QUEBRADA ARENA COMMUNITY; WATER DISTRIBUTION SYSTEM

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OUTLINE:

- Mission Statement
- Community Background
- Current Water
- Challenges
- Project Assessment
- Proposed Design
- Cost Estimate
- Conclusions



YUCCA ENGINEERING: MISSION STATEMENT

 Yucca Engineering's mission is to provide practical solutions to better the daily lives of rural communities throughout the world. By implementing sustainable, cost effective solutions to issues of concern, Yucca Engineering strives to design systems focused on customer demands and needs in the eyes of both the community and engineer.



DESIGN OBJECTIVES:

- 30 gallons per day
- Disinfected water
- Low maintenance
- Cost effective



NGÖBE-BUGLÉ COMARCA, PANAMA:





Cerro Piedra, Panama

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COMMUNITY BACKGROUND:

- ~30 households
- ~240 members
- 50% under age of 15
- Subsistence Farming
- Primary Education







CURRENT WATER SITUATION:

- Location of source
- Water Quality
- Water Quantity





DATA ANALYSIS:

- Survey of community layout
- Flow measurement of main water source
- Microbial assessment





DATA ANALYSIS: WATER QUALITY ASSESSMENT

Main Source Count

- 6 E. coli
- 115 Total Bacteria

Secondary Source Count

- 5 E. coli
- 130 Total Bacteria





Elevation Profile Mainline

DATA ANALYSIS: WATER AVAILABILITY VS. DEMAND

- 60 GPM Wet Season Flow
- 13 GPM Peak
 Community Demand

Total Use per House			
Time	Gal/Hr	Demand Ratio	
6-11 AM	23.75	2.36	
11-2 PM	5.0	0.5	
5-8 PM	11.6	1.2	



DESIGN: PIPELINE

SDR 26 PVC Pipe			
Size	Length (m)	Length (ft)	
0.5″	1,256	4,119	
1″	3,503	11,491	
2″	138	450	
Total Pipe Length	4,897	16,060	



DESIGN: SPRING BOX



- Overflow Pipe
- Access Door
- Air Vent
- 1" Outlet Pipe
- Shut off Valve
- Filters through gravel and large rocks
- Outflow = 38 LPM

DESIGN: TAP STANDS

- Concrete Column
- Splash Pad
- 0.5" PVC
- Recommend Rebar



DESIGN: CHLORINATION



- Calcium hypochlorite tablets
- Effectively treats against most water born illnesses
- 0.51 ppm
- One tablet per week

DESIGN: STORAGE TANK



- Volume = 8 m3
- 1" Inlet Pipe
- 2" Outlet Pipe
- 2" Overflow Pipe
- Drain
- Access Hatch

DESIGN CHALLENGES:

- High Pressures
- Gully Crossings



DESIGN CHALLENGES: EXCESS PRESSURES

Elevation Profile Mainline



HIGH PRESSURE SOLUTION: PRESSURE BREAK TANKS





mrkdv18-Flickr

GULLY CROSSINGS:

- 2 Suspension Bridges
 Simple construction

 - 35m & 38m
- Low maintenance
 - 1/8" cable



ALTERNATIVE WATER TREATMENT METHODS:

• Point of use treatment



In-line photo catalytic reactor



COST OF PROPOSED DISTRIBUTION SYSTEM:

Spring Box	\$950
Storage Tank	\$1,235
Tap Stand (32)	\$1,500
Pressure Break Tank (6)	\$740
Bridge Structures (2)	\$655
Pipeline (3.6 miles)	\$5,070
Air Release Valve (5)	\$30
Transportation of Mat'l	\$1,000
Total Cost	\$12,300



CONSTRUCTION:

- Crew of 5 + PCV
- Total time of construction = 6 months
 - Dry season = 4 months
- Construction to last 2 dry seasons
 - 1st tank + spring box + tap stands
 - 2nd pipeline + break tanks + gully crossings

CONCLUSIONS / NEXT STEPS

- Submittal to Peace Corps
- Possible Funding and Implementation



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THANK YOU!

QUESTIONS?

