Document 521
PRE-ASSESSMENT REPORT

CHAPTER: University of Alaska Anchorage
COUNTRY: Cameroon
COMMUNITY: Rhema Grace Orphanage
PROJECT: Current Water System Optimization, Water Filtration, and Continued Health Assessment
TRAVEL DATES: 8/02/2011-8/20/2011

PREPARED BY:
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Mentors: Chuck Stilwell, Nancy Hibbert, and John Pepe

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ENGINEERS WITHOUT BORDERS-USA
www.ewb-usa.org

Pre-Assessment Report Part 1 – Administrative Information

1.0 Contact Information

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Faculty Advisor	Aaron Dotson PE	addotson@uaa.alaska.edu	907-786-6041	EWB-UAA
Health & Safety Officer	Tim Samuelson	timothyvsamuelson@gmail.com	301-859-9671	EWB-UAA
NGO/Community Contact	Steve Tataw	asahsteve@yahoo.com	77 20 35 89	EWB-UAA
Education Lead	Nancy Hibbert	nancyhibbert@gmail.com	907-360-3279	EWB-SCA

2.0 Travel History

Dates of Travel	Assessment or Implementation	Description of Trip
August 2009	**Assessment**	Collect information sufficient to develop a plan, based on needs identified by the orphanage and the goals of EWB, which can be developed into an engineered design that could be implemented in two weeks, one year later.
August 2010	**Assessment & Implementation**	Constructed an efficient wood burning cook stove to reduce the inhalation of smoke, collected information (pertaining to the daily water supply and usage) sufficient to develop a plan that could be implemented in August 2011, conducted a health assessment to later gauge the success of the overall project, and developed a maintenance program within the orphanage.

3.0 Travel Team

#	Name	E-mail	Phone	Chapter	Student or Professional
1	Sean Hovorka	seanian1985@gmail.com	970-901-1453	EWB-UAA	Student
2	Kirk Louthan	kirkinator_skier88@hotmail.com	907-394-4980	EWB-UAA	Student
3	Ryan Johnston	ryanj1979@gmail.com	907-317-9307	EWB-UAA	Student
4	Patricia A. Peshel	ppeshel@gmail.com	907-376-6789	EWB-UAA	Student
5	Nancy Hibbert	nancyhibbert@gmail.com	907-360-3279	EWB-SCA	Professional
6	Chuck Stilwell PE	Chuck.Stilwell@bp.com	406-491-1129	EWB-SCA	Professional

4.0 Health and Safety

4.1 Travel Safety

Department of State Travel Warning/Alert and International SOS Travel Risk Ratings

There are no Department of State Travel Warnings or Alerts for Cameroon at present. According to ISOS, Cameroon has a Medium Travel Risk rating, with the Bakassi Peninsula, Douala, Yaounde, Bamenda, and the extreme northern parts of the country having High Travel Risk ratings. In order to mitigate the risks of travel in Cameroon, the group will initially be guided by the Community Contact, Steve Tataw. Throughout the trip, travel and work will be conducted as a group or in pairs at a minimum. Precautions will be ensured to avoid travel at night. Two mentors, Nancy Hibbert and Chuck Stilwell, traveled to Tiko in August of 2010 which will give the group the advantage of previous experience.

Point to point travel detail

Team members will arrive in Douala and will be met by Mercy Batetataw, director of the Rhema Grace Orphanage, at the airport. The team will spend one night in a hotel in Douala before traveling to Tiko. Steve Tataw will work with the group for the first half of the trip, helping introduce team members to the different cultural and social practices in the country as well as possibly aiding in procuring materials. Our over-land mode of transportation will consist mainly of a rented van (with a driver). Road transportation will be minimized due to high risk associated with it and will be mainly for the purpose of gathering materials and off-site lodging. Emergency

travel arrangements and night-time travel arrangements need to be finalized, but we are currently considering options through Limbe Rotary member, Peter Akote.

Food and water will be purchased in bulk by the travel group. After arriving in Douala, we will, if possible, purchase cell phones and pre-paid minutes. We will e-mail those numbers to UAA and EWB-USA. Team members will alternate between staying at Rhema Grace and the hotel. The team members who travel to Limbe will be responsible for purchasing food and water for the other team members. Also, the orphanage will be providing and preparing food for the travel group as a contribution to the project and as appreciation for EWB's presence in their community. The last day in Cameroon will be spent in a hotel in Douala and transportation to the airport will be provided by shuttle service.

4.2 Site Safety – Health and Safety Plan

The travel team will be following the revised Health and Safety Plan submitted in conjunction with this document.

5.0 Budget

5.1 Cost

Excess or contingency expenses incurred by team members during project activities are not anticipated to exceed $1,000 per traveler. Travelers are prepared to meet these costs using out-of-pocket funds; potential reimbursement is available through ongoing chapter fundraising activities.

Table 1. Estimated project related costs for 3 student travelers

Expense	Cost
Airfare	$9,000
Ground Transportation	$3,400
Food and Lodging	$1,800
Project Materials	$7,650
Travel Expenses	$2,500
Miscellaneous	$650
Total	**$25,000**

5.2 Donors and Funding

Table 2. Deposited donations 2011 to present

Donor Name	**Type** (private, in-kind, company, foundation)	**Account Kept at EWB-USA**	**Amount**
Rotary International (Restricted Funds)	Foundation	No	$15,000.00
BP Matching Grant	Foundation	Yes	$6000.00
GrassRoots Fair Trade	Company	No	$182.00
EDC Inc.	Company	No	$1,000.00
Event (No Shave November)	Private	No	$316.00
RFN Management, Inc. (Rotary)	Private	No	$100.00
V.M. Montemezzani (Rotary)	Private	No	$150.00
Event (Thursday Night Fights)	Private	No	$390.00
Event (Battle of the Beards)	Private	No	$90.00
Gail French (Corporate Matching)	Company	Yes	$100.00
BP Fabric of America Fund	Foundation	Yes	$300.00
Total Amount Raised:			**$23,628.00**

5.3 Hours (January 2011– May 2011)

Member	**Number of Weeks**	**Hours Per Week**	**Individual Totals**
Aaron Dotson	21	1.0	21.0
Austin Stewart	21	1.0	21.0
Brittany Barkshire	21	2.0	42.0
Chuck Stillwell	21	1.5	31.5
Jaime Bronga	21	1.0	21.0
James Renovatio	21	1.5	31.5
Jarrod Nelson	21	5.0	100.0
Jeanne Kemp	21	0.5	10.5
Kelsey Coolidge	21	0.5	10.5
Kirk Louthan	21	2.0	42.0
Kris Homerding	21	6.0	126.0
Michael Ulmgren	21	1.5	31.5
Nancy Hibbert	21	1.5	31.5
Patricia A. Peshel	12	10.0	120.0
Paul Kelly	12	0.5	6.0
Robert Champion	21	1.0	21.0
Ryan Johnston	12	6.5	78.0

Sean Hovorka	21	6.5	136.5
Seth Campbell	21	0.5	10.5
Tim Samuelson	21	2.5	52.5
Utpal Dutta	21	0.5	10.5
Total			**955.0**

6.0 Project Discipline(s): Check the specific project discipline(s) addressed in this report. Check all that apply.

Water Supply
____ Source Development
__X_ Water Storage
__X_ Water Distribution
__X_ Water Treatment
__X_ Water Pump

Sanitation
____ Latrine
____ Gray Water System
____ Black Water System

Structures
____ Bridge
____ Building

Civil Works
____ Roads
__X_ Drainage
____ Dams

Energy
____ Fuel
__X_ Electricity

Agriculture
____ Irrigation Pump
____ Irrigation Line
____ Water Storage
____ Soil Improvement
____ Fish Farm
____ Crop Processing Equipment

Information Systems
____ Computer Service

7.0 Project Location

Longitude: 9.3680556; 9° 22' 5" E
Latitude: 4.0786111; 4° 4' 43" N

Mailing address of Rhema Grace Orphanage:
P.O Box 1016 Limbe
Fako Division
South West Region
Cameroon – West Africa

8.0 Project Impact

Number of persons directly affected: 54 children and 17 full and part-time employees at the orphanage

Number of persons indirectly affected: the same, but also there is potential impact due to technology and education transfer in the nearby village of Tiko.

9.0 Mentor Resume(s) – Please see Appendix A for all Mentor resumes.

Pre-Assessment Report Part 2 – Technical Information

1.0 INTRODUCTION

This document is to inform Engineers Without Borders (EWB-USA) of EWB-UAA's intent to travel to Rhema Grace Orphanage, Cameroon to provide a more extensive assessment of the current water system optimization and a clean water filtration system for a sustainable solution to their clean drinking water needs. EWB-UAA made an assessment trip in August of 2009 and an implementation/assessment trip in August of 2010.

EWB-UAA will be implementing a water catchment system and drainage/erosion flood control system as outlined in the 525 document. In addition to the implementation, we will be conducting an assessment for future projects to be conducted at the orphanage to include; water optimization system improvements (including a safe and sustainable electrical system), water filtration, and continued health assessment (details found in appendix B-G). We will also be assessing possible future projects to meet the clean water needs of the surrounding community.

Details of the August 2011 implementation projects are found in the 525 report and include water catchment system and drainage/erosion control.

2.0 PROGRAM BACKGROUND

This background is provided for the assessment of the potential future projects involving water system improvements and reliable access to clean drinking water. This assessment will be the third for EWB-UAA and will be performed concurrently with the construction of a water catchment system and site drainage/erosion control system.

The project was initially described by Peter Njodzeka of the Life and Water Development Group and proposed to EWB-USA. At that time, the orphanage was called St. Marks Orphanage. Since then the name has been changed to the Rhema Grace Orphanage. EWB-UAA applied for and was awarded the project described as kitchen and water improvements.

3.0 OBJECTIVES OF SITE ASSESSMENT TRIP

Objectives of this assessment trip are organized by potential projects to be considered for implementation in the next year and include; water system optimization, water filtration, and continued health assessment.

3.1 Current Water System Optimization

The purpose of the current water system optimization assessment is to establish a sustainable/reliable source of clean drinking water for the orphanage. The current well water system is operated by an undersized generator attached to an electrical system that appears unsafe for operation under national electrical code (NEC) standards.

3.1.1 Assessing the condition of the well water distribution system

The condition of the well water distribution system will be assessed to include:

- water pipe fittings
- water shut-off valves
- water piping

The assessment of the well water system will help ensure the longevity of clean water distribution at the orphanage.

3.1.2 Assessing the condition of the electrical system

Limited electrical information has been gathered by prior site assessments. The electrical assessment will be conducted by an Alaska licensed Journeyman Electrician.

Objectives of the assessment for the current electrical system of the orphanage:

- Determine the condition of the current electrical system
  - Investigate the electrical system in each orphanage building
  - Note code violations (many pictures will be taken)
  - Locate any possible fire hazards
  - Determine the condition of the electrical grounding system

- Determine the specific electrical needs of the orphanage
  - Current electrical load demand
    - Well pump voltage and amperage
    - Lighting
    - Fridge
    - Freezer
    - Electric heat (if applicable)
    - Television
    - Any other devices they are currently using
  - Future possible electrical load needed

- Locate a source for proper electrical supplies in the area
  - Availability of supplies (Type of supplies that will comply with current NEC standards)

        - Electrical wiring
            - Direct Burial Underground wiring (UF or URD (XHHW))
            - NMB 12-2 with ground indoor wiring
            - THHN (Red, Black, White, and Green) indoor wring
        - Outlets
        - Switches
        - Single gang boxes
        - Double gang boxes
        - Ceiling light boxes
        - Junction boxes
        - PVC (glue, pipe, terminal adapters, lock rings, bushings, LB, etc.)
        - Panels
        - Breakers
        - Generator transfer switch
        - 2 inch Metal conduit for future electrical grid hook up
        - 2 inch Weather head
        - Unistrut
        - Smoke detectors
        - Concrete anchors
    - Determine the cost of electrical items needed

- Locate a local electrical company to help with installation of new electrical system

- Determine availability of tools needed to install the electrical equipment
    - Impact Drill
    - Hand Saw
    - Wire strippers
    - Hammer
    - Utility Knife
    - Tape Measure
    - Screw Driver (Phillips and standard)
    - Needle nose
    - Side Cutter pliers
    - Ladders

- Investigate when AES Sonel can connect the orphanage to grid power

- Determine if any local electrical codes are present in the area

- Determine the specific measurement layout of the orphanage
    - Measure between building for proper wire sizing
    - Measure square meters of each building
    - Sketch a layout of rooms in each building

- Begin developing and discussing an electrical installation approach with Mercy
  - Lighting and outlet layout
  - Location of dedicated circuits
  - Proper breaker sizing for circuits
  - Rewiring of the well pump tech system
  - Underground electrical system between buildings
  - PVC system in the structure for minimal moisture impact on devices
  - Smoke Detection system in each building
  - Proper over-current protection for circuits in use
  - Proper Ground fault protection for exterior and damp areas
  - Proper lighting and outlet placement
  - Generator transfer system that will allow ease of future grid connection

- Determine if Landlord will approve electrical improvements to rented building
  - Receive approval from Landlord of current reading room for our proposed electrical upgrades

- Establish the location of a generator/electrical mechanical room on the orphanages property
  - Centrally located
  - Located close to the well pump for voltage drop concerns
  - Determine if generator/electrical room will be a possible option for a buy in solution for the orphanage

- Investigate the size and condition of the generator
  - Exact voltage of the generator
  - Operating condition
  - Determine the Maintenance schedule currently in practice
  - Provide needed repairs to ensure generator will last until next implementation

- Locate a properly sized generator (some information has already been gathered)
  - Determine availability
  - Investigate warranty or service plan details included in purchase price
    - Details of the plan
    - Availability of technicians to perform future generator mechanical issues
  - Select a possible model (to aid in developing the O&M)

Assessing the prior objectives will aid in determining a sustainable/reliable electrical system for implementation. The upgraded electrical system implementation will provide safe, reliable electricity to the current well water system and surrounding orphanage buildings.

3.2 Water Filtration

The purpose of water filtration assessment is to provide the orphanage with a sustainable/reliable/affordable means of providing their immediate community with filtered, potable water. While the orphanage currently uses the well system for their drinking needs, this system is expensive and often unreliable. A form of filtration could enable the orphanage to further increase their water supply to meet the WHO's water consumption guidelines.

3.2.1 Assessment of Water Filtration Needs

The orphanage's current water sources will be analyzed for several health concerns to determine the varying degrees of contamination. Testing will be conducted both by in-country laboratories as well as by University of Alaska Anchorage (UAA) facilities. The testing to be conducted in country will be primarily for bacterial forms of contamination such as fecal coli forms and parasites. Testing to be done at UAA will focus primarily on sediment and other mineral content.

A small portion of on-site testing will also be performed via field test kits for e-coli and turbidity. Samples of water will be taken from the three main water sources; the creek, the well, and the rain water catchment. The sources from the river will be taken primarily in the location where the orphanage gathers the majority of its water but will also have samples taken from up and down stream.

A walk up stream will also be beneficial in understanding what forms of contamination may be introduced to the creek before the orphanage is able to gather their water. It is already known that garbage is often thrown in the water and that the village vehicles are often washed in the stream causing several petroleum related contaminates to be introduced to the creek. However, the site will also be investigated for any sort of additional sources of contamination such as livestock or factory runoff.

3.2.2 Water Quality Testing

Table 3. Water Testing Kits

Water Source	Test	Test Form	Cost
Bore Hole	Aerobic Count, E. Coli/Coliform Count	3M Petrifilm	Free
Water Catchment	Aerobic Count, E. Coli/Coliform Count	3M Petrifilm	Free
Creek	Aerobic Count, E. Coli/Coliform Count	3M Petrifilm	Free

The 3M Petrifilms will be brought with the traveling students. The only necessary testing environment is a dark place of somewhat constant temperature. Testing will be performed on the bore hole and creek at earliest convenience, probably within the first few days of arrival. Testing on the water catchment however will need to be done after the catchment system is installed. If

there is not enough rainfall to test water directly from the catchment system before the travelers leave, rain water will be collected directly from the roof to provide a general idea of rain water quality.

In addition to the 3M Petrifilm testing to be completed in country, water samples from each source will be brought back in order to test for hard metals and any other inorganic materials. Additional professional testing is being arranged with an in-country laboratory for the bore-hole. However, a comprehensive list of the items to be tested for has not been received at this time.

3.2.3 Assessment of Established Filtration Methods

Research will be conducted to determine what forms of water filtration have already been successfully introduced in the surrounding areas. This research will ensure that a sustainable method of filtration is selected. It will also ensure that the necessary tools and materials are already in demand and will be easily obtainable for the orphanage

3.3 Continued Health Assessment

The August 2010 visit highlighted the need to apply an interdisciplinary approach to future projects in support of the EWB-UAA phase II Rain Water Catchment System and Flood Control Project. Thus, the EWB-UAA Chapter extended an invitation to members of the UAA Master of Public Health (MPH) Program. Through collaborative efforts, assessment tools in the form of a survey, interviews, and an observation checklist were developed for collection of data that will build on the initial health assessment, and provide essential data for future monitoring and evaluation in a subsequent longitudinal study.

The continued community health assessment will include a survey (Appendix B), interviews (Appendixes C & D), observations (Appendix E), malaria survey tool (Appendix F), and orphanage physical assessment and local production of nets (Appendix G) . The developed tools will be used at both the Rhema Grace Orphanage, and the neighboring village of Ombe. Primary areas of study are:

- Water utilization practices
- Hygiene practices
- Sanitation practices
- Health
- Demographics
- Education
- Socioeconomics

Knowledge gained in this study will allow EWB-UAA to establish the necessary benchmarks to evaluate projects and identify opportunities for disease prevention and health promotion. The objectives of the health assessment include:

- The development of user-friendly assessment and analysis tools for subsequent use as part of a longitudinal study.
- Implementation of health assessment on the Rhema Grace Orphanage and village of Ombe to establish benchmarks required to evaluate EWB-UAA projects.
- Identification of factors that affect the health of the adjacent communities.

Monitoring and evaluation through the reutilization of tools and continued analysis will be conducted annually through the duration of involvement with these communities. Indicators to be used to measure results will be derived from baseline data results. These indicators serve as markers that measure one aspect of a project and serve to show how close a project is to its desired outcomes. Using monitoring and evaluation will allow the EWB-UAA Chapter the flexibility to make adjustments if evaluation of projects shows that something is not working, or if circumstances change. Through careful monitoring and adjustment, a thorough evaluation can be completed and provide the data that reflects moving forward with current plan of action, or that will address the need to revise plans for optimum results.

The research design for this study calls for mixed methods of both qualitative and quantitative data. Qualitative research methods, using individual interviews, will be used to gain an in-depth understanding about the participants' viewpoints and experiences regarding water utilization and hygiene practices. A series of open-ended questions will be posed to individuals to learn about their experiences with water use and hygiene practices. This will allow interviewed individuals to share detailed information, and provide the opportunity to probe into residents daily use practices for the collection of comprehensive data. Field observations will provide us insight into the practices and beliefs of people served. Observation locations will include the orphanage kitchen, orphanage tap, village homes, and the creek used by both the orphanage and the people of Ombe village. Observations to be noted are water collection practices, water treatment practices, cross contamination, bed net use, and hand washing practices.

Both the Rhema Grace Orphanage and Ombe village communities will participate in the health assessment. However, the populations will be evaluated as individual case studies. This will allow the communities to be monitored and evaluated individually and allow for comparative data analysis. It is recognized that comparisons made from collected data between the two assessed communities will be skewed due to the differences in the population demographic. However, the primary focus of the baseline data is water use and practices at the Rhema Grace Orphanage and Ombe village. The fact that the orphanage has access to a clean source via a tap, and at last report the village only had access to a creek that is believed to be contaminated, cannot be ignored. Analyzed data may provide measurable indicators that could prove valuable for future project developments. Water samples from the creek, tap, and rain catchment systems will be analyzed for contaminants while in country.

Data collected will be analyzed using Microsoft Excel 2010. Qualitative data will require color coding of observational narratives and interview transcripts to categorize themes and accurately

input data into Excel 2010. The decision to use Excel 2010 for data analysis was based on ease of use and the common familiarity of the program with the general computer literate public. Excel spreadsheets lend themselves to easy data entry and analysis. These tools are readily available, set up to input data, will not require a substantial time commitment to input data, and can be used for the long-term subsequent longitudinal study.

The residents of the Rhema Grace Orphanage and Ombe village are supportive of this health assessment. Both the director of the orphanage and quarter head (community official) of the village of Ombe have written letters of support for the health assessment and expressed interest in learning about the results of the assessment. Results will be provided to these communities via email, as well as hard copy if requested, upon completion of the finalized report. It is recognized that a good community health assessment must incorporate several key components. Identified key components include: a planned and purposeful assessment, clear goals and objectives, active participation of stakeholders, responsible and ethical administration, and transparency.

3.4 Hardware Pricing and Availability

The purpose of pricing and locating hardware is to establish what materials and viable substitutes are available in the area and get an estimate of the cost of general hardware needed for potential future implementation at the orphanage. Specific objectives for this element include:

- Determine the availability of materials,
- Develop data sheets and material lists with common hardware listed and plausible alternative parts and materials in SI units,
- Establish a cost estimate for construction of project elements,
- Establish availability and costs of electrical supplies in the area,
- Establish the local availability of water filtration system parts and prices, and
- Develop relations with local Rotary engineer and/or member of the Douala Civil Engineering Laboratory for future offsite material and parts reference

3.5 Operations & Maintenance and Sustainability Ownership

A critical and fundamental goal of EWB-UAA project work is to develop ownership by the community. The main objectives in this process include the following:

- Help the community to clearly define their needs, goals and provide a forum that allows open and honest discussions,
- Empower the community to take ownership and affect change,
- Promote the communities responsibility for both the success and failure of the project(s), and

- Continue to develop a structure for the management of project construction and operations and maintenance (O&M) that is sustainable and meets the needs identified by the community.

The project team will plan the following activities in order to achieve the previous objectives:

- Daily meetings with the orphanage director and staff to discuss and define needs that potentially can be met with sustainable projects,
- Review the value and necessity of project ownership, sustainability and define EWBUAA and the orphanage's role in this process,
- Review the Memorandum of Understanding (MOU) with the director and staff and make edits as required,
- Review the orphanage's resources (financial and non-monetary) and discuss the short and long term goals of the orphanage, and
- Propose and discuss a structured approach to forming an operations and maintenance (O&M) committee of responsible staff.

In addition, the orphanage will provide labor in construction, lodging, and other resources in the project effort. This agreement will be further developed during discussions with the orphanage and documented in the MOU. The travelers plan to leave any tools used in construction, along with as-built drawings, design documents, material data and sources.

3.5.1 Operations and Maintenance (O&M) Plan

The intent is the orphanage will own and maintain all projects and facilities. The travel team's objectives will include the following:

- Training and assistance in assessing/budgeting funding required for O&M,
- Discuss the value and necessity of O&M, sustainability and clearly define EWB-UAA and the orphanage's role,
- Identify individuals within the staff who are willing and able to take on responsibility for the O&M committee,
- Provide training to the committee/staff on effective and required maintenance,
- Provide detailed operation and maintenance manuals for all new projects, and
- Establish relationships with a local tradesman to allow for assistance with repairs/reconstruction as needed in the future. This goal would also to be to promote sustainable technology transfer.

As discussed above, we plan to work with the orphanage director and staff to develop an operations and maintenance committee. This committee will be composed of a minimum of two adult staff (one primary and one alternate) responsible for overseeing O&M activities. The committee will also be responsible for following:

- Assessing/budgeting and developing funding required for O&M,
- Training new committee/staff members on the value of effective and required maintenance,
- Maintaining O&M manuals for all new projects, and
- Maintaining relationships with local tradesmen to allow for assistance with repairs/reconstruction as needed in the future.

Our team can use the prior small cook stove project to review our O&M procedure and make adjustments accordingly to ensure future projects sustainability and longevity. Assessment of ownership and O&M capabilities will be a critical issue in establishing our long term relationship with the orphanage. In addition to the stove usage as a metric, last year the travel group left tools for continued maintenance of the existing water system. An evaluation of how these tools have been used will also be an indicator of the community's ability to maintain future projects.

3.5.2 Sustainability

Sustainability is critical for the ultimate success of our project work. An important component of sustainability is ownership from the community, as discussed above. We will use these considerations as the criteria in all decisions. Goals for achieving project sustainability will include:

- Empowering the orphanage to take ownership and affect change,
- Providing an effective O&M program for all facilities, and
- Limiting the need for an influx of outside resources.

In addition, the following four aspects will be reviewed in more detail:

- **Ecological**: The team will review all natural resources which are used and the impact the orphanage's practices have on the surrounding environment. We will review how waste, both biological and non-biological, is handled and alternatives to current practices.

- **Economically**: Review the current funding resources and operating budget of the orphanage. This will be challenging given the orphanage may not want to honestly disclose this information.

- **Political**: The leadership of the orphanage is the director, Ms. Mercy Batetataw. She has been the main point of contact for the orphanage and involved in all decision making related to the project development. She has directed those in charge to support our efforts while helping us to make contacts with groups outside the orphanage. In addition, this year we plan to meet with the quarter head (local government official) of Ombe village to introduce ourselves and facilitate the possibility of future work in the village which surrounds the orphanage

- **Cultural**: As discussed above, all project development work should be driven by the orphanage. We will consider fully all cultural norms, customs and practices when developing the projects and in our interactions with the community.

The project team will also review local NGOs in the region. This is in an effort to develop possible partnerships and utilize locally successful methods of construction and organization. The team will also review the relationship of the orphanage with the surrounding communities in an effort to answer the following:

- How is the surrounding population organized?
- Determine the sources of potable and non-potable water used by the surrounding population.
- Determine opportunities and options for assisting the surrounding population with their water needs.
- Determine the surrounding population's opinion of the potential projects as well as EWB's assistance given to the orphanage.

4.0 COMMUNITY INFORMATION

4.1 Description of Community

For this assessment, we have identified the 'community' as the Rhema Grace Orphanage. In August 2010, fifty-four children and 17 full- and part-time employees and volunteers were at Rhema Grace Orphanage relying on its infrastructure. Mercy Batetataw, the founder and director, is the only one who lives there full time. The other employees and volunteers live in the area. The children range in age from infancy to twenty-one years of age.

The Rhema Grace Orphanage is located closest to Mutengene. About 3 km west of Mutengene on Route N3 there is a dirt road leading south on the east of a river. About 2.5 km south of Route N3, the Orphanage is located on the east side of the road. It is the first of a number of buildings after passing through farmland. The name of the orphanage is painted prominently on the front of the building. There is a small population center (about 250 people) surrounding the orphanage but it is known by a number of different names and not officially recognized.

According to Mercy, the founder and director of the orphanage, the recent population is diverse and composed of many tribal groups from other parts of the country. She indicated that the government had recently made inexpensive land available in the area and that is what had drawn the people from many different areas.

The infrastructure relevant to the community includes 3 km dirt road access from Route N3, a 37m deep borehole, a dormitory, a bathhouse with latrines, and a kitchen structure. The orphanage's infrastructure is located on two adjacent properties, one rented and one owned by

the Orphanage. The dormitory is on the rented land and everything else is on the parcel owned by the orphanage. The Orphanage owns an additional plot of land towards Route N3 which they use to raise crops.

The Orphanage grows a portion of the food they need. They would like to raise meats as well but currently do not have the capacity besides a few chickens. There is a gravel pit about a quarter mile further down the road that provides crushed stone of different sorted sizes. Agriculture is the largest employment in the area. The orphanage grows plantains, bananas, squash and other crops. Palm plantations are common in the area. Limbe has a cement works and there is oil produced in the area. There is a French refinery about 20 miles away on the coast.

The Orphanage's current water system was built in partnership between the Limbe Rotary Chapter and a Spanish Rotary Chapter. It includes a borehole, a submersible pump, a generator, an elevated water tank, a tap near the kitchen. The Orphanage also has a bathhouse with latrines. Wastewater flows to a poured concrete tank underground next to the bathhouse.

The generator donated to the orphanage with the Rotary water system has broken and at the time of our first assessment had not been repaired. In its place, they are using another, smaller generator to power the pump which appeared to be undersized. Before the first generator had broken, the orphanage found it was difficult to pay for diesel fuel for the generator. The orphanage also uses the current generator to power a limited number of loads in the dormitory.

Due to the cost of diesel fuel for the generator, the borehole water is only used for drinking and cooking. Creek water is used for bathing, flushing the latrines, etc. The creek is downstream from Mutengene, likely polluted, and a perceived source of illness in both the orphanage and the surrounding village. The showers are unused, although they did turn them on for the travel team in 2010. Water for bathing is heated on the cook stove (implemented last year) in the kitchen.

4.2 Community and Partnering Organization/NGO Resources and Constraints

The resources of the orphanage are unclear, they seem to change frequently and that can make planning difficult. As of 2010 information, the orphanage receives no government support. It is funded partially by the revenue from the directors' ministry income and partially by donations of individuals and business in the local area. In the past, they have received assistance from the US Navy, Spanish Rotary Chapter, banks and other charitable organizations but these seem to be one-time donations.

Mercy has an old friend and classmate who is a high-ranking instructor at the police academy nearby and he helped us with secure transportation and frequently makes things happen for the orphanage. The organization of the orphanage relies almost entirely on Mercy. The previous travelers assembled a panel for the purpose of collecting information and ideas but Mercy is clearly the leader. The older children contribute significantly to the running of the orphanage and

care of the younger children. The employees include a man named Allen who was educated as a mechanical engineer and we hope to do our work with him close at hand.

Two schoolteachers are also employed in the summer. The rest of the help is not formally trained, to our knowledge, but provide domestic help. Some of the older children are studying accounting and management. The orphanage's administrative capacity is strained and they identified this as an area of great need. Pidgin English is spoken in this area and in Limbe but French is spoken in Douala. The first day there the 2010 travelers experienced some trouble communicating but after a day or two they became more accustomed to the accent and could understand each other. It is important for travelers to speak slowly and with common, simple words. We have met with a local mason who has his own crew. The orphanage is about 15 miles from Limbe and 35 miles from Douala. Vendors of construction materials are in both cities. Traveling this distance can take some time however, due to police stops and crowds/ livestock in the roads. Our group's biggest constraint is time since business is conducted at a slower pace in Cameroon.

The community resources that need to be identified and how they will be documented are included in the following:

- Materials data and prices from local market - data collection in the market
- Equipment rental costs - visit rental shop
- Labor rates - ask electrician
- Orphanage financial resources - ask Mercy
- Other possible partners - ask Mercy and Rotary

4.3 Community Relations

The community is the Rhema Grace Orphanage and our primary contact method is via e-mail with Mercy, the director. We were able to keep continued communication with Mercy and Steve over the past year and they helped in answering many questions in regards to operational costs along with the availability of materials in the local area. During the first assessment trip, we were able to hold discussions with a good cross section of the orphanage from residents to staff and volunteers.

During the last trip, the travelers met with the local clergy, a mason, elders, business people, police, and the Minister of Social affairs for the region. The clergy tend to the people in the surrounding population; the mason has done work for the orphanage in the past and would like to help us in our project. The business people sell materials or are a part of Rotary; Rotary may fund our water project and has previously drilled a well and constructed a water system at the orphanage.

The police officer who helped us with transport and general information was a high school classmate of Mercy's and is now the head instructor at the nearby commando/police academy.

The Ministry of Social Affairs provides some measure (it is unclear how much) of support for the orphanage.

4.4 Community Priorities

During the 2009 assessment, the following needs were identified by the orphanage:

1. Electricity (*large portion of 2011 assessment*)
2. Classrooms
3. Administration and Organization
4. Medicine/Health (*continued assessment in 2011*)
5. Food and Financial Support
6. Dining Facilities
7. Dormitories
8. Improve the Kitchen (*Stove completed in 2010*)
9. Reading Room

In 2010 this same list was reviewed and re-prioritized by EWV-UAA travel team and Rhema Grace staff. During this 2011 assessment, we will work closely with the orphanage leadership to review their current priorities and find mutually agreeable, sustainable projects that meet their needs

5.0 DATA COLLECTION AND ANALYSIS

5.1 Site Mapping

5.1.1 Current Water System Optimization

The well water system was mapped on a prior assessment trip and will help us locate the fittings and valves that need to be checked for proper operation. If any additional water piping was added by the orphanage those items will be noted and updated in our existing well water system diagram.

Completing the following will help us determine the proper layout and wiring sizing for the possible electrical system to be implemented in 2012:

- Determine the specific measurement layout of the orphanage buildings,
- Measure between buildings for proper wire sizing,
- Measure square meters of each building,
- Determine the best wiring route between buildings, and
- Determine an appropriate sized generator/mechanical room and appropriate location (preferably close to the well borehole for minimum voltage drop)

With the above measurement conducted will be able to design a proper electrical system that will help ensure efficient and safe access to clean drinking water.

5.1.2 Water Filtration System

The orphanage's existing water sources will be mapped to determine ideal placement of the filtration devices. The placement of these systems will be integral to ensuring their successful implementation. A site will need to be selected that ensures the filtration system is convenient to use and yet does not introduce any additional possibilities of contamination such as open water for mosquito nesting. Ideally, multiple filtration systems will be constructed to provide the orphanage with multiple locations to filter their water.

5.2 Technical Data Collection

5.2.1 Current Water System Optimization

The following data must be obtained:

- Operating condition of the well water system
    - Pipes, fittings, valves, etc.
- Exact electrical load of the orphanage
- Square meters of orphanage buildings
- Distances between buildings
- Voltage and amperage of current well pump in use
- Condition of onsite generator
- Local electrical codes
- Condition of electrical grounding system
- Availability of local electrical contractors

5.2.2 Water Filtration

The following data must be obtained:

- The contamination levels of the individual water sources
- The consumption levels of the orphanage
- Availability and cleanliness of filtration mediums
- The filtration flow rate needed to keep up with the orphanages water demands
- The orphanages understanding of their need for clean water
- Determine what uses of filtration are used by surrounding communities
- Availability of building materials
    - Plastic Barrels
    - Concrete Forms
    - Valves
    - PVC Pipe

5.3 Pricing and Locating Hardware

The following data must be obtained:

- The location of various hardware/electrical supply stores in Douala with maps and directions will need to be obtained while in Cameroon. The materials available at the hardware stores and the prices will be documented using photography. (A photograph of the pricing board will be taken if available).
- The prices of materials and parts available at the hardware/electrical supply stores and prices will be obtained using data sheets with materials and parts listed and explained so the list can be given to a salesman and filled out to expedite the locating and pricing of materials.
- Determine the availability of parts for the possible generator replacement and electrical system upgrades in addition to items needed for the bio-sand filtration system.

6.0 MONITORING:

EWB-UAA has outlined the following criteria to measure the success of the assessment:

- All communication with the Rhema Grace Orphanage, NGOs, local technicians, and the surrounding community will be documented in the form of Minutes.
- A Questionnaire regarding to the quantitative and qualitative data that is to be assessed will be developed by EWB-UAA prior to departure to ensure orderly recording of data.
- An agenda for all community meetings will be organized prior to departure by EWB-UAA to ensure the acknowledgement of cultural differences and effective communication by EWB-UAA.
- Daily progress reports will be compiled from Minutes at evening re-grouping meetings by a EWB-UAA member.
- Community involvement with assessment.
- Community reaction and opinions on information presented will be evaluated daily.
- Attempt to establish where the orphanage gets their money so that we can establish maintenance expectations.

6.1 Monitoring of past-implemented project

The monitoring of past implementation projects, primarily the stove, will be based on the success measures determined during last year's implementation trip. The stove will be monitored based on the following criteria:

- Is the stove still used as an integral part of daily life?
- Does the stove still function efficiently according to its predetermined standards?
  - Time required to boil 20 L of water
  - Fuel required to boil 20 L of water
- Is the stove regularly maintained?
- Is the orphanage still interested in the stove?
- Has the orphanage eliminated or reduced their dependency on additional or separate cook fires?
- Has the surrounding village expressed any interest in the stove?
- Are all pieces of the stove still present and operational?

Information gathered during the monitoring of the past-implemented project will determine the orphanages ability to take ownership of and maintain projects. These observations will aid in further determining the orphanages ability to undertake larger or more complex implementations in the future.

7.0 COMMUNITY AGREEMENT/CONTRACT:

The community agreement/contract will be based on prior year format and will be signed by appropriate signees before traveling. See Appendix B for signed Memorandum of Understanding.

8.0 SCHEDULE OF TASKS (Approximate Schedule)

Date **August 2011**	**Travel**	**Construction Task**	**Assessment Task**
2	Leave Anchorage	N/A	N/A
3	Arrive in Douala	N/A	N/A
4	Arrive at Orphanage	Material and Tool Procurement	Meeting with Orphanage panel. Review of MOU, Schedule.
5	To and From Limbe	Material and tool Procurement	Continued market assessment for future materials needed.
8	To and From Limbe	**Catchment**: Concrete Pour Activities **Drainage**: Dig Swale #1; finish with rock lining	Begin water optimization health and water filtration assessment

9		**Catchment**: Hardware field-fitting **Drainage**: Dig Swale #2; finish with rock lining	Continued water optimization health and water filtration assessment
10		**Catchment**: Build ancillary catchments system **Drainage**: Dig Swale #4; finish with rock lining	Continued health and water system assessments. Water testing assessment
11	To and From Limbe	**Catchment**: Finalize **Drainage**: Complete walk-way to Boy's Dorm	Feasibility, sustainability, O&M, ownership assessment
12		Testing/Training	Finalize all assessments
13			Wrap-up day
15	Leave Orphanage		

9.0 PROJECT FEASIBILITY

All assessment elements are considered feasible projects at this point. Further evaluation and extensive discussion with the orphanage leadership while on-site will determine the long-term feasibility of these proposed project elements.

10.0 MENTOR ASSESSMENT

This document was prepared by the project team of the EWB-UAA chapter with oversight by their professional mentors (Nancy Hibbert, Chuck Stilwell, and John Pepe). As in the previous, the students organized the efforts by dividing into sub-teams by assessment component. The project team has prepared for this assessment in a number of ways:

- Evaluating the needs of the community using information provided from the initial assessment;
- Performing preliminary design concepts for bio-filtration, well water, and electrical systems.
- Performing research of proven system designs for the assessment aspects of this trip via internet and meetings with mentors. Some team member have years of hands on experience with the installation of certain systems to be assessed.
- Met on average twice a week for over four months to collaborate on preliminary designs, then also in developing this assessment;
- Consulted with the three professional advisors throughout the process.

- Additionally, the travel team will meet for various training and preparation, including: cultural awareness; travel safety; and coordination of construction and assessment activities.

With these previous and planned activities, the three professional advisors believe the team is prepared for this assessment, as well as the construction of the water catchment and onsite drainage systems.

11.0 APPENDICES:

Appendix A – Mentor Resumes

Appendix B – Signed Memorandum of Understanding (MOU)

Appendix C – Continued Health Survey

Appendix D – Health Interview for Adults

Appendix E – Health Interview for Children

Appendix F – Observation Checklist and Notes

Appendix G – Malaria Survey Tool

Appendix H – Orphanage Physical Assessment and Local Production of Nets

Appendix A- Mentor Resumes

John A. Pepe, P.E.

3104 Doil Drive, Anchorage, Alaska 99507, email: john.pepe1@gmail.com

PROFESSIONAL QUALIFICATIONS
John is a principal of EDC, Inc. Consultants, in Anchorage and the engineer of record for many projects designed by the firm. He has over 20 years' experience in the design and construction of remote, rural Alaskan federal, state, municipal and tribal commercial, industrial and educational facilities. His firm specializes in remote rural community facility planning, design and construction.

SPECIALIZED EXPERIENCE
• Remote Water and Sewer Facilities
• Rural Community Utility Master Planning

EDUCATION
• Currently pursuing, MS
Environmental Engineering, University of Alaska, Anchorage
• BSEE, 1994, Electrical
Engineering, Oregon State University

PROFESSIONAL LICENSE
• Registered Professional Engineer, State of Alaska (EE- 11387)

AFFILIATIONS
• EWB-USA, Engineers Without Borders South-central Alaska
• IEEE, Institute of Electrical and Electronic Engineers
• NSPE, National Society of Professional Engineers

RELATED EXPERIENCE

• Alaska State Representative for EWB-USA, 2009- Present
• Founder of the South-central Alaska Professional Chapter of EWB-USA, 2005
• Team Lead, Malawi Children's Village Water Project, Mangochi District, Malawi; EWB-SC Alaska Professionals, 2008-Present
• Team Member, Matunda Health Water System Project, Lugari District Western Kenya, EWB New York Professional Chapter
    o Assisted with on-site construction/repairs and site testing/assessment, July-August 2009
• Professional Mentor, Namawanga Village Water Project, Western Kenya, EWB UMASS Amherst Student Chapter

  - o Assisted with on-site construction and project management, August 2009
- Team Member, Boho Water Supply Development Project, EWB SC Alaska; Moyale District/Liban Zone, Ethiopia, 2006
  - o Responsible for assessment travel planning and partner NGO coordination
- Project Leader, Help International Phi Phi, Ko Phi Phi/Krabi Thailand, 2004-2005
  - o Project management and on-site reconstruction of residential and commercial facilities following the 2004 Tsunami in this region
- Project Manager and Engineer, EDC, Inc.

Nancy Hibbert

3774 Coventry Dr. Anchorage, AK 99507 ● (907)360-3279 ● nancyhibbert@gmail.com

TECHNICAL EXPERIENCE

Petroleum Engineer—BP Exploration—Sept 2006-present

- Optimization and improvement of 60 oil wells in Prudhoe Bay reservoir
- Eight months spent field based with well interventions and drilling

Research Assistant—Laboratoire de Génie Chimique—Summer 2006—Toulouse, France

- Micro-reactor development project for use in pharmaceuticals
- Mixing/eddy analysis for entry angle's effect on reaction speed

Reservoir Engineering Intern—BP Exploration—Summer 2005—Anchorage, AK

- Calculated and mapped reserves at risk for drill site in Prudhoe Bay
- Presented action plan for recovery of 9 million barrels of untapped oil over next 10 years

Environmental Extraction Technician—Analytica Alaska—Summer 2001—Anchorage, Alaska

- Extracted 70-100 samples of soil/water daily containing diesel and residual range organics
- Optimized quality control sampling—increase of 30% in 3 months—savings of $210,000

EDUCATION **Brigham Young University**

Bachelor of Science in Chemical Engineering—April 2006
GPA: 3.62/4.00
EIT April 2006

LEADERSHIP/INVOLVEMENT

Engineers Without Borders South-central Alaska Chapter Secretary—Oct 2009-present
Refuge Assistance Volunteer—Anchorage, Alaska—Oct 2009-present
President of women's religious service group of 50 members—Anchorage, AK—Sept 2007-present
Society of Petroleum Engineers Member—2005-present
Good Buddies Volunteer for children with disabilities—Provo, UT—2004-05

Representative Volunteer—Church of Jesus Christ of Latter-day Saints—2003-04—Brussels, Belgium
Youth Counselor—CES Youth and Family Services—Summer 2002—Logan, Utah

SKILLS

Speak and write French fluently
CPR and Wilderness 1st Aid Certified 2009-2011

CHARLES T. (CHUCK) STILWELL, P.E.

12940 Von Scheben Dr. Phone: 406-491-1129
Anchorage, Alaska 99516
chuck.stilwell@bp.com

PROFILE

- Broad experience in project management for oil and gas and mining industries.
- Have both U.S. and international experience.
- Skilled in leading interdisciplinary teams in planning, design and construction of complex projects.
- Broad experience in Health, Safety, and Environmental (HSE) management in oil and gas industry.
- Quick study and able to lead in new, unfamiliar work environments.
- Extensive experience in negotiating with governmental entities, and non-governmental organizations.
- Have led multiple large projects (>$50Million); example projects provided upon request.
- Exemplary HSE performance record for projects managed, many in heavy construction.
- Keen sense in both developing long term company strategies, and executing those strategies through cost- and time-efficient procedures and actions.

WORK EXPERIENCE

September 2006 - Present
Project Manager
BP / Remediation Management, Anchorage, Alaska

- Project Manager for remediation and decommissioning projects of exploration and production assets on Alaska's North Slope, as well as refining and mining sites in western U.S.
- Responsible for projects' financial, schedule, quality, and HSE performance.
- Financial performance responsibilities include managing project portfolio with total costs of >$70Million and annual budgets of $10-20 Million.
- Excellent HSE performance on field construction projects managed, including no Lost Time Accidents or environmental violations in over 3 years and 100K+ man-hours.
- Project types include: soil and water remediation; tundra restoration; groundwater collection and treatment; HSE program and process development

November 2004 – August 2006; October 1991 - December 2003
Project Manager
BP / Remediation Management, Butte, MT

- Team Lead for numerous remediation projects associated with historic metals mining sites.

- Responsible for projects' financial, schedule, quality, and HSE performance. HSE performance involves compliance and permit acquisition for safety, air, water, waste, wetlands, and land access.
- Financial performance responsibilities included managing portfolio with total project costs of over $100Million and annual budgets of $7-15Million.
- Excellent HSE performance on field construction projects managed, including no Lost Time Accidents or environmental violations in over 7 years and 400K+ man-hours.
- Project types include: water treatment plants; pipelines; soil and stream restoration; and structures.

January 2004 – October 2004
HSE Special Advisor
TNK-BP, Moscow, Russia

- Team Lead for developing the Company's initial long range HSE Strategic Plan, reporting to TNK-BP's HSE Vice President.
- Responsible for managing team of Russian and ex-patriot personnel to assess Company's HSE issues and develop Strategic Plan to address HSE issues.
- Strategic Plan was intended to direct HSE investment of over $500Million over a 5 year period.
- Assessment and plan included upstream, mid-stream, downstream, and retail operations.

October 1990 – September 1991
Operations/Analytical Engineer
ARCO Oil & Gas Company; Midland, TX

- Managed development and production of an onshore oil field, including reservoir studies, well work overs, and other actions to optimize production and net income of the asset.

March 1986 – October 1990
Environmental Engineer
ARCO Oil and Gas Company, Midland, TX

- Provided environmental engineering and regulatory compliance support for oil and gas drilling and production operations.
- Developed and implemented environmental training and compliance programs.
- Responsible for regulatory approvals and compliance for major projects and operations.
- Responsible for regulatory agency and stakeholder relationships for Company.

March 1982 – March 1986
Staff Environmental Engineer
ARCO Oil and Gas Company, Dallas, TX

- Provided environmental support to drilling and production operations, with emphasis in air permitting, hazardous waste disposal, and underground storage tanks.

August 1981 – March 1982
Environmental Engineer
U.S. Army Corps of Engineers; Ft. Worth, TX

- Responsible for water resource engineering, floodplain mapping and flood flow analysis

CIVIC ACTIVITIES

- Professional Advisor – Engineers Without Borders, University of Alaska Anchorage student chapter, 2009-2010
- Mission Team Member – Housing Enhancement Project, Puerto Punto, Mexico, 2005
- Director – Butte Arts Foundation, 1999-2006
- President, Director – Butte Amateur Hockey Association, 2003-4, 2000-2006
- Elder – First Presbyterian Church, Butte, Montana, 1997-2000
- Director – Butte Rescue Mission, 1995-2001

EDUCATION

B.S. – Texas A&M University, College Station, TX; May 1981
Major: Bioengineering; 3.0 GPA

CERTIFICATIONS / ACKNOWLEDGEMENTS / PUBLICATIONS

- Registered Professional Engineer (Texas, 69702), since 1991
- Patent – U.S. Patent Number: 4,898,106 (Feb. 6, 1990) Combustion Method and Apparatus – For design of a clean-burning oilfield waste incinerator.
- Technical paper/publications – multiple publications related to oil and gas environmental and mine-site reclamation projects; specific list of papers available upon request

OTHER SKILLS

- Intermediate competency in Spanish; Basic competency in Russian and German

Appendix B – Memorandum of Understanding

Memorandum of Understanding (MOU) for EWB-UAA Rain Catchment and Water System Improvements

This contract is between the Rhema Grace Orphanage and the University of Alaska Anchorage chapter of Engineers Without Borders-USA (EWB-UAA) for the purpose of setting guidelines for Implementing Rain Catchment and Water System Improvements.

The residents of the Rhema Grace Orphanage agree to the following:

- The Rhema Grace Orphanage residents agree to allow EWB-UAA to work on the construction of Rain Catchment Systems, and perform drainage and well water system improvements.

- The Rhema Grace Orphanage residents agree to participate in the work of constructing the Rain Catchment Systems, drainage and well water system improvements.

- The Rhema Grace Orphanage agrees to elect responsible individuals to become *thoroughly familiar with the construction of the Rain Catchment Systems* and who will be responsible for maintenance of the Rain Catchment Systems and well water system improvements in the future.

- The Rhema Grace Orphanage residents agree to maintain their Rain Catchment Systems and well water system.

- The Rhema Grace Orphanage will provide a review of the performance of the Rain Catchment Systems, drainage and well water system improvements to EWB-UAA.

- The Rhema Grace Orphanage will provide water, labor, and any other available resources for the construction of the Rain Catchment Systems, drainage and well water system improvements.

- The Rhema Grace Orphanage residents agree that the goal of the Rain Catchment Systems, drainage and well water system improvements is to improve health without compromising existing capabilities and capacities.

- The Rhema Grace Orphanage understands that the goal of EWB-UAA is the transfer of technology that sustainably meets the basic human needs of the residents of the orphanage.

- The Rhema Grace Orphanage will provide housing and meals for EWB-UAA team members for approximately 10 days of the group's stay in Cameroon.

- The Rhema Grace Orphanage will provide an Ownership Contribution of 2% of project related expenses (max $200.00 USD, potentially spent on building materials prior to travel teams arrival).The rest of their buy-in will be with labor and hosting the travel team.

- The Rhema Grace Orphanage will secure requested materials on-site prior to the arrival of the EWB-UAA Travel Team (sand and gravel, if in excess of $200 then EWB-UAA will pay the remainder.)

EWB-UAA of EWB-USA agrees to the following:

- EWB-UAA will work with The Rhema Grace Orphanage to design and develop the Rain Catchment Systems, drainage and well water system improvements.
- EWB-UAA will provide materials not obtained by the community for construction of the project.
- EWB-UAA will teach community members and a responsible party about construction, safety and how to maintain their systems.
- EWB-UAA will seek input from community members during the design phase, but will not submit plans for approval by a third party.
- EWB-UAA will provide as-built drawings, material data, contacts and a manual for operation and maintenance to The Rhema Grace Orphanage after project completion.
- UAA Masters of Public Health student in partnership with EWB-UAA will conduct a health assessment of the Rhema Grace Orphanage and surrounding Ombe village.

On behalf of, and acting with the authority of the residents of The Rhema Grace Orphanage and EWB-UAA chapter of EWB-USA, the under-signed agree to abide by the above conditions.

Batetataw Mercy Beyang
Director, Rhema Grace Orphanage

Jarrod Nelson
Project Manager, EWB-UAA

Nancy Hibbert
Project Mentor, EWB-UAA

Chuck Stilwell
Project Mentor, EWB-UAA

Sean Hovorka
Student Traveler, EWB-UAA

Appendix C – Continued Health Survey

Date: _____/_____/_____ Interviewer Name: _____

Demographics:

1. Respondent's Community: _____ 2. Age: _____ 3. Sex: F M

4. What tribe are you a member of? _____

5. How many people live in your home (if applicable)? _____

6. What are the ages of the people who live in the home (if applicable)? _____

Water Related Questions:

7. Where do you get drinking water? (write location on line & answer next question)
☐ Well ☐ Creek ☐ Pump ☐ Tap ☐ Rain ☐ Other

Lists selected drinking water sources above and ask how often the named source is used.

7a._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
7b._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
7c._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
7d._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
7e._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
7f._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

8. How much water do you use every day (on average - separate drinking from other source)?_____

9. Who is responsible (in charge) for fetching water? _____

10. What is the distance to your drinking water source (list source then distance)? _____

_____

11. What is the distance to other water sources? _____

12. What do you do with the water once you bring it home/to the orphanage?

☐ Boil ☐ Disinfect ☐ Filter ☐ Nothing ☐ Other _____

Lists selected action (treatment of water sources) from above and ask how often the named treatment is done.

12a._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
12b._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
12c._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
12d._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
12e._____ ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never
12f. How often do you do this? ☐Always ☐Very Often ☐Sometimes ☐Rarely ☐Never

12g. Why? _____

_____

13. Is there enough water available to meet your needs during all times of the year?

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

14. Please check the box that matches the water availability for that month.

	Always Enough Water	Very Often Enough Water	Sometimes Enough Water	Rarely Enough Water	No Water
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

15. What do you do when there is not enough water? _____

_____

16. What do you use to collect your water? _____

17. Do you store your water in a different container than you collect it in? ☐ Yes ☐ No

17a. Do you do this: ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

18. If you collect water from different sources, do you use different containers for each source? ☐ Yes ☐ No

18a. Do you do this: ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

19. Do you clean your drinking water storage or collection containers?

	Collection Container	Storage Container
Do you clean your drinking water containers?	☐ Yes ☐ No	☐ Yes ☐ No
If Yes, how do you Clean your water container?	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____

19a. Do you do this: ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

20. What water source do you use for each of the following?

	Private Well	Public Well	Creek	Pump	Tap	Rain Water	Other (List)
Drinking							
Cooking							
Washing Hands							
Washing Dishes							
Washing Clothes							
Cleaning House							
Bathing							
Animals							
Irrigation (crops)							
Other Activities							

21. How safe do you think the following are?

	Always Safe	Very Often Safe	Sometimes Safe	Rarely Safe	Never Safe
Well water					
Creek Water					
Pump Water					
Tap Water					
Rain Water					

21a. If participant selected "Sometimes Safe, Rarely Safe, or Never Safe" on any of the above choices ask, Why do you believe _____ source is _____.

_____

_____

22. Do you believe it is possible to get sick from drinking the following?

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Well water					
Creek Water					
Pump Water					
Tap Water					
Rain Water					

23. If you could change one thing about the water you use, what would it be and why?

_____

_____

Sanitation Related Questions:

24. How do you dispose (get rid of) your garbage, such as food waste, paper products,

and other items you do not want? _____

_____

25. Where do you urinate (go to the latrine)?

☐ Flush toilet ☐ Pit Latrines ☐ Outside in Field ☐ Creek ☐ Other (describe)

_____

25a. Where do you defecate (go to the latrine)?

☐ Flush toilet ☐ Pit Latrines ☐ Outside in Field ☐ Creek ☐ Other (describe)

_____

Hygiene Related Questions:

26. Hand washing practices:

Do you wash your hands before cooking?	☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____
Do you wash your hands before feeding a baby?	☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____
Do you wash your hands after changing a baby?	☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____
Do you wash your hands after using the latrine?	☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never	☐ Wash with only water ☐ Wash with soap and water ☐ Other: _____

26a. Where do you bathe? _____

Health Related Questions:

27. How would you rate your health?

☐ Excellent ☐ Very Good ☐ Fair ☐ Poor ☐ Very Poor

28. Where do you get your health information? (Check all that apply):
☐ Family/Friends ☐ Internet ☐ Clinic ☐ Hospital ☐ Traditional Healers ☐ Church
☐ Media (TV, Radio, Newspaper) ☐ School ☐ Other _____

29. In the past month, have you or anyone in your family had any of the following:

		How many people felt this way?	What are their ages?	Treatment (if any)
Cough or hard to breathe	☐ Yes ☐ No			
Stuffy or runny nose	☐ Yes ☐ No			
Diarrhea (running stomach)	☐ Yes ☐ No			
Nausea	☐ Yes ☐ No			
Vomiting	☐ Yes ☐ No			
Stomachache	☐ Yes ☐ No			
Headache	☐ Yes ☐ No			
Fever	☐ Yes ☐ No			
Skin sores or boils	☐ Yes ☐ No			

30. What are the three most common illnesses in your community? Please rank in order:

1._____ 2._____ 3._____

31. What do you think causes these illnesses (match illness above to cause, i.e. #1 to #1)?

1._____

2._____

3._____

32. Where do you go for healthcare services? _____

_____

33. What is done to prevent Malaria? _____

34. What is done to treat Malaria? (if not previously addressed) _____

_____

35. Do you use bed nets? ☐Always ☐Very Often ☐Sometimes ☐Rarely ☐Never

35a. If yes, are the bed nets treated? ☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

36. Who uses the bed net and how often?

	Always	Very Often	Sometimes	Rarely	Never
Yourself					
Children					
Adults					
Everyone					

37. If never, why don't you use bed nets? _____

38. If never, would you use bed nets if they were provided to you at a small cost?
☐ Yes ☐ No ☐ Not sure

40. Are there certain diseases that always occur at specific times of the year?
☐ Yes ☐ No ☐ Not sure

Explain: _____

_____

Education:

41. How important is education for you?
☐Very Important ☐Important ☐Somewhat Important ☐Little Importance ☐Unimportant

41a. How important is education for your sons?
☐Very Important ☐Important ☐Somewhat Important ☐Little Importance ☐Unimportant

41b. How important is education for your daughters?
☐Very Important ☐Important ☐Somewhat Important ☐Little Importance ☐Unimportant

41c. How important is education for other adults?
☐Very Important ☐Important ☐Somewhat Important ☐Little Importance ☐Unimportant

42. What is your education level?
☐ Primary Education ☐ Secondary Education ☐ Some University
☐ University Graduate ☐ Other: _____

Socioeconomics:

43. What is your job (primary employment)? _____

44. Do you own your own home?
☐ Yes ☐ No ☐ Other: _____

Appendix D – Health Interview for Adults

Date: _____/_____/_____ Interviewer Name: _____

Respondent's Community: _____ Tribe: _____ Age: ____ Sex: F M

1. Where do you collect your water for your home/for the orphanage? _____

   _____

   _____

2. Why do you get your water from there? _____

   _____

   _____

3. What do you do with the water when you get it home/to the orphanage? _____

   _____

   _____

4. What if anything, do you do to the water before you drink it? _____

   _____

   _____

5. Can you tell me about water availability in your community throughout the year? _____

   _____

   _____

6. Tell me about where you and the people of your village/the orphanage bathe? _____

   _____

   _____

7. When do you wash your hands? _____

_____

8. How do you dispose of garbage/trash in your village/at the orphanage? _____

_____

9. Where do you and the people of your village/at the orphanage urinate/defecate? _____

_____

_____

10. What do you think makes people get sick in the village/at the orphanage? _____

_____

_____

11. Please tell me what you know about bed nets. _____

_____

12. In your opinion, what are some of the greatest needs of your village/the orphanage? _____

_____

_____

_____

13. What else would you like to tell me about water use in your village/the orphanage that you think is important, but I did not ask or you did not get to talk about? _____

_____

_____

Appendix E – Health Interview for Children

Date: _____/_____/_____ Interviewer Name: _____

Respondent's Community: _____ Tribe: _____ Age: ____ Sex: F M

1. Tell me about where you get your drinking water from? _____

   _____

   _____

2. Why do you get your water from there? _____

   _____

   _____

3. What do you think about drinking water from the creek? _____

   _____

   _____

4. What happens when you get sick? _____

   _____

   _____

5. Tell me about taking baths? _____

   _____

6. When do you wash your hands? _____

   _____

7. What do you do if the generator doesn't work and you can't get water from the tap? _____

   _____

8. I wonder, what you have been told about which water (source) to use for bathing, drinking, and so on?

_____

_____

9. Can you tell me about the places you urinate/defecate (pee/potty)? _____

_____

10. What makes you decide where you will get water from (which source)? _____

_____

11. What makes you decide where you will urinate/defecate (pee/potty)? _____

_____

12. What do you think makes people get sick at the orphanage? _____

_____

_____

13. What do you know about bed nets? _____

_____

14. What do you think would make people healthier (feel better) at the orphanage? _____

_____

_____

15. What else would you like to tell me that you think is important for me to know, but I did not ask or you did not get to talk about?

_____

_____

16. In the past month, have you had any of the following:

		Treatment (if any)
Cough or hard to breathe	☐ Yes ☐ No	
Stuffy or runny nose	☐ Yes ☐ No	
Diarrhea (running stomach)	☐ Yes ☐ No	
Nausea (feel like throwing up)	☐ Yes ☐ No	
Vomiting	☐ Yes ☐ No	
Stomachache	☐ Yes ☐ No	
Headache	☐ Yes ☐ No	
Fever	☐ Yes ☐ No	
Skin sores or boils	☐ Yes ☐ No	

Appendix F – Observation Checklist and Notes

Observation Checklist

A. Water observations in the home/orphanage:	Yes	No
1. Is there pipe water?		
2. Is there well water?		
3. Is there stored rain water?		
4. Is there creek water?		
5. Is water supply covered during observation?		
6. Is the water visibly dirty during observation?		
7. Is there stagnant water around?		
8. Water collecting and storing equipment observed?		
9. Does collecting equipment appear clean?		
10. Does storing equipment appear clean?		
11. Is possibility of cross contamination observed?		
12. Water supply contact with animals?		
13. Water treatment of any kind observed?		
B. Hand washing observations in the home/orphanage:		
14. Observed hand washing?		
C. Bed nets observations in the home/orphanage:		
15. Were bed nets observed?		
16. Were bed nets used correctly?		
D. Hygiene observations in the home/orphanage:		
17. Observed bathing in the creek?		
18. Observed urinating/defecating		

Note: List applicable letter or number that corresponds with the topic/specific question related to corresponding observation note below.

_____

_____

_____

_____

_____

_____

Appendix G – Malaria Survey Tool

Malaria Survey Tool
Rhema Grace Orphanage
August 2011

1. Please tell me what you know about bed nets. _____

_____

2. Do you use bed nets?
   Always Very Often Sometimes Rarely Never

3. If never, why don't you use bed nets? _____

4. If never, would you use bed nets if they were provided to you at a small cost?
   Yes No Not sure

5. If yes, are the bed nets treated?
   Always Very Often Sometimes Rarely Never

6. Have you ever heard of malaria?
   Yes No Not sure

7. Have you ever been told you have malaria?
   Yes No Not sure

8. If yes, did you get treatment for malaria?
   Yes No Not sure

9. Where did you go to get treatment? _____

10. What was the treatment? _____

11. If you didn't get treatment, why not? _____

_____

12. What do you think causes malaria? _____

Appendix H – Orphanage Physical Assessment and Local Production of Nets

Orphanage Physical Assessment and Local Production of Nets

1. What are the dimensions/configuration of the beds? _____

2. How will the nets be secured around the bottom and tied off to the ceiling or bunk above?

_____

3. What are the dimensions of the windows for netting?

a) Dormitories? _____

b) Kitchen? _____

c) Parlors? _____

d) Other _____

4. What are the costs of netting at the local market? _____

_____

5. Is the netting pretreated with Permethrin? Yes No

6. What would be the cost of making a net locally? _____

_____

7. Is a certain color preferable for aesthetics or bug repelling? _____

8. Were bednets observed in the orphanage? Yes No

9. Were they implemented correctly? Yes No