EFFICIENT WASTE MANAGEMENT FOR URBAN NIGERIA

WASTEWATER AND SOLID WASTE:

A PILOT PROJECT

World Igbo Environmental Foundation
WIC 12th Annual Convention
Boston, Massachusetts

August 31 – September 4, 2006
Delivery by:

Joe N. Eto, P.G.
(President/CEO)

SETS ENGINEERING SERVICES
(A DIVISION OF SOIL & ENVIRONMENTAL TESTING SERVICES, INC.)

WWW.SETSINTERNATIONAL.COM
sets@setsinternational.com
In Nigeria, urbanization and industrialization have led to a waste management crisis, resulting in widespread air, water, and soil pollution...improperly constructed landfills all contribute to serious environmental damage.

U.S. Library of Congress – Federal Research Division
Municipal solid waste heaps dot several parts of Nigerian major cities, blocking motorways and making passages along alleys and pavements difficult.

Municipal waste disposal and sewage problems are particularly serious in all urban centers.

United Nations Environment Programme
The burning of electronic goods may pose a health hazard because of materials used in their construction. Plastic casings incorporate chemicals such as flame retardants, while lead is often present in motherboards and monitors.
‘There is a growing body of evidence that demonstrates the crucial importance of water, sanitation and hygiene not only to human health but also for the economic and social development of communities and nations around the world.’

Abuja (central sewerage system): The temporary plant now in use has capacity to serve only 50,000 people, that is, 25% of its present population. It is therefore not able to provide adequate treatment of the wastewater.

United Nations Environment Programme
Only 5% of the inhabitants of Lagos Metropolis, Nigeria are connected to water-borne system and associated sewerage treatment plants. The plants do not treat the sewage to acceptable standards, and are poorly maintained and operated.
Electronic scrap from Europe and the United States is littering the streets of Onitsha and Aba, Nigeria.
In 1995 the total wastewater emptied into Lagos Lagoon was 811,300 m³ per day, of which domestic wastewater accounted for 54%. The volume of wastewater generated is expected to increase to 1,663,090 m³ per day by 2010.

United Nations Environment Programme
Water and sanitation related illness is a major drain on the health of children and prosperity of nations

*UNICEF*
GENERAL POPULATION MORTALITY RATES*

<table>
<thead>
<tr>
<th>Unit of Measure</th>
<th>Nigeria</th>
<th>France</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy at birth (years) males</td>
<td>45.0 (2004)</td>
<td>76.0 (2004)</td>
<td>75.0 (2004)</td>
</tr>
<tr>
<td>Deaths among children under five years of age due to malaria (per 1000)</td>
<td>15.7 (2000)</td>
<td>0.0 (2000)</td>
<td>0.0 (2000)</td>
</tr>
<tr>
<td>Deaths among children under five years of age due to diarrhoeal diseases (per 1000)</td>
<td>24.1 (2000)</td>
<td>0.9 (2000)</td>
<td>0.1 (2000)</td>
</tr>
</tbody>
</table>

*W.H.O. World Health Organization
THE SOLID WASTE LANDFILL:  THE ENGINEERED LANDFILL

SOLID WASTE TREATMENT
THE ENGINEERED LANDFILL

- This is the remedy to the eyesore of litter and dumps of solid wastes in Nigeria’s urban centers.

- It will improve the health of all Nigerians by reducing breeding havens for disease carriers, and promote the national economy.

- With proper design and operations management, could last between 10 and 100 years.

- Engineered landfill, a must for Nigeria’s urban cities, and a worthwhile investment.
1. Final Cover Cap
2. Daily Cover Soil
3. Active Landfill Area
4. Daily Waste Cells
5. Leachate Drainage Layer
6. Composite Clay & Plastic Liner
7. Leachate Collection Pipe
8. Landfill Gas Collection Pipe
9. Methane gas Migration Monitoring Well
10. Ground Water Monitoring Well
11. Storm Water Runoff Ditch
LANDFILL SYSTEMS

- Final Cap
- Landfill gas control collection
- Leachate control collection and cleaning
- Stormwater basins
- monitoring systems

6in min.
2ft min.
WASTEWATER MANAGEMENT
Arrangement of a Typical Wastewater Treatment Facility

INFLOW
SEWAGE

Preliminary Treatment

Primary Treatment

Secondary Treatment

Advanced Treatment

Residual Management

Residuals to Land

OUTFLOW
To Water Course
Unit Operations in Waste Treatment Plant

1. INFLOW SEWAGE
   - Screen
   - Grit Chamber
   - Flow Meter
   - PRIMARY

2. PRIMARY
   - Settling Tank
   - Aeration Tank
   - Settling Tank
   - SECONDARY

3. ADVANCED
   - Sand Filter
   - Disinfection
   - Re-aeration
   - OUTFLOW

4. EFFLUENT
SETS ENGINEERING SERVICES

(A Division of Soil & Environmental Testing Services, Inc.)

COMPANY OVERVIEW

- Founded in 1988
- Multi-disciplined
- Client – Private and Public Sector
- Successfully completed all projects to date
CORE SERVICES

CIVIL ENGINEERING AND CONSTRUCTION MANAGEMENT

ENVIRONMENTAL CONSULTING SERVICES

MATERIALS TESTING

GEO-TECHNICAL SERVICES

LABORATORY SERVICES
KEY TECHNICAL STAFF

JOE N. ETO, P.G (GA, AL)
- M.S. ENGINEERING GEOLOGY
- M.S. – MINERALOLOGY
- 25+ YEARS INDUSTRY EXPERIENCE
- BUDGETING, FUNDING, PROGRAM MANAGEMENT

WILLARD NORTON, P.G (GA)
- M.S. - GEOLOGY
- B.S. – PETROLEUM ENGINEERING
- 28+ YEARS INDUSTRY EXPERIENCE
- SITE ASSESSMENTS
- REMEDIAL INVESTIGATIONS
- WELL INSTALLATIONS AND MONITORING
- EXPERIENCED PROJECT MANAGER

GINA KELLY MONTGOMERY (REM, CIPS)
- B.S. - CHEMISTRY
- REGISTERED ENVIRONMENTAL MANAGER
- REGISTERED CERTIFIED INFRASTRUCTURE PREPAREDNESS SPECIALIST
- 15+ YEAR EXPERIENCE - INDUSTRY
- EXPERT HUMAN HEALTH RISK ASSESSOR
- US EPA EXPERIENCE – MULTI – SUPER FUND SITE MANAGEMENT EXPERIENCE
- HIGHLY TRAINED RISK ASSESSOR
- HOMELAND SECURITY EVALUATIONS
KEY TECHNICAL STAFF

EKURE TAWO, Ph.D
- Ph.D – MINING STATISTICS/ENGINEERING
- P.E. – UNITED KINGDOM
- M.Sc. – MINING ENGINEERING
- B.S. - GEOLOGY
- 26+ YEARS INDUSTRY EXPERIENCE
- EXPERIENCED GEO-TECHNICAL ENGINEER
- EXPERIENCED DEEP ROCK STRUCTURAL ANALYST
- GEO-LOGICAL MAPPING
- TUNNEL DESIGN EXPERT

CHRIS OJI, P.E (GA)
- Ph.D – STRUCTURAL ENGINEERING
- M.S. – STRUCTURAL ENGINEERING
- M.S. – GEO-PHYSICS
- B.S. – CIVIL ENGINEERING
- 20+ YEARS INDUSTRY EXPERIENCE
- VERY STRONG BRIDGE DESIGN EXPERIENCE
- EXPERT STRUCTURAL DESIGN ENGINEER
- D.O.T. EXPERIENCE
- AIRPORT STRUCTURES EXPERIENCE

CHARLES GEORGE
- M.S. – GEO-TECHNICAL & ENVIRONMENTAL ENGINEERING
- M.S. – GEO-PHYSICS
- B.S. - PHYSICS
- 5+ YEARS INDUSTRY EXPERIENCE
- EXPERIENCE IN SUBSURFACE INVESTIGATIONS
- DRILLING OVERSIGHT AND CORE ANALYSIS
- WELL INSTALLATIONS AND MONITORING
- TUNNEL EXPERIENCE

WAYNE WILSON, P.G (GA, AL)
- B.S. – CIVIL ENGINEERING
- 30+ YEARS EXPERIENCE
- TRANSPORT ENGINEERING
- ROAD AND HIGHWAY/UTILITY DESIGN
- STORM DRAINAGE
- HYDROLOGY AND HYDRAULICS DESIGN
- FACILITIES AND SITE DEVELOPMENT DESIGN FOR SEVERAL AIRPORTS
- VERY EXPERIENCED PROGRAM MANAGER
SAMPLE PROJECT EXPERIENCE

WASTE WATER CONSTRUCTION

Design/Build of Nancy Creek Trunk Sewer Capacity Management Facility, Atlanta, Georgia

Client: City of Atlanta
Prime Contractor: J J & G
Sub Contractor: SETS
Contract Sum: $8M (design phase) $205 mil (construction phase)
SAMPLE PROJECT EXPERIENCE

West CSO Groundwater Monitoring

Client: City of Atlanta
Prime Contractor: J J & G
Subcontractor: SETS
Contract Sum: $10M (design phase) $265M (construction phase)
SAMPLE PROJECT EXPERIENCE

Tenth Ward Trunk Sewer Project in Southeast Atlanta

Client: City of Atlanta
Prime Contractor: SETS
Contract Sum: $1.75M
Key Road, and Cascade Road Landfills.
- Atlanta, Georgia

Client:
City of Atlanta

Prime Contractor:
CH2M Hill
Sub Contractor: SETS

Contract Sum:
$4.5mil (design phase)
Objective:
To achieve not less than 80 per cent effective management in the volume of municipal solid waste generated at all levels and ensure environmentally sound disposal.

United Nations Environment Programme
It is by acts and not by ideas that people live.

--Anatole France