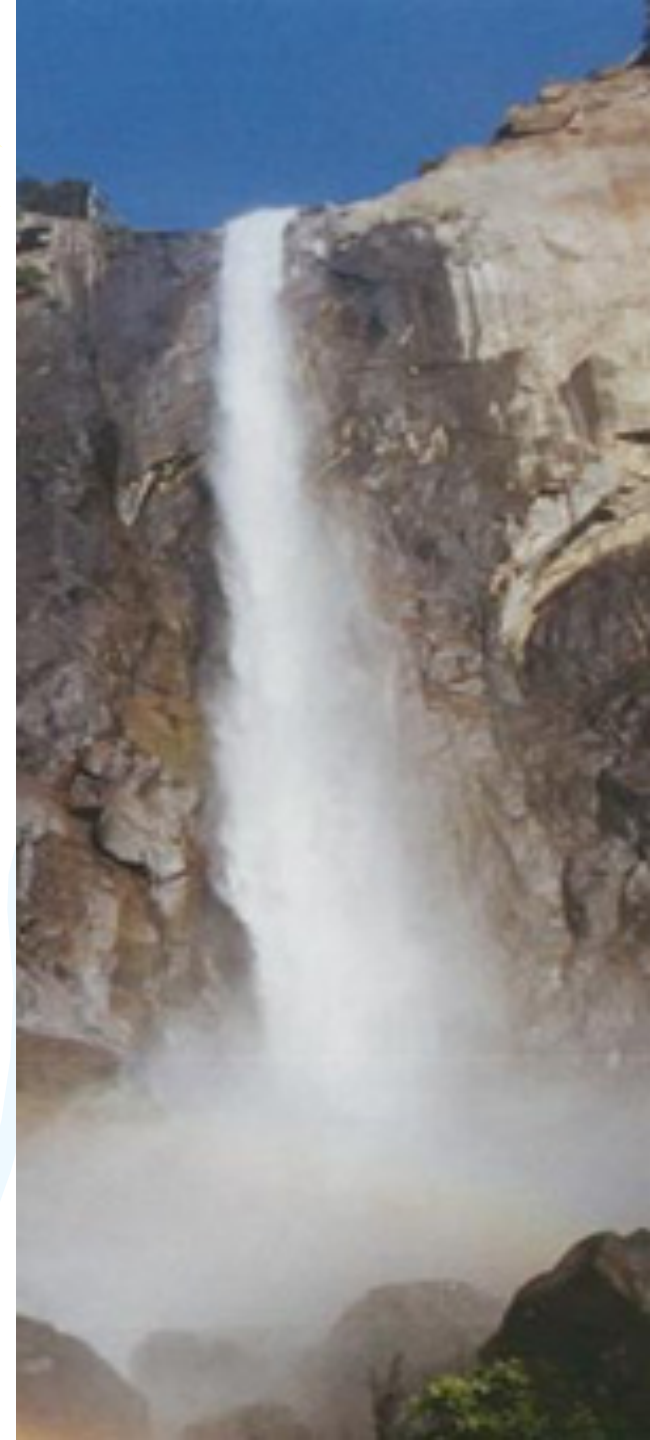


**WORKSHOP ON
APPROPRIATE TECHNOLOGY
FOR THE 21st
CENTURY:
SUSTAINABLE
DEVELOPMENT in AFRICA**
*DATE: Monday, May 27th,
Kenyatta University,
Nairobi, Kenya*

Kinyua Ngige
**Clean Air Energy
Solutions**



Clean Air Kenya



Clean Air Energy solutions is a renewable energy department of CAM Communications (K) Ltd. Started in 1999

Objectives:

- offering a broad range of renewable energy products and services from a single source, backed-up by superb support services.

Projects we have Undertaken Include: -

- Micro-Hydros: - Kiangima, Kahinduini, Mbiri, Suam Uganda, Mungetha, Ndakaini, Rukingiri
- Hydrams: - Mathioya, Murugu, Isharias, Nyatike,

Clients:

- Community Based Organizations, NGOs, GIZ, UNICEF, Government.

Introduction.

This Presentation reviews a project using appropriate technology to supply portable water to a poor rural community in South Nyanza.

It reviews :-

- the use of 3 hydraulic ram pumps to lift 60 Cubic meters of water a day
- to a composite water filtration tank at a 100meters head above the pumps.
- Treated water is conveyed through a 13km long water supply line
- To nine water vending Kiosks where water will be sold by the community
- To raise funds to maintain the system.
- Water will also be supplied to 3 schools and 2 Health clinics through metered distribution lines.

Nyatike Water Project





The project is financed by World Vision Kenya, Unicef and the community

Its aim is to increase availability of portable water

- to reduce the high children mortality rate in the area due to water borne diseases.
- To reduce high burden of water collection mostly by women and children.
- improve livestock quality.

Options Investigated

Different Options were investigated including

- Solar Driven Pumps
 - Cost High, and Site in a Valley with few hours of direct sunlight
- Water Turbine Driven pumps
 - High cost and low water flow during the dry seasons
- Diesel Pump
 - High cost of fuel unsustainable, high cost management
- Imported Hydraulic Ram Pumps
 - Expensive to buy, low maintenance cost, parts hard to source, Environmentally friendly, very Long life
- Locally Manufactured Hydraulic Ram Pumps
 - Affordable, easy low cost maintenance, Parts locally available
 - Environmentally friendly, Appropriate technology, long life

Locally Manufactured Hdyram was selected

Hydraulic Ram Pumps

Developed over 200 years ago they are: -

- Very Simple with only two moving parts
- Automatic requiring very little Management
- Lubricated and cooled by water that drives them
- Requires no fuel or electricity
- Use the power of falling water
- Only pumps a small part of water driving it
- Environmentally very friendly
- Cheap and easy to build

This Workshop hopes to show how simple it is for anyone with basic mechanical aptitude to survey, design and build a good hydram from locally available materials and undertake any necessary maintenance.

With the hope of renewing and popularizing their use

HYDRAM INSTALLATION

The use of a Hydrams requires the availability of a suitable supply of continuously flowing water. The site needs to be suitably prepared to provide water input to the Hydrum and also output side pipes for waste and delivery



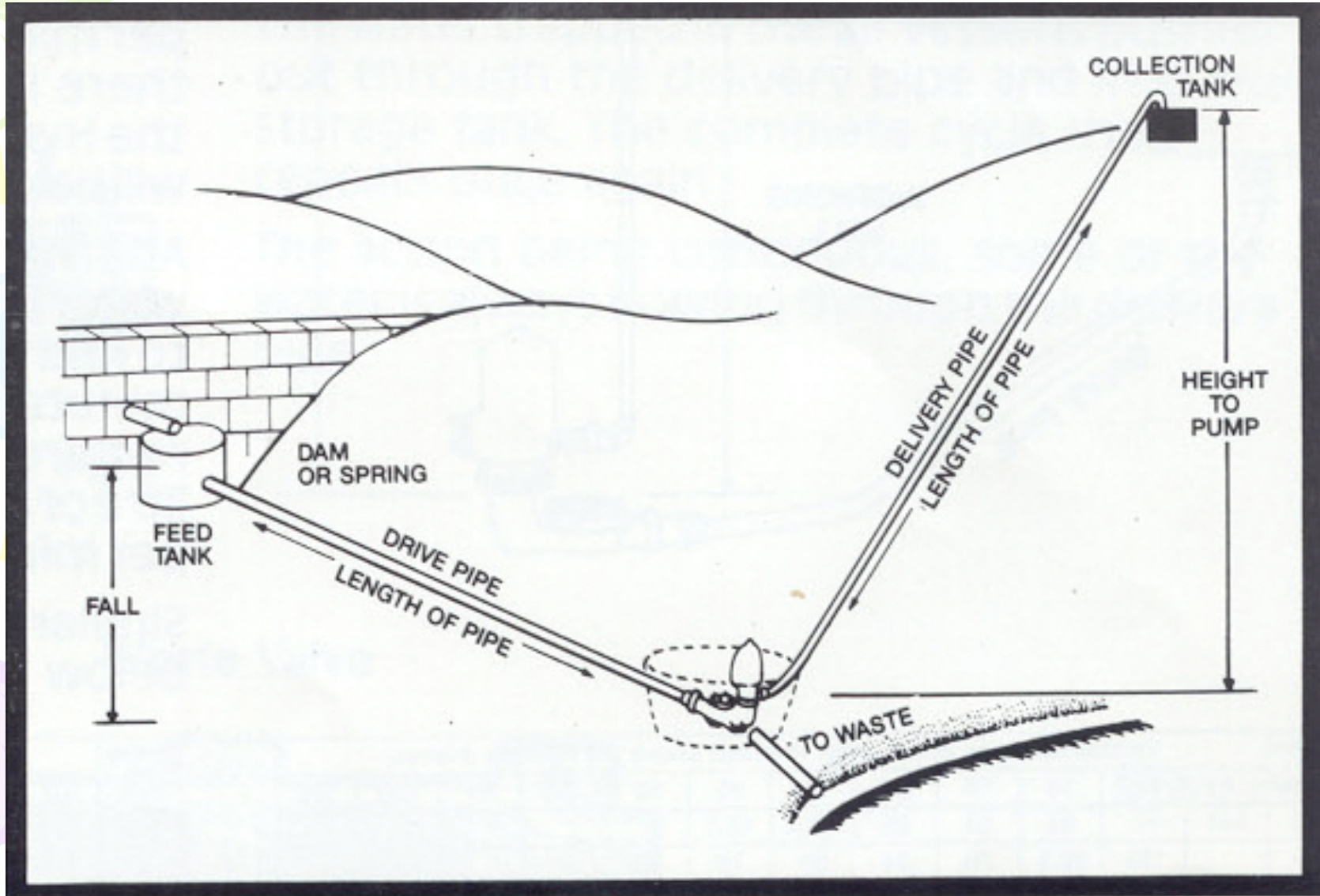


Successful installation of Hydrams

To properly install a Hydram the following is required.

- Approximate quantity of water to be pumped per 24 hours
- Availability of suitable supply of continuously flowing water.
- Adequate working fall commensurate with the delivery head
- Distance in which the working fall can be obtained)
- Delivery head (vertical height to which the water will be pumped)
- Distance water is to be pumped.
- Site suitability for civil works
- Flood levels

Installation Layout





Civil Works

Water abstraction from water sources including Rivers, springs and dams is required to drive hydrams.

Most failed hydram projects are because of poor design of the civil works and poor workmanship during installation



Intake

Properly designed Intake should abstract water from Source and:

- assure continuous flow of water to drive tank
- Remove large debris with minimum requirements for management

Nyatike Intake



Drive Tank

Assure constant flow of water to the drive pipes
To remove debris from the water

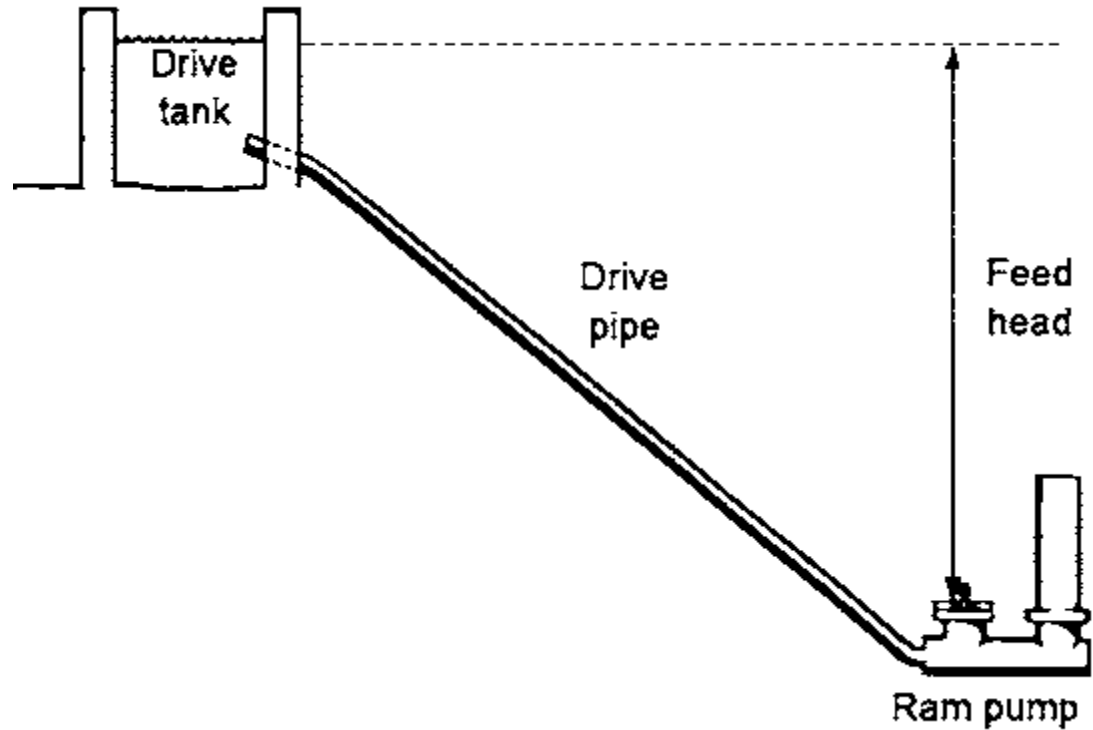


Drive Tank



Drive Pipes

- The drive pipes are subjected to high and low pressures and require to be of high quality materials and properly sized to meet the water delivery requirements.

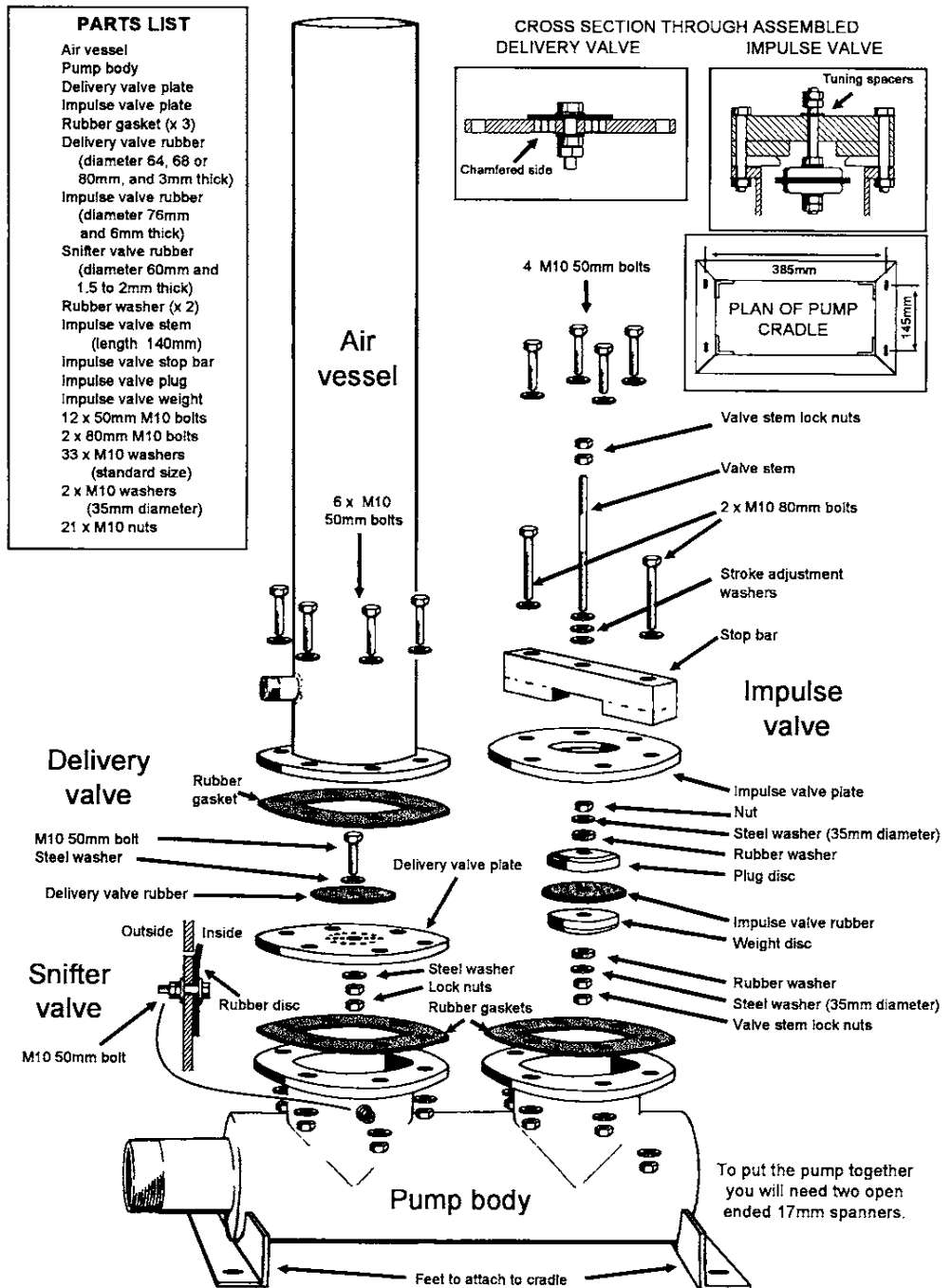


Drive Pipes



Hydraulic Rum Pumps

Exploded View of a DTU S2 Pump



Hydraulic Ram Pumps at Nyatike



Composite Filter



Storage Tank

500M³



Water up on the hill



Testing Flow Rate

