four (4) interns for the Spring 2008 semester (12/07 to 01/08)
  - Dates: 1/08
  - Percent of Budget: 6%
• Start interns in classrooms in Sacred Heart of Jesus Parish School, Central Intermediate School, and Wadsworth High School. Interns collaborate with teachers to determine what class activities from various environmental/sustainability curricula best meet the needs of the students in the classes. Curricula that may be used include:
  ▪ Talkin’ Trash (Can Manufacturer’s Institute)
  ▪ Aluminum Beverage Cans (ABCs): The ABCs of Environmental Education (Can Manufacturer’s Institute)
  ▪ Energy and Society (Project Learning Tree)
  ▪ Affluenza (PBS and NAEE)
  ▪ Green Schools Energy Project (Greening Schools)
  ▪ The Trash We Pass (Redefining Progress)
  ▪ Renewable Energy (Earth Day Network and Redefining Progress)
  ▪ Other EPA and DNR developed environmental education curricula
    o Dates: Jan 08
    o Percent of Budget: 0%
• Interns present agreed upon activities/lessons in the classroom as well as work with students, teachers, and administrators to create and implement the school-wide composting project
  o Dates: Jan 08 to May 08
  o Percent of budget: 6%
• Interns identify at least three (3) other schools in northeast Ohio to approach for participation in the Practical Applications program
  o Dates: Feb 08 to May 08
  o Percent of budget: 0%
• Interns prepare and present information to teachers, administrators and other decision makers at the identified schools about the Practical Applications program.
  o Dates: Feb 08 to April 08
  o Percent of budget: 1%
• Advertise Fall 08 semester internship position to same schools and websites including any others that may be identified in the process
  o Dates: June 08 to August 08
  o Percent of budget: 0%
• Hire four (4) interns for Fall 08 semester (8/24/2008 to 12/12/08)
  o Dates: Aug 08
  o Percent of budget: 6%
• Interns meet with teachers and to implement class activities and assist with the composting program
  o Dates: Aug 08 to Dec 08
  o Percent of budget: 3%
• Interns identify at least three (3) other schools in northeast Ohio to approach for participation in the Practical Applications program
  o Dates: Aug 08 to Dec 08
  o Percent of budget: 0%
• Interns prepare and present information to teachers, administrators and other decision makers at the identified schools about the Practical Applications program.
  o Dates: Aug 08 to Dec 08
  o Percent of budget: 1%
• Interns write report on their activities at the school for future reference by other S.E.E. and school personnel.
  o Dates: Nov 08 to Dec 08
  o Percent of budget: 0%
• Interns leave curricula and other necessary information to run the school program with teachers and administrators at the schools as well as with S.E.E. personnel for future use
  o Dates: Dec 08
  o Percent of budget: 2%
• Advertise Spring 09 semester internship position to same schools and websites including any others that may be identified in the process
  o Dates: Nov 08 to Jan 09
  o Percent of budget: 0%
• Hire four (4) interns for Spring 09 semester (1/2009 to 5/2009)
  o Dates: Jan 09
  o Percent of budget: 6%
• Interns meet with teachers and to implement class activities and assist with the composting program
  o Dates: Jan 09 to May 09
  o Percent of budget: 3%
• Interns identify at least three (3) other schools in northeast Ohio to approach for participation in the Practical Applications program
  o Dates: Feb 09 to April 09
  o Percent of budget: 0%
• Interns prepare and present information to teachers, administrators and other decision makers at the identified schools about the Practical Applications program.
  o Dates: Feb 09 to May 09
  o Percent of budget: 1%
• Interns write report on their activities at the school for future reference by other S.E.E. and school personnel.
  o Dates: May 09
  o Percent of budget: 0%
• Interns leave curricula and other necessary information to run the school program with teachers and administrators at the schools as well as with S.E.E. personnel for future use
  o Dates: May 09
  o Percent of budget: 2%
• Advertise Fall 09 semester internship position to same schools and websites including any others that may be identified in the process
  o Dates: June 09 to August 09
  o Percent of budget: 0%
• Hire four (4) interns for Fall 09 semester (8/24/2009 to 12/12/09)
  o Dates: Aug 09
  o Percent of budget: 6%
• Interns meet with teachers and to implement class activities and assist with the composting program
  o Dates: Aug 09 to Dec 09
  o Percent of budget: 3%
• Interns identify at least three (3) other schools in northeast Ohio to approach for participation in the Practical Applications program
  o Dates: Aug 09 to Dec 09
  o Percent of budget: 0%
• Interns prepare and present information to teachers, administrators and other decision makers at the identified schools about the Practical Applications program.
  o Dates: Aug 09 to Dec 09
  o Percent of budget: 1%
• Interns write report on their activities at the school for future reference by other S.E.E. and school personnel.
Interns leave curricula and other necessary information to run the school program with teachers and administrators at the schools as well as with S.E.E. personnel for future use
- Dates: Nov 09 to Dec 09
- Percent of budget: 0%

Advertise Spring 10 semester internship position to same schools and websites including any others that may be identified in the process
- Dates: Nov 10 to Jan 10
- Percent of budget: 2%

Hire four (4) interns for Spring 09 semester (1/2010 to 5/2010)
- Dates: Jan 10
- Percent of budget: 6%

Interns meet with teachers and to implement class activities and assist with the composting program
- Dates: Jan 10 to May 10
- Percent of budget: 3%

Interns identify at least three (3) other schools in northeast Ohio to approach for participation in the Practical Applications program
- Dates: Feb 10 to April 10
- Percent of budget: 0%

Interns prepare and present information to teachers, administrators and other decision makers at the identified schools about the Practical Applications program.
- Dates: Feb 10 to May 10
- Percent of budget: 1%

Interns write report on their activities at the school for future reference by other S.E.E. and school personnel.
- Dates: May 10
- Percent of budget: 0%

Interns leave curricula and other necessary information to run the school program with teachers and administrators at the schools as well as with S.E.E. personnel for future use
- Dates: May 10
- Percent of budget: 2%

Outcome Measurements and Evaluation
The initial outcome of the internship portion of the Practical Applications program will be measured by the number and quality of the interns hired and by the number of classrooms visited each internship cycle (Spring 08, Fall 08, Spring 09, Fall 09, and Spring 10). The greater the number of classrooms visited that also have at least five (5) sustainability lesson/activities in a given cycle, the more successful this program will be. To keep track of the number of classroom visits and number of lessons, interns will be asked to keep a weekly log of (1) classes visited, (2) activities and curricula used in each class, and (3) number of student in each class. This methodology allows for S.E.E. administrators to assess how much each intern has progressed over their internship period. If interns are implementing a wide-range of sustainability topics and playing a strong supportive role in the development and implementation of the school-wide sustainability program, interns will be considered effective. It will also help show the Practical Applications program to be innovative yet highly effective in both environmental education in the 5-12 classroom, but also for future educators.

Future S.E.E. interns and staff will monitor long-term effects of the internship portion of the Practical Applications program as S.E.E. will have a continued presence in schools associated with the Practical Applications program. Interns will be sent surveys after six months, one year, and two years to determine how
the S.E.E. internship program affected their teaching style and how they are incorporating sustainability/environmental education into their own classrooms.

**Objective 2:**

Over a 30-month period we will provide sustainability-themed class activities for students in grades 5-12 in, at least, three (3) schools – Sacred Heart of Jesus Parish Elementary School (k-8), Wadsworth Central Intermediate School (5-6), and Wadsworth High School (9-12). At least nine other schools in northeast Ohio will be identified to participate in the program. At the end of the 30-month period, at least six schools will have participated in the *Practical Applications* program. By using active vermiculture (composting with worms) systems to introduce students to composting students will receive hands-on experience separating food scraps and maintaining the system as well as inquiry based learning into the “what, where, why, and how” of the worms and the resulting “castings” (digested material from the worms likened to compost). Students will then apply the knowledge this knowledge to a larger-scale, real world composting program within their own schools (discussed in Objective 3).

This portion of the *Practical Applications* program addresses the Education Reform priority because all lessons will be aligned with Ohio’s Academic Content Standards in the following manner (page numbers are associated with printed version of The Ohio Department of Education’s Academic Content Standards for k-12 Science):

**Physical Sciences Benchmark**
- Grade 5 – Nature of Energy – Indicator 4, pg 68
- Grade 6 – Nature of Energy – Indicators 5-8, pg 69
- Grade 11 – Forces and Motion – Indicator 4, pg 73

**Science and Technology Benchmark**
- Grade 5 – Understanding Technology, Abilities to do Technological Design – Indicators 1-3, pg 77
- Grade 6 – Understanding Technology, Abilities to do Technological Design – Indicators 2 & 5, pg 77
- Grade 7 – Abilities to do Technological Design – Indicator 4, pg 77
- Grade 8 - Understanding Technology, Abilities to do Technological Design – Indicators 2-4, pg 78
- Grade 9 - Understanding Technology, Abilities to do Technological Design – Indicators 1-3, pg 78
- Grade 10 - Understanding Technology, Abilities to do Technological Design – Indicators 2-3, pg 78
- Grade 11 – Understanding Technology – Indicator 2 & 5, pg 79
- Grade 11 – Understanding Technology – Indicator 3, pg 79

**Earth and Space Benchmark**
- Grade 5 – Earth Systems – Indicators 5-6, pg 48
- Grade 7 – Earth Systems – 2 & 4, pg 49
- Grade 10 – Historical Perspectives and Scientific Revolutions – Indicator 7, pg 52
- Grade 11 – Earth Systems – Indicator 11, pg 53
- Grade 12 – Earth Systems – Indicator 6, pg 54
- Life Sciences Benchmark
- Grade 5 – Diversity/Interdependence of Life – Indicator 2, 4-6, pg 57-58
- Grade 6 - Diversity/Interdependence of Life – Indicator 8, pg 59
- Grade 7 – Characteristics/Structure of Life & Diversity/Interdependence of Life – Indicator – Indicators 1-3, pg 59
- Grade 10 – Historical Perspectives and Scientific Revolutions – Indicator 28, pg 63
- Grade 11 - Diversity/Interdependence of Life – Indicator 11, pg 64
Scientific Inquiry Benchmark

- Grade 5 – Doing Scientific Inquiry – Indicator 1, pg 83
- Grade 6 – Doing Scientific Inquiry – Indicator 2, pg 83
- Grade 7 – Doing Scientific Inquiry – Indicators 5-6, pg 84
- Grade 8 – Doing Scientific Inquiry – Indicator 4, pg 84
- Grade 9 – Doing Scientific Inquiry – Indicators 3, 5-6, pg 84-85
- Grade 10 – Doing Scientific Inquiry – Indicators 2 & 4, pg 85
- Grade 11 – Doing Scientific Inquiry – Indicators 1-5, pg 85
- Grade 12 – Doing Scientific Inquiry – Indicators 1, 4-5, pg 85-86

Scientific Ways of Knowing Benchmark

- Grade 5 – Nature of Science – Indicators 2 & 4, pg 88
- Grade 6 – Science and Society – Indicator 3, pg 89
- Grade 8 – Ethical Practices – Indicator 2, pg 89
- Grade 9 – Nature of Science, Ethical Practices, Scientific Theories, Science and Society – Indicators 1-9, pg 89-90
- Grade 10 – Nature of Science – Indicator 2, pg 90
- Grade 11 – Science and Society – Indicator 8, pg 91
- Grade 12 – Science and Society – Indicators 10-11, pg 93

OEEF Preferred Characteristics met with this objective include:

- Participatory learning
- Working Together
- Connecting Curriculum Topics and Real World Issues
- Becoming Actively Involved in Groups and the Community
- Interdisciplinary and Thematic Educational Programs
- Learners become Actively Involved in Examining and Resolving Environmental Issues Though Hands-on Activities and Inquiry-based Learning

**Activities:**

- Interns train with SEE’s formal educator to ensure adherence to Ohio Academic Standards, North American Association for Environmental Education (NAAEE) standards, and quality teaching standards set forth by SEE.
  - Dates: Ongoing
  - Percent of Budget: 5%
- Interns work with students on sustainability-themed class activities based on student, teacher, and administrator input
  - Dates: Ongoing
  - Percent of Budget: 10%
- Interns, students, teachers, and administrators write stories, articles, poems, etc and draw or take pictures of compost activities to include in the twice-yearly composting newsletter to be distributed at the schools and in the community.
  - Dates: Ongoing
  - Percent of Budget: 4%

**Outcome Measurements and Evaluation**

The initial effects of the k-12 environmental education portion of the Practical Applications program will also be measured by the weekly reports produced by the interns. These reports will indicate the number of activities conducted, type, what Academic Content Standard indicators were met, and number of students who
participated in the class activity. These figures will give S.E.E. administrators and teachers a strong sense of how many students are experiencing in-class sustainability/environmental education activities.

Future S.E.E. interns and staff will monitor the long-term effects of the K-12 environmental/sustainability portion of the Practical Applications program. These personnel will use student indicators, such as recall and ability to use and build upon past knowledge, to determine the long-term success of the environmental education. Students who can recall class activities and can actively apply the concepts learned one to three years later would be considered successful.

**Objective 3:**

Over a 30-month period SEE will provide assistance in starting and running school-wide food scrap composting programs in, at least, three (3) schools – Sacred Heart of Jesus Parish Elementary School (k-8), Wadsworth Central Intermediate School (5-6), and Wadsworth High School (9-12). At least nine (9) other schools in northeast Ohio will be identified to participate in the program and at the end of the 30-month period at least five (5) schools will be implementing a composting program. By implementing a composting program schools will see a decrease in the amount of waste they must have hauled away and perhaps, depending on billing method, a decrease in the cost of waste hauling. The composting programs will be modeled after the Mansfield Middle School (Mansfield, CT) program funded through the Connecticut Department of Environmental Protection. A copy of the School Composting Manual: The Next Step in Recycling, outlining the Mansfield Middle School project, can be found at [http://www.ct.gov/dep/cwp/view.asp?a=2718&q=325392&depNav_GID=1645#Download](http://www.ct.gov/dep/cwp/view.asp?a=2718&q=325392&depNav_GID=1645#Download).

OEEF Preferred Characteristics met with this objective include:

- Participatory learning
- Working together
- Connecting curriculum topics and real world issues
- Learners become actively involved in examining and resolving environmental issues through hands-on activities and inquiry-based learning

**Activities:**

- Work with identified teachers and administrators to develop a plan of action and to gather support within the school
  - Dates: Dec 07 to Jan 07
  - Percent of budget: 3%
- Recruit a core group of people including students, parents, teachers, administrators, kitchen and custodial/maintenance staff, etc. to become members of the Composting Steering Committee.
  - Dates: Jan 08 to Feb 08
  - Percent of budget: 3%
- Determine design, location, and size of compost bin with input from steering committee, teachers, and students (can be an educational class activity). Determine location of food scrap collection containers.
  - Dates: Feb 08 to April 08
  - Percent of budget: 1%
- Build compost bin
  - Dates: April 08
  - Percent of Budget: 8%
- Define composting daily and weekly composting tasks. Daily tasks include collecting and weighing food scraps, transporting scraps from collection bins to composting bins, taking the temperature of the compost, spreading the food scraps on the pile, layering with bulking materials, and tidying up the site. These tasks should take a team of two or three students, supervised by an adult, less than 15 minutes to complete. Weekly tasks (or as needed) include checking and maintaining the structure of
the bin, turning the pile, maintaining the bulking material, and troubleshooting any imbalances in the compost/process.
  - Dates: April 08
  - Percent of Budget: 1%

- Recruit and train student and staff volunteers to complete daily/weekly tasks
  - Dates: April 08
  - Percent of Budget: 1%

- Perform daily, weekly, and yearly tasks. Yearly tasks include such as testing, curing, and using the finished compost
  - Dates: ongoing
  - Percent of Budget: 1%

- Prepare annual summary report discussing the success of the program, any problems encountered, and a sum of the tons diverted from the waste stream. This summary report can also include amount of money saved by composting through a decrease in amount of money spent on waste hauling or on mulch/landscaping additives.
  - Dates: ongoing
  - Percent of Budget: 2%

**Outcome Measurements and Evaluation**

The Steering Committee and SEE representatives should meet regularly to evaluate the implementation and success of the compost operation. Feedback from various staff members will help address the following questions:

- Is the daily processing of food scraps running smoothly?
- Are the bins and equipment in good repair?
- Are the students and staff volunteers working well?
- Are students taking an active role in the program?
- What is the general attitude of the students and staff about the composting program?
- What adjustments can be made to make the process more efficient?
- How can we recognize and celebrate our accomplishment thus far?
- What types of lessons can teachers incorporate into their classes that use knowledge gained from the compost (plant studies, decomposition, worms, etc)

The long-term success of the school-wide sustainability program will be based on the program meeting the needs of the students, teachers, and staff as well as making the school more sustainable. Questions to answer in the long-term include:

- Does the program make the school more sustainable in some tangible way?
- Do a majority of the students at the school participate in some way with the program?
- Are students taking an active role in program?
- Will this program be able to sustain itself without the help of an intern?

Programs that fizzle out or fall into disuse will be considered failures, while programs that make small, practical steps toward sustainability will be considered successful.

**Continuation and Replication Plan**

The *Practical Applications* program is easily continued and replicated throughout northeast Ohio and, as S.E.E. expands, in the rest of the state. This program is the main thrust of the non-profit and S.E.E. needs a pilot project, such as this one, to identify any problems within the system and introduce its concept and goals to
teachers. Once S.E.E. has proven itself with this project, we can use this success as a benchmark to show S.E.E.’s strength and abilities to current and future donors. It is one of the foremost goals of S.E.E. to continue working with schools in some capacity for the long-term, either through providing interns to help set up sustainability education programs and school-wide activities or by providing expertise and a warehouse of environmental/sustainability education tools and resources for the classroom. The internship program can sustain itself after the grant period ends through the donations from our donors and through volunteer interns. These volunteer interns may not perform as many hours as the paid interns, but will still be contributing to the success of the Practical Applications program.

While this program may be difficult to replicate without the use of a non-profit to run the internship program, it is not impossible. S.E.E. is always looking for new schools and new opportunities to work with teachers and students to collaborate for positive change in their schools. By utilizing student teachers and college/university students observing in the classroom to implement sustainability/environmental education, this program can be replicated; this gives the k-12 students access sustainability activities but also provides the student teacher a valuable experience with conducting sustainability education in the classroom. It is foreseeable that these interns will utilize what they learn during their time with SEE in their future careers as teachers and educators.

The results of this program will be shared with other educators through the composting newsletter given to parents and community members and through the S.E.E. website (http://www.seeohio.net). Interns become teachers and spread the word of their internship and experiences. Interns are also encouraged (or may be required) to write articles for professional newsletters and websites, as well as give presentations at professional meetings. Current teachers, through professional organizations, talk with other teachers about the S.E.E. Practical Application’s program. Within a given school district, other buildings and teachers are brought into the program through teachers and administrators talking with colleagues. Lastly, county education service centers can sponsor or promote S.E.E. to other districts in the county.

S.E.E. will promote this program via informational marketing pieces, the compost newsletter, and future interns, as well. Interns will visit schools not involved in the Practical Applications program to tell them about what S.E.E. does and how we can help them practically apply environmental principles in their schools. An email newsletter about the successes of this program (including what lessons worked, what lessons didn’t, good curricula, and how teachers integrated sustainability into their required lessons) will be sent to all interested teachers and administrators.

Budget Narrative

Personnel
**Salary/Wages:**
Interns (20) – approx 15-20 hours per week for 16 weeks @ stipend of $2000; OEEF: $25,000, match: $15000
Grant/Intern Coordinator – approx 15 hours per week @ $18/hour; donated: all
Formal Educator – 20 hrs/wk, 80 weeks @ $18/hr; donated: all

Non-personnel
**Supplies:**
Case of recycled content paper – 2 cases @ $40
Classroom activity supplies (supplies vary from poster board to safety goggles, construction paper to PVC piping) – approx $8000 over two and a half school years; OEEF: $6500, Donated: $1500

Video – *It’s Gotten Rotten: Scientific Inquiry for High School Students*, 1 video; OEEF: $60

Work Gloves – 20 dozen pair @ $6.95/dozen; OEEF: $140

Aprons – 100 aprons at $4/apron; OEEF $400

Dust Masks – for students with asthma and/or allergies – 10 boxes, 50 masks/box @ $8/box; OEEF - $80

Spatulas – to attach to collection containers - $50 @ $2/spatula = $100

Garden Rakes, pitch forks, small forks – 10 of each @ $12-15 each = $390

Wheelbarrows – 5 @ $55 each = $275

*Equipment:*

Digital Cameras (suitable for children) – 5 @ $60/camera = $300

Portable Vermiculture Systems – 6 systems at $80/system = $480

Compost Thermometers – 5 at $105/thermometer = $525

Industrial Scale – to measure amount of food scraps collected, 5 @ $120/scale = $600

Outdoor compost bins – lumber, nails, hinges, handles, safety hooks for 5, 4 bin units at $1100/unit = $5,500

Food Scrap Collection Containers – 20 at $30/container = $600

*Printing:*

Classroom activity needs, school-wide program needs – approx 4000 copies @ 5 cents per copy = $200, donated: $100

Curricula and lesson plans to leave at school – approx 4000 copies @ 5 cents/copy = $200, donated: $100

Composting Newsletters for parents/family/community – 5 issues, 10 pages/issue, 2000 printed/issues – approx 100,000 copies @ 5 cents per copy = $5000

*Other:*

Transportation - $0.34 (cents) per mile – approximately 9000 miles over 2.5 years = OEEF: $2000, Match: $1,000
APPENDIX N: INTERNSHIP DESCRIPTION AND SURVEY

EDUCATION AND PROJECT DEVELOPMENT INTERNSHIP

Employer: Sustainability for Educators and the Environment (S.E.E.)
Location: Kent, Ohio
Contact: Sarah Lane, Internship and Grants Coordinator
        330.842.2364 or slane@seeohio.net (http://www.seeohio.net)
Mission: Sustainability for Educators and the Environment seeks to promote and provide environmental education, specifically waste reduction and recycling education, to northeast Ohio schools
Application Deadline: While there is no formal application deadline the internship will start as close to the beginning of the Spring 2008 semester as possible.
Application Materials: Please send cover letter and resume to Sarah Lane via email or postal mail.

INTERNSHIP DUTIES:
Interns will work with teachers in Wadsworth and other locations in northeast Ohio to include sustainability and environmental education in the k-12 classroom. Interns will be responsible for presenting these sustainability lessons and activities in classrooms as well as work with the internship coordinator to identify other schools and make initial presentations to those teachers and administrators. Interns will also assist teachers, students, and administrators in the implementation of a sustainability themed school-wide project. The Spring 2008 project is composting and vermiculture (worm composting).
Travel and personal transportation is required.

VALUE OF INTERNSHIP TO STUDENTS:
Students with an interest in non-profit management and/or education will gain direct experience with program development, serving as a public liaison, networking with schools and environmental agencies, fundraising, preparing age-appropriate academic curricula, and teaching. Students with an interest in hard sciences will gain experience in finding a practical application of those science and sustainability principles. Students will learn about the state of education in Ohio and the most effective means to make sustainability issues relevant to students and the community.

SKILL REQUIREMENTS:
Intern must be proficient with Microsoft Office and possess excellent written and oral communication skills. A background and interest in science is necessary, and students who are considering a career in non-profits or education are encouraged to apply. Intern must be able to work well independently, be self-starters, and be rigorous in coordinating with other interns. Interns who feel more comfortable or who have more experience working with a specific age group should mention this when applying. All interns must be able to pass a background check and TB test for placement in schools.

HOURS AND PAY:
Interns will work approximately 8-14 hours per week. Most of the interns’ time spent will be in various k-12 schools in NE Ohio presenting sustainability education activities or assisting in a sustainable school-wide program. Time will also be spent in the main Kent office collaborating with other interns and the Internship Coordinator. Pay is a monthly stipend of $400.00. Length of internship is not to exceed 4 months, but can be shortened to accommodate college/university requirements.
SEE Intern Questionnaire

Please answer the following:

1. How did you hear about S.E.E. and our internship program?

2. What resources did you use when searching for an internship?

3. What criteria did you use when deciding what type of internship to accept (compensation, challenge, career advancement, etc.)?

4. What was the single most important factor in your decision to intern with S.E.E.?

5. Are you attending college? If yes, what is your major?

6. Did you use an internet search to find this internship? If yes, what search criteria did you use?

7. If you are attending college, do you belong to any student organizations?
APPENDIX O: OHIO EPA OEEF GRANT DOCUMENTS

OEEF's Preferred Characteristics for Projects Targeting Preschool- through University-level Audiences

Notable redesign and restructuring of educational institutions is underway in Ohio and nationally. These trends in educational reform are based on years of research and innovation. The academic content standards developed by the Ohio Department of Education are a result of the state's reform efforts for elementary and secondary education and many schools in Ohio already have made progress in developing better educational programs.

Environmental Education can be an outstanding vehicle for implementing many aspects of educational reform efforts for all grade levels. The development of meaningful learning experiences that focus on environmental issues not only supports educational reform efforts but also contributes to an improved environment. OEEF-funded materials and activities for the K-12 audience must be aligned with the Ohio Department of Education's academic content standards. These learning opportunities contribute to the development of learners who:

- take the major responsibility for their own learning
- view knowledge as integrated and holistic
- enjoy and value participatory learning
- have developed a variety of strategies for identifying issues and solving problems
- can work effectively with others, individually and in small or large groups, and value diversity in backgrounds and ability levels
- understand how curriculum topics are related to the real world
- continually develop and use inquiry skills
- make evidence-based decisions
- have the knowledge and desire to become actively involved in various groups and in the community
- are aware of and use their multiple intelligences
- view the whole community, natural and built, as a site for learning
- can assess their own progress
- are lifelong learners

OEEF will support projects that provide meaningful learning experiences for preschool through university-level audiences. Applications should demonstrate how the following learning opportunities have been built into the educational program.
• Opportunities are provided for learners to become actively involved in examining and resolving environmental issues.

• **Learners participate** in as many aspects of selecting, planning, doing and evaluating the learning experience as possible.

• Learning experiences are designed for learners to work individually or in **small groups** more often than in large groups.

• Learning experiences engage learners in **hands-on activities** and thinking processes.

• Learning experiences emphasize the **process of inquiry** rather than knowing a "right" answer.

• Learning experiences draw upon **multiple intelligences** of learners.

• Learning experiences use resources and sites **outside of the classroom**.

• Learning experiences are developed and **implemented collaboratively** among teachers and outside resource people, if outside resource people are used.

• Educational programs are **interdisciplinary and/or thematic**.

• Educational programs include **authentic and diverse assessment**, which focus on expected outcomes of the learner.

• Educational programs and/or activities are **replicable** in other settings.

• Learning experiences used to educate teachers are **consistent** with the learning experiences teachers subsequently will use to educate their students.

• **Teachers** have a major responsibility and **commitment** in the planning and execution of any pre-service and in-service activity.

• Teachers use quality educational practices that will result in the learners acquiring **lifelong skills** and abilities in pre-service and in-service activities.

• Pre-service or in-service programs are conducted over an extended period of time and include one or more **follow-up sessions**.
2007 OEEF Peer Reviewers Score Sheet
Applications for Pre-school – University Audience

The following pages are used by peer reviewers in evaluating grant proposals.

**Audience Need (20 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The target audience is well described</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The need is a documented need of the target audience, not the applicant/provider organization.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The need for the project was determined in a valid way.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Meeting this need will yield substantial benefits to the target audience.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Need Statement:**

**Organizational Qualifications: (10 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The applicant organization and/or its collaborators are experienced and well-qualified to work with this audience.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The applicant organization and/or its collaborators have appropriate expertise to conduct this project and ensure that the project information is scientifically valid and unbiased.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Organizational Qualifications**

**Project Objectives (35 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The objectives define specifically who will benefit and what will be learned.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The objectives address the need of the target audience as presented in the Statement of Need.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The objectives are consistent with the mission of the applicant organization.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The objectives meet one of OEEF's educational priorities.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The objectives are measurable.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The objectives are realistic for the age group or audience being targeted.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The project does not appear to duplicate other available environmental education resources and programs.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Objectives**
**Project Activities (35 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project activities are specific, and the sequence of activities is appropriate.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The project activities are appropriate for meeting the stated project objectives.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Reasonable steps are taken to ensure that the project information is scientifically valid and unbiased.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The project activities are (or will be) aligned with the Ohio Department of Education’s Academic Content Standards for K-12 education. (for pre-school or university audience projects, award 5 points)</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The activities are age-appropriate.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The project does more than disseminate information: learners will engage in hands-on activities, problem solving, and/or skill-building.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The project makes good use of existing environmental education materials, or provides good justification for the decision to develop new materials.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Activities**

**Timetable (10 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The timetable is realistic for completion of the activities</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The timetable is presented in 4 columns linking objectives, activities, timeline and % of budget.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Timetable**
**Outcome Measurement (15 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The measurements are scientifically and educationally valid for determining if the project objectives were achieved.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The measurements describe success indicators, tools being used to measure, methods of analyzing the data, and who will be conducting the evaluation.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The measurements address both short-term and long-term effects of the project.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Outcome Measurement**

**Continuation/Replication Plan (15 points)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project includes a realistic plan for sharing the results with other educators.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The plan describes how the project can continue once OEEF funding ends.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The plan describes how the project can serve as a model for replication with similar audiences.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Reviewer comments on Continuation/Replication**
### Budget (20 points)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Yes</th>
<th>Somewhat</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>The budget table and narrative clearly explain all expenditures to be funded by the OEEF.</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>The budget is appropriate for this type of project</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Salary costs are reasonable as a proportion of the overall budget. (In general, salary costs should not exceed 50% of the total OEEF budget for the project. Higher amounts should be very well justified by the applicant)</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Equipment costs are reasonable as a proportion of the overall budget. (In general, equipment costs should not exceed 50% of the total OEEF budget for the project. Higher amounts should be very well justified by the applicant)</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

### Reviewer comments on Budget

### Discretionary Points (up to 10 points)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Points Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10 discretionary points may be awarded by the peer reviewer in cases where the applicant has demonstrated that the project has unique characteristics and excellent overall quality, where this distinction does not appropriately fit into the categories previously listed. The reviewer must explain in the comment section why the discretionary points were awarded.</td>
<td></td>
</tr>
</tbody>
</table>

### Reviewer comments on Awarding of Discretionary Points

Total points awarded by peer reviewer, out of 170 possible: _______
SUMMARY OF GRANT ADMINISTRATION REFERENCE FOLDER

Congratulations on receiving a grant from the Ohio Environmental Education Fund (OEEF)! By applying for and receiving a grant you have become an example of the growing number of Ohio educators, business professionals and other citizens who understand the importance of and need for increased environmental awareness through education.

Throughout the life of your project you will be required to submit activity and fiscal accounting reports, and other documents necessary to meet the conditions of your Grant Agreement. In order to make the reporting process as simple and straightforward as possible we are providing you with guidelines for preparing your reports.

- Contained in this Grant Administration Reference Folder (GARF) are the following items.
- OEEF Grant Agreement (including obligations; application; budget; and conditions, if applicable)
- Highlights of Grant Agreement Obligations
- Instructions for completing Activity Reports
- Instructions for completing Fiscal Reports
- Formats for Fiscal Reports

Education should be fun and we want you to stay excited about your grant project instead of feeling bogged down with reporting requirements of the grant.

Good luck with your project. Please call, write or visit us whenever you have questions, want to provide us with informational tidbits or to offer us recommendations for improving our programs. We maintain a library of products developed under OEEF grants which you are always welcome to review and copy.

Ohio EPA - OEEF
P.O. Box 1049
Columbus, Ohio 43216-1049
122 S. Front Street
Columbus, Ohio 43215
Phone: 614-644-2873
Fax: 614-728-1275
Email: oeef@epa.state.oh.us
HIGHLIGHTS OF GRANT AGREEMENT OBLIGATIONS

Please review your Grant Agreement carefully and be sure your Fiscal Agent also is familiar with the obligations prior to initiating your project. Becoming familiar with your obligations under this Agreement, your budget and any conditions placed on the award of your grant, will help you to avoid reporting problems at the end of your grant project. We would like you to focus your attention on a few of the obligations.

- **Term of Agreement (Pg 1):** The term of the Grant Agreement is the time period you are bound to the requirements of the Agreement. This begins with the date the Grant Agreement was signed by both parties and runs through the date OEEF issues a written letter of closure, and includes the five-year records retention requirement. This time period is different from the Project Period.

- **Project Period (Pg 1):** Your Project Period is the timeline you decided you needed to undertake your project from the initiation of your project activities to the completion of your project evaluation. Extending the Project Period requires a written request and approval.

- **Three Copies of Products (Pg 2):** Three copies of materials produced in whole or in part under this Agreement must be provided to the OEEF. If a product involves a major expense, such as a several-hundred-dollar classroom "toolbox" of instructional material, please discuss this in advance with OEEF staff.

- **Initial/Final Payments (Pg 2):** The OEEF will advance your organization 90% of your grant award. Ten percent of the award will be held until all requirements of the Grant Agreement are met (except for the five-year records retention. This will mean you are obligated to pay for up to ten percent of your expenses prior to reimbursement from the OEEF. Be sure your Fiscal Agent understands this condition.

- **Expenditures Incurred Prior to Effective Date of Agreement (Pg 2):** Debts for activities under this grant must not be incurred prior to the effective date of this Agreement.

- **Activity/Fiscal Progress & Closing Reports (Pg 3):** Mark on your calendar the dates your Activity and Fiscal Reports are due to the OEEF. An explanation of the content requirements of Activity Reports and examples identifying the content and format of Fiscal Reports are contained in this folder. All reports must be signed by two individuals, unless the parties agree otherwise. The reports may be signed by the Project Director, Authorizing Agent and/or the Fiscal Agent.

- **Project Budget Modifications (Pg 3):** You do NOT need to acquire prior approval from the OEEF to modify your grant budget, however, you must submit a written modification to the OEEF within 30 days of determining a change is needed. Also keep in mind, any expenses not eligible for funding identified in the OEEF Grant Guidelines apply to active grants.

- **Project Activity Modifications (Pg 3):** You DO need to request, in writing, prior approval from the OEEF to modify your grant activities. Every effort will be made to respond quickly to your requests so that your project is not delayed.

- **Separate Accounting/Records Retention (Pg 3):** You must maintain separate accounting records of grant funds and retain these records for five years from the date the grant is closed.
• **Access and Audit** The OEEF has the right to conduct a compliance audit of your financial records of the Grant Project. Maintaining complete records will be beneficial to you in the event of an audit.

• **Disputes/Termination/Arbitration (Pg 4):** We look forward to an enjoyable and productive working relationship with all of the grantees, however, in the event a controversy or dispute regarding your obligations under your Grant Agreement arises, conditions for resolving these disputes are identified in Articles VII and VIII.

• **Right to Reproduce (Pg 5):** The OEEF and Ohio EPA reserves a royalty-free, nonexclusive, and irrevocable license and right to reproduce, publish or otherwise use, and to authorize others to use, for governmental purposes, materials developed using OEEF grant moneys, the copyright in any work developed using OEEF grant moneys, and any rights or copyright purchased using OEEF grant moneys.

• **General Provisions (Pgs 5,6,7):** Be aware of all general provisions and in particular the ones dealing with Subcontracting, Contractual Services, Campaign Contributions, and Soliciting Donations.

If you have any questions concerning your obligations under the Grant Agreement during the course of your grant project, please call the OEEF staff at 614-644-2873.

**ACTIVITY PROGRESS REPORTS**

When preparing the Activity Progress Reports discuss your project activities, successes and concerns you had during the prior six month period. There is no minimum or maximum page requirement, however, if you can address the areas below in two pages that is acceptable. Please include a discussion of:

* activities undertaken and how your progress compares with your proposed timeline; if you are behind schedule, explain reasons

* highlights of exciting and successful events or milestones

* who and how many of your intended audience are experiencing the benefits of your project thus far

* the collaboration of the project planners and how the collaboration efforts are enhancing your project or what difficulties you are having

* whether you feel you are beginning to accomplish your educational objectives

* concerns you have and how you are addressing the problems

* recognition you received for your project (Please send copies of news articles, awards, and any pictures which capture the project activities)

* materials produced (Don't forget to include 3 copies of these materials with your report)

* modifications made to your project activities and budget

* anticipated problems
ACTIVITY CLOSING REPORT

When preparing the Activity Closing Report prepare a cumulative review of the entire project covering all project periods previously reported. Include the information requested in the progress reports and the following additional information:

* describe in detail how the activities were undertaken; include any information needed for others to replicate your project

* describe in detail two or three exemplary learning experiences

* choose a strength of your program and highlight how that affected the increased knowledge of your audience

* describe accomplishments made towards your educational objectives

* describe specific evaluation measures used to determine how well your educational objectives were met and explain or include examples of responses provided by your audience

* describe how your project has been shared with others and products developed disseminated

* describe your plans for the continuation of your program or future dissemination of products developed

* discuss your thoughts on if, and how, your project can be replicated by other organizations, how the products you developed can be duplicated and used by others, and the audience that would most likely benefit from these educational materials and activities.

We want to be as flexible as possible in the reporting format, so as long as you provide the above information you can be as creative (of course we as reviewers encourage that!) as you like in style and format. There is no minimum or maximum page requirement.

The OEEF will conduct an evaluation of your grant project and if your project is selected as an outstanding example of environmental education, the OEEF will make every effort to assist you in your efforts to publicize your program or replicate materials developed. Please call OEEF staff to learn more about the criteria used.

REQUESTS FOR
ACTIVITY MODIFICATIONS AND PROJECT PERIOD EXTENSIONS

If you want to modify the activities in your project or you think you need an extension of your Project Period, you must receive prior approval of the OEEF. You may initially discuss your ideas with OEEF staff but you must also prepare a written request. OEEF will respond in writing to these requests. The written request and OEEF written approval will serve as a modification to your OEEF Grant Agreement.

Please prepare all written requests on your organization's letterhead. At the top of the front page, type "Activity Modification Request" or "Project Period Extension Request", and reference your OEEF ID number.
FISCAL PROGRESS REPORTS

Fiscal Progress Reports account for the expenditures and line item balances of your OEEF grant moneys. Please prepare these reports on your organization's letterhead, using the enclosed format. Fiscal Progress Reports use a four column table format with "Current Budget", "Previous Balance", "Expenditures this Period", and "Remaining Balance" across the top with Expenditure Line Items down the side. Your "Current Budget" is either your original proposed budget or, if applicable, your modified budget from the most recent Budget Modification Report. (see Budget Modifications)

FISCAL CLOSING REPORT

The Fiscal Closing Report accounts for all expenditures made during the course of the grant project and line item balances of OEEF grant moneys based on the final budget. Please prepare this report on your organization's letterhead, using the enclosed format. The Fiscal Closing Report uses a three column table format with "Current Budget", "Total Expenditures", and "Remaining Balance" across the top with Expenditure Line Items down the side. Your "Current Budget" is either your original proposed budget or, if applicable, your modified budget from the most recent Budget Modification Report. (see Budget Modifications)

We would like to know how much money, in cash and volunteer services, was provided to educate Ohio citizens on environmental issues as a result of OEEF grants. Please include, therefore, in your Fiscal Closing Report, the total amount of fiscal contributions made by your organization towards the project throughout the life of the grant project.

BUDGET MODIFICATIONS

We understand budgets submitted with grant applications are best estimates of expenditures necessary for the successful completion of the proposed project. Once any project is underway adjustments to the proposed budget need to be made.

Budget modifications can be made without prior written approval of the OEEF provided the modifications do not increase the total grant award or the activities of your project have not been modified. Once you have determined a modification to the budget is necessary, within 30 days you must notify the OEEF in writing of these changes. If the modification to the budget is being made as a result of a change in your project activities, however, you will need prior written approval of the proposed changes in activities. (See Requests for Activity Modification and Project Period Extensions)

Please prepare Budget Modification Reports on your organization's letterhead, using the enclosed format. The Budget Modification Report uses a three column table format with "Previous Budget", "Amount of Change (+ or -)", and "Modified Budget" across the top with Expense Line Items down the side. After submitting a Budget Modification Report, the number in the :Modified Budget" column will be entered in the "Current Budget" column of the next Fiscal Progress Report.
APPENDIX P: PLANET PROTECTORS ALIGNMENT

Planet Protectors Curriculum
Alignment to Ohio Academic Content Standards

K-2 Science
By the end of the K-2 program:

Scientific Inquiry
A. Ask a testable question.
B. Design and conduct a simple investigation to explore a question.
C. Gather and communicate information from careful observations and simple investigation through a variety of methods.

Scientific Ways of Knowing
A. Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.
B. Recognize the importance of respect for all living things.
C. Recognize that diverse groups of people contribute to our understanding of the natural world.

KINDERGARTEN:
Physical Science

Nature of Matter
1) Demonstrate that objects are made of parts (e.g., toys, chairs).
2) Examine and describe objects according to the materials that make up the object (e.g., wood, metal, plastic and cloth).
3) Describe and sort objects by one or more properties (e.g. size, color and shape).

Science and Technology
Understanding Technology
1) Explore that objects can be sorted as "natural" or "man-made".
2) Explore that some materials can be used over and over again (e.g., plastic or glass containers, cardboard boxes and tubes).

Scientific Inquiry
Doing Scientific Inquiry
1) Ask "what if" questions.
2) Explore and pursue student-generated "what if" questions.
3) Use appropriate safety procedures when completing scientific investigations.
4) Use the five senses to make observations about the natural world.
5) Draw pictures that correctly portray features of the item being described.
6) Recognize that numbers can be used to count a collection of things.
7) Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers and other appropriate tools).
8) Measure the lengths of objects using non-standard methods of measurement (e.g., teddy bear counters and pennies).
9) Make pictographs and use them to describe observations and draw conclusions.
10) Make new observations when people give different descriptions for the same thing.

**Scientific Ways of Knowing**

*Ethical Practices*
3) Interact with living things and the environment in ways that promote respect.

**Science and Society**
4) Demonstrate ways science is practiced by people everyday (children and adults).

**GRADE 1:**

**Earth and Space Sciences**

*Earth Systems*
1) Identify that resources are things that we get from the living (e.g., forests) and nonliving (e.g., minerals, water) environment and that resources are necessary to meet the needs and wants of a population.
2) Explain that the supply of many resources is limited but the supply can be extended through careful use, decreased use, reusing and/or recycling.

**Physical Sciences**

*Nature of Matter*
1) Classify objects according to the materials they are made of and their physical properties.
3) Explore and observe that things can be done to materials to change their properties (e.g., eating, freezing, mixing, cutting, wetting, dissolving, bending and exposing to light).

**Science and Technology**

*Understanding Technology*
3) Identify some materials that can be saved for community recycling projects (e.g., newspapers, glass and aluminum).

**Scientific Inquiry**

*Doing Scientific Inquiry*
1) Ask "what happens when?" questions.
2) Explore and pursue student-generated "what happens when" questions.
8) Use oral, written and pictorial representation to communicate work.
9) Describe things as accurately as possible and compare with the observations of others.

**Grade 2**

**Science and Technology**

*Understanding Technology*
1) Explain that developing and using technology involves benefits and risks.
2) Investigate why people make new products or invent new ways to meet their individual wants and needs.
3) Predict how building or trying something new might affect other people and the environment.
**Abilities To Do Technological Design**

4) Communicate orally, pictorially, or in written form the design process used to make something.

**Scientific Inquiry**

*Doing Scientific Inquiry*

1) Ask "how can I/we" questions.
2) Ask "how do you know" questions (not "why" questions) in appropriate situations and attempt to give reasonable answers when others ask questions.
3) Explore and pursue student-generated "how" questions.
4) Use appropriate safety procedures when completing scientific investigations.
5) Use evidence to develop explanations of scientific investigations. (What do you think? How do you know?)
6) Recognize that explanations are generated in response to observations, events and phenomena.
7) Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, non-breakable thermometers, timers, rulers, balances and calculators and other appropriate tools).
8) Measure properties of objects using tools such as rulers, balances and thermometers.
9) Use whole numbers to order, count, identify, measure and describe things and experiences.
10) Share explanations with others to provide opportunities to ask questions, examine evidence and suggest alternative explanations.

**Scientific Ways of Knowing**

*Ethical Practices*

3) Describe ways in which using the solution to a problem might affect other people and the environment.
3-5 Science Benchmarks
By the end of the 3-5 program:

**Earth and Space Sciences**
A. Explain the characteristics, cycles and patterns involving Earth and its place in the solar system.
B. Summarize the processes that shape Earth's surface and describe evidence of those processes.
C. Describe Earth's resources including rocks, soil, water, air, animals and plants and the ways in which they can be conserved.
D. Analyze weather and changes that occur over a period of time.

**Life Sciences**
A. Differentiate between the life cycles of different plants and animals.
B. Analyze plant and animal structures and functions needed for survival and describe the flow of energy through a system that all organisms use to survive.
C. Compare changes in an organism's ecosystem/habitat that affect its survival.

**Science and Technology**
A. Describe how technology affects human life.
B. Describe and illustrate the design process.

**Physical Sciences**
A. Compare the characteristics of simple physical and chemical changes.
B. Identify and describe the physical properties of matter in its various states.
C. Describe the forces that directly affect objects and their motion.
D. Summarize the way changes in temperature can be produced and thermal energy transferred.
E. Trace how electrical energy flows through a simple electrical circuit and describe how the electrical energy can produce thermal energy, light, sound and magnetic forces.
F. Describe the properties of light and sound energy.

**Scientific Inquiry**
A. Use appropriate instruments safely to observe, measure and collect data when conducting a scientific investigation.
B. Organize and evaluate observations, measurements and other data to formulate inferences and conclusions.
C. Develop, design and safely conduct scientific investigations and communicate the results.

**Scientific Ways of Knowing**
A. Distinguish between fact and opinion and explain how ideas and conclusions change as new knowledge is gained.
B. Describe different types of investigations and use results and data from investigations to provide the evidence to support explanations and conclusions.
C. Explain the importance of keeping records of observations and investigations that are accurate and understandable.
D. Explain that men and women of diverse countries and cultures participate in careers in all fields of science.
GRADE 3
Earth and Space Sciences

Earth Sciences
4) Observe and describe the composition of soil (e.g., small pieces of rock and decomposed pieces of plants and animals, and products of plants and animals)
5) Investigate the properties of soil (e.g., color, texture, capacity to retain water, ability to support plant growth).

Science and Technology
Understanding Technology
2) Describe ways that using technology can have helpful and/or harmful results.
3) Investigate ways that the results of technology may affect the individual, family and community.

Abilities To Do Technological Design
4) Use a simple design process to solve a problem (e.g. identify a problem, identify possible solutions and design a solution).
5) Describe possible solutions to a design problem (e.g. how to hold down paper in the wind).

Scientific Inquiry
Doing Scientific Inquiry
1) Select the appropriate tools and use relevant safety procedures to measure and record length and weight in metric and English units.
2) Discuss observations and measurements made by other people.
3) Read and interpret simple tables and graphs produced by self/others.
4) Identify and apply science safety procedures.
5) Record and organize observations (e.g., journals, charts and tables).
6) Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

GRADE 4
Life Sciences

Diversity and Interdependence of Life
5) Describe how organisms interact with one another in various ways (e.g., many plants depend on animals for carrying pollen or dispersing seeds).

Physical Sciences
Nature of Matter
1) Identify characteristics of a simple physical change (e.g. heating or cooling can change water from one state to another and the change is reversible).
2) Describe objects by the properties of the materials from which they are made and that these properties can be used to separate or sort a group of objects (e.g., paper, glass, plastic and metal).
Science and Technology
Understanding Technology
1) Explain how technology from different areas (e.g. transportation, communication, nutrition, healthcare, agriculture, entertainment and manufacturing) has improved human lives.
2) Investigate how technology and inventions change to meet peoples' needs and wants.

Abilities To Do Technological Design
3) Describe, illustrate and evaluate the design process used to solve a problem.

Scientific Inquiry
Doing Scientific Inquiry
1) Select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature and area in metric and English units.

Scientific Ways of Knowing
Nature of Science
1) Differentiate fact from opinion and explain that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.
2) Record the results and data from an investigation and make a reasonable explanation.

GRADE 5
Earth and Space Sciences
Earth Systems
1) Explain how the supply of many non-renewable resources is limited and can be extended through reducing, reusing and recycling but cannot be extended indefinitely.
2) Investigate ways Earth's renewable resources (e.g., fresh water, air, wildlife and trees) can be maintained.

Science and Technology
Understanding Technology
1) Investigate positive and negative impacts of human activity and technology on the environment.
2) Abilities To Do Technological Design
3) Explain how the solution to one problem may create other problems.
4) Scientific Inquiry
5) Doing Scientific Inquiry
- Use evidence and observations to explain and communicate the results of investigations.
- Explain why results of an experiment are sometimes different (e.g., because of unexpected differences in what is being investigated, unrealized differences in the methods used or in the circumstances in which the investigation was carried out, and because of errors in observations).
- Scientific Ways of Knowing
- Ethical Practices
- Keep records of investigations and observations that are understandable weeks or months later.