Methane to Markets

密封厌氧发酵池在中国养猪场的应用（第二天）

Covered Anaerobic Lagoons—Application to Swine Farms in China (Day 2)

2010年3月16日

March 16, 2010

Methane to Markets

第二天: 议程 Day 2: Agenda

- 第五部分：施工
- Section 5: Construction

- 第六部分：启动、操作和维护
- Section 6: Start-up and O&M

- 第七部分： 疑难问题处理
- Section 7: Troubleshooting

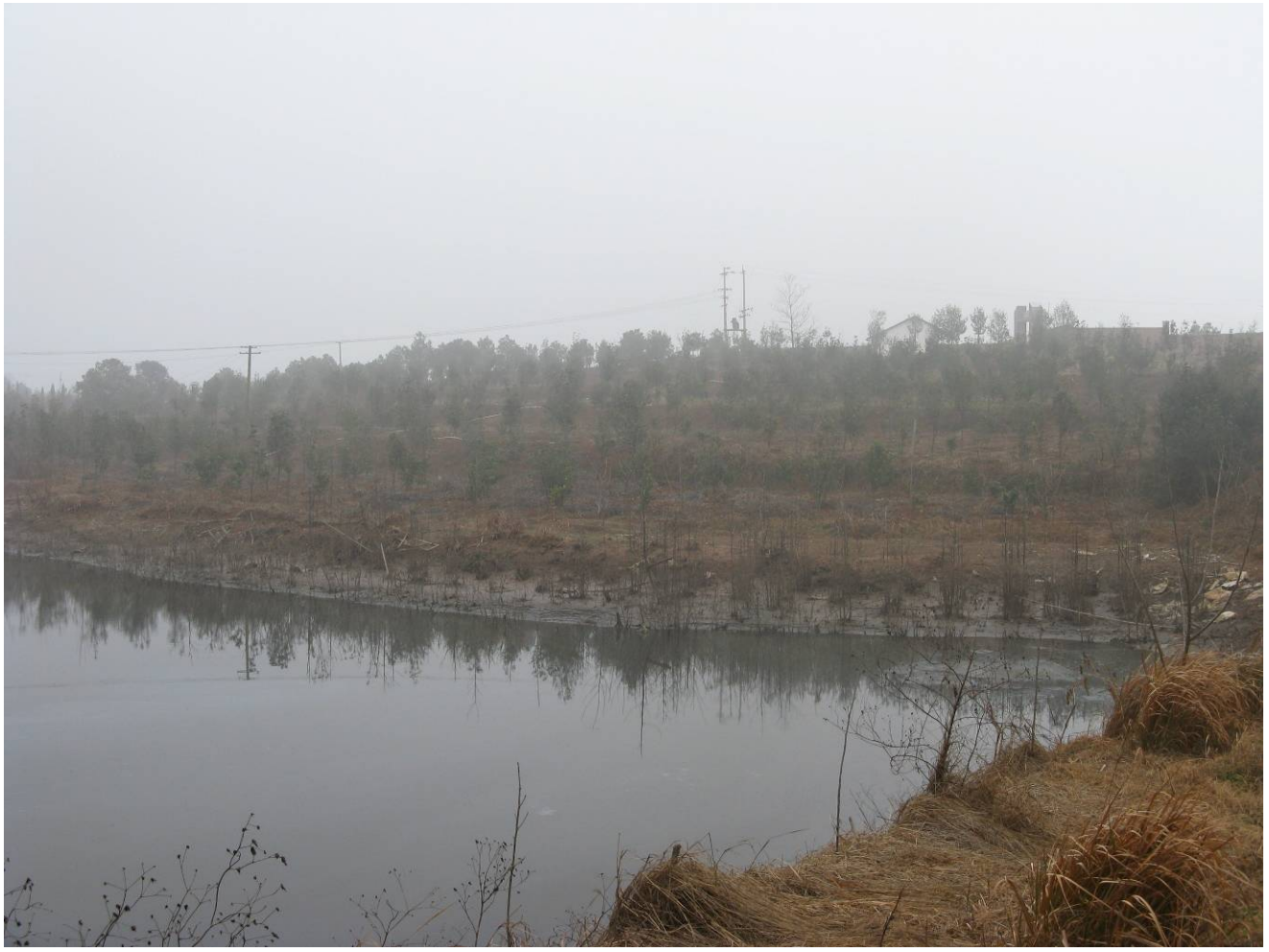
- 第八部分： 海东养猪场实地考察
- Section 8: Haidong swine farm site visit

Methane to Markets

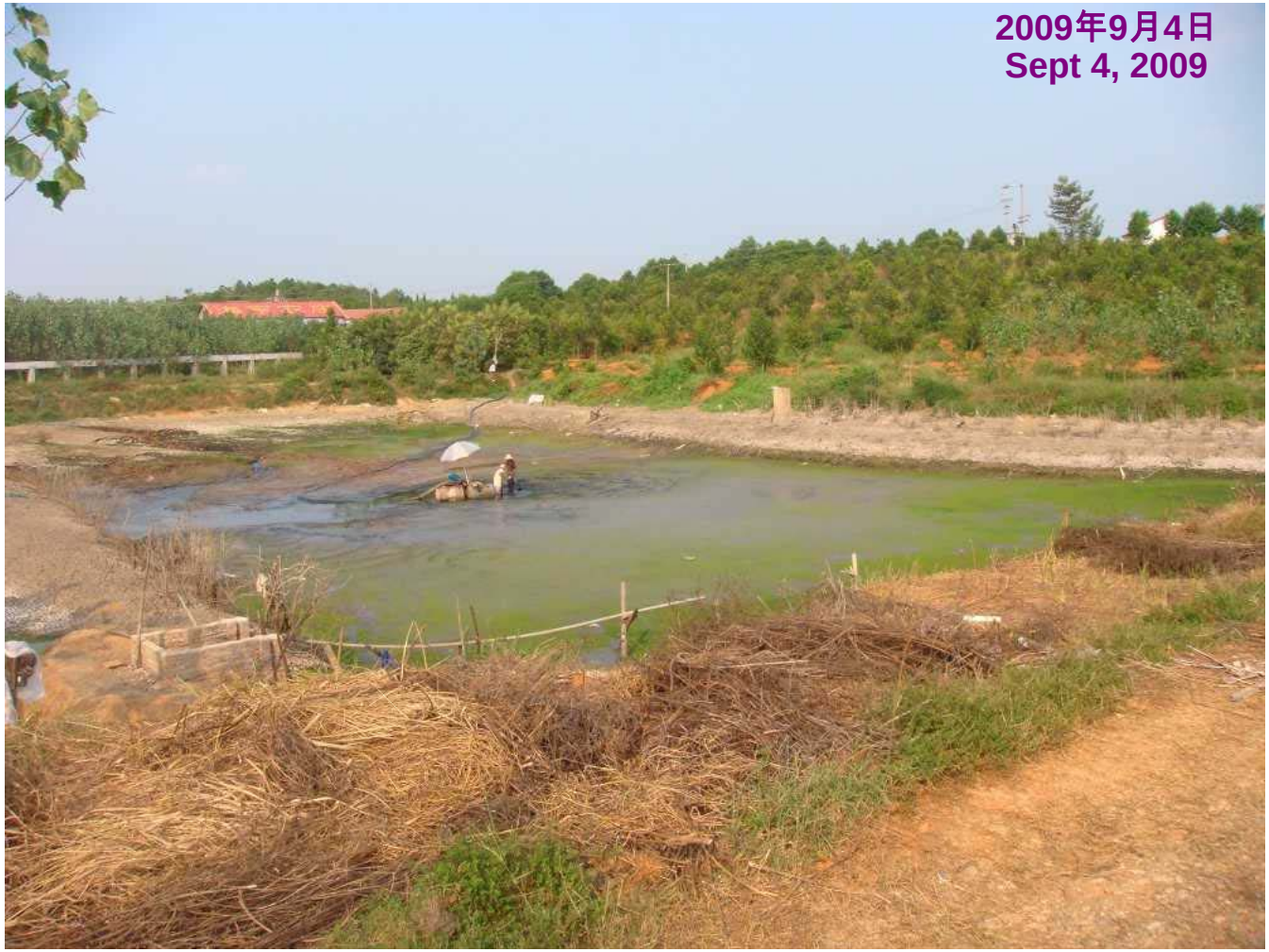
施工步骤 1　Construction steps 1

- **准备工作**: **Prepare the terrain**:
  - 从现有发酵池中抽水，pump the water out of the existing cell,
  - 存储排水培养发酵池， store the drained water for seeding
  - 清除污泥， remove sludge,
  - 挖掘，excavate,
  - 清除多余材料， remove excess material,
  - 按照要求增加发酵池的深度和尺寸，increase depth and size of cell as required,
  - 准备地基， prepare subgrade,
  - 挖掘锚座沟渠，excavate anchor trenches,
  - 开始安装抽泥管。start the installation of sludge draw-off pipes

从现有发酵池开始
Start With An Existing Cell

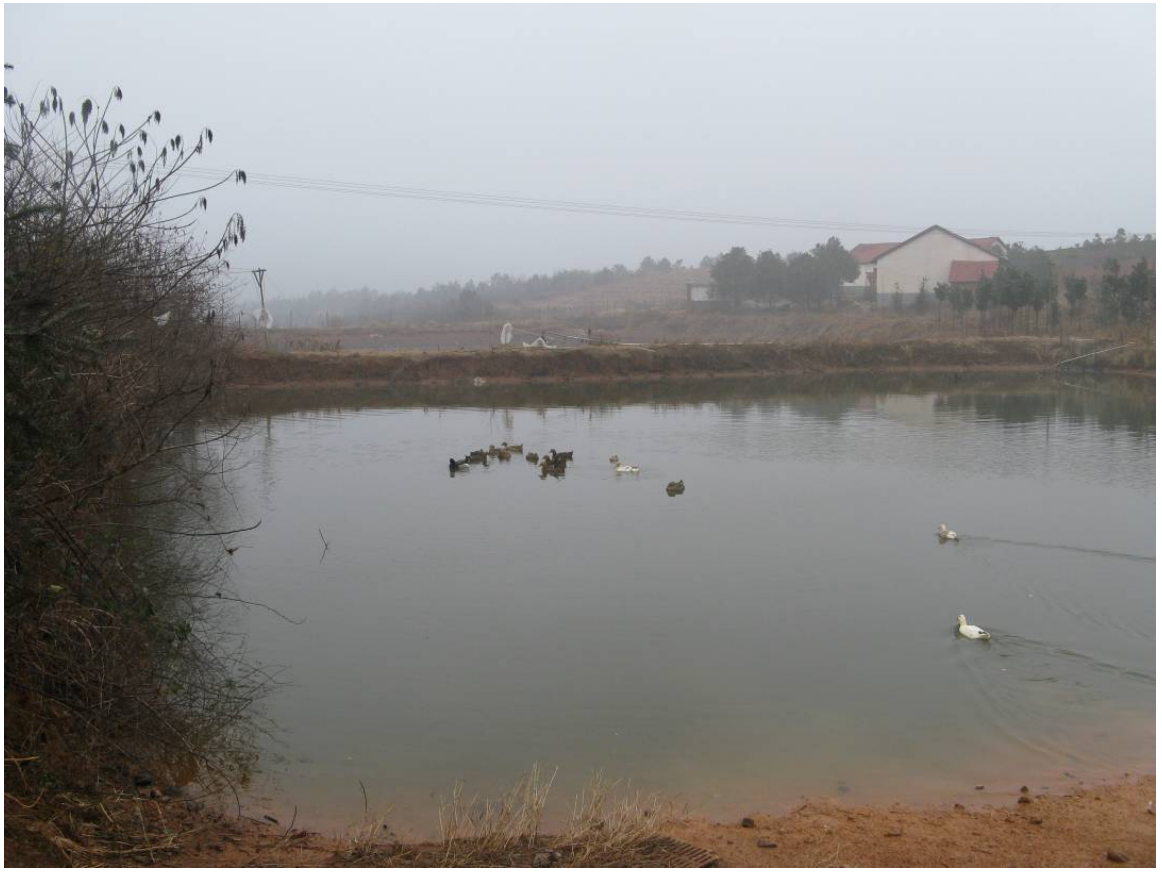


准备工作– 排空废水
Prepare Terrain – Drain the Lagoon



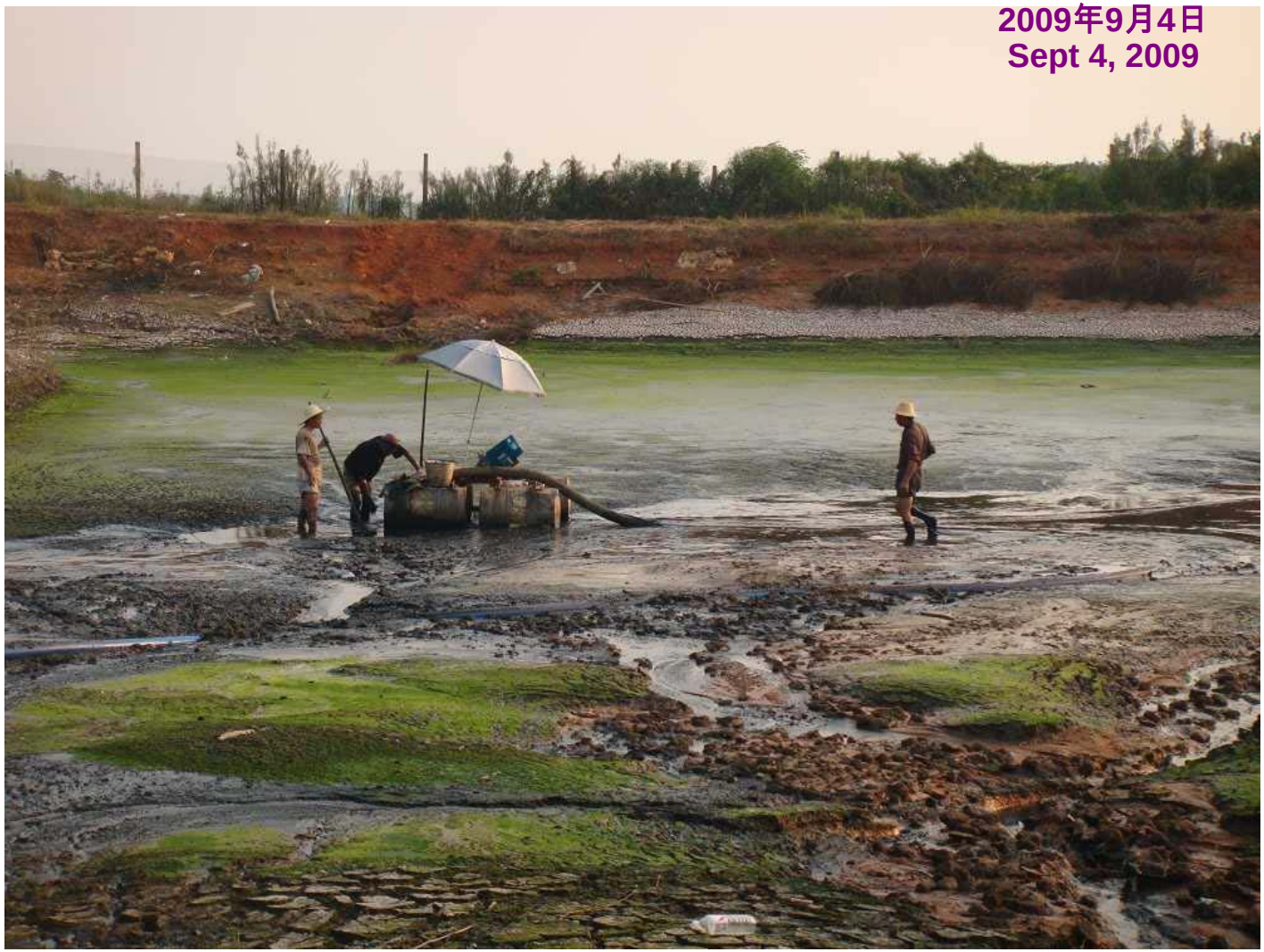
准备工作– 排空并存储废水，培养新发酵池1/2
Prepare Terrain – Drain and store Biomass for seeding of Digester 1/2

准备工作– 排空并存储废水，培养新发酵池2/2
Prepare Terrain – Drain and store Biomass for seeding of new Digester 2/2



利用集水池储存猪圈的粪便适时培养新发酵池
Used the rain catchment pond to store manure coming from the pens to seed the new lagoon when it is ready

准备工作– 清除污泥
Prepare Terrain – Remove Sludge



准备工作- 挖掘 – 1/3
Prepare Terrain - Excavate – 1/3

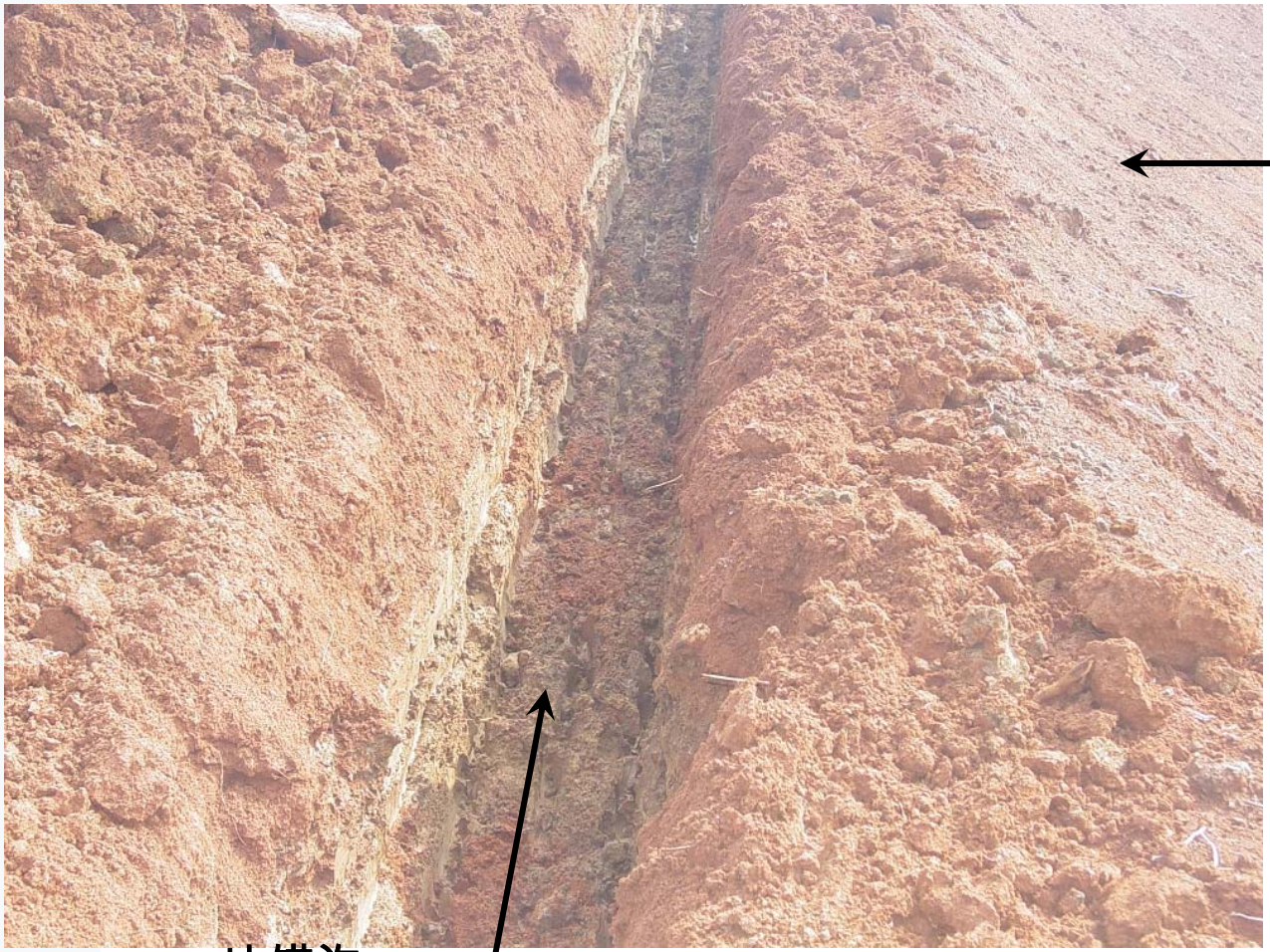
准备工作 – 挖掘 2/3
Prepare Terrain – Excavate 2/3

准备工作 – 挖掘 3/3
Prepare Terrain – Excavate 3/3

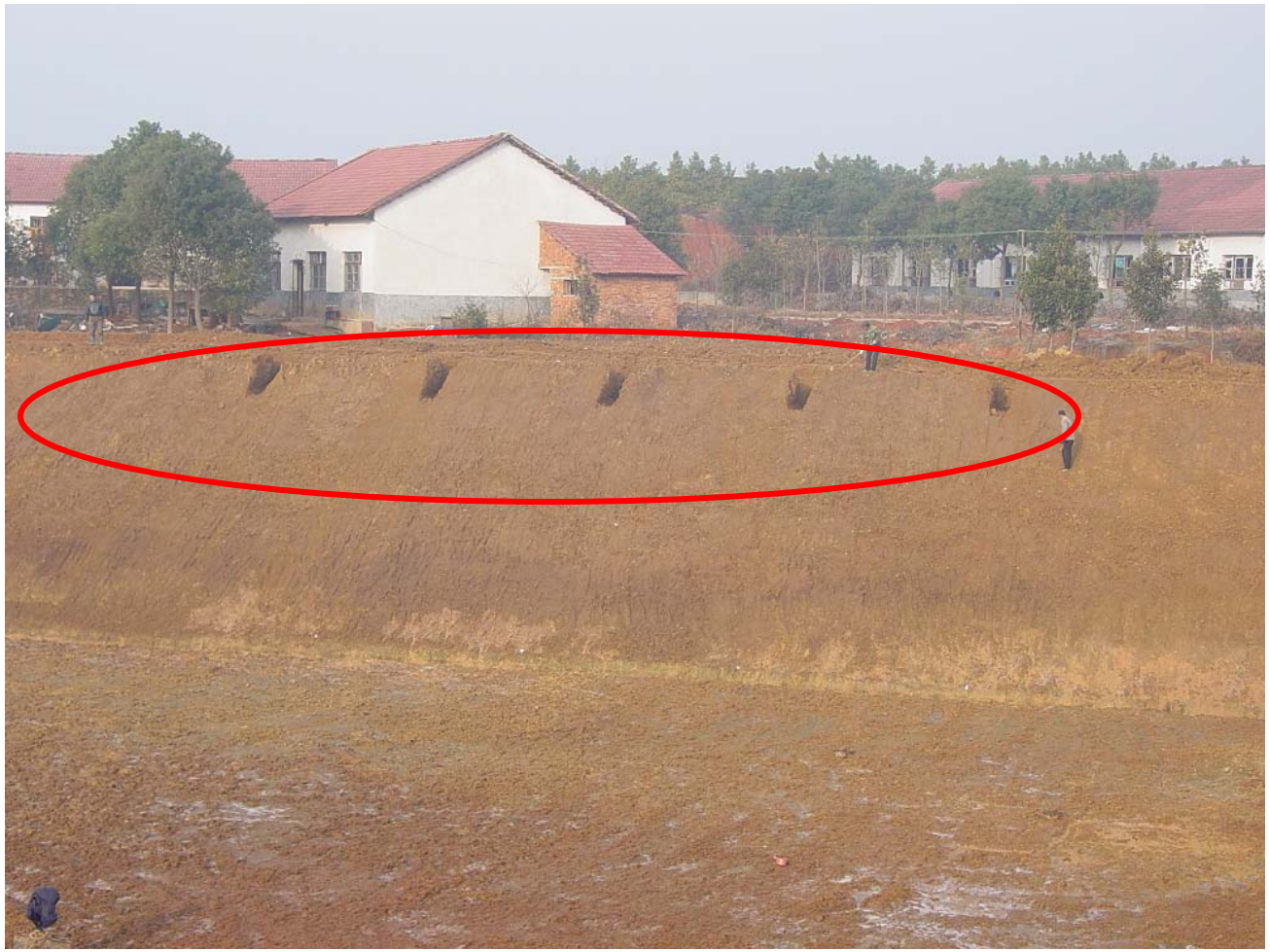
准备工作– 挖掘地锚沟 1/2
Prepare Terrain– Excavate Anchor Trench 1/2

挖掘地锚沟
Excavating the anchor trenches

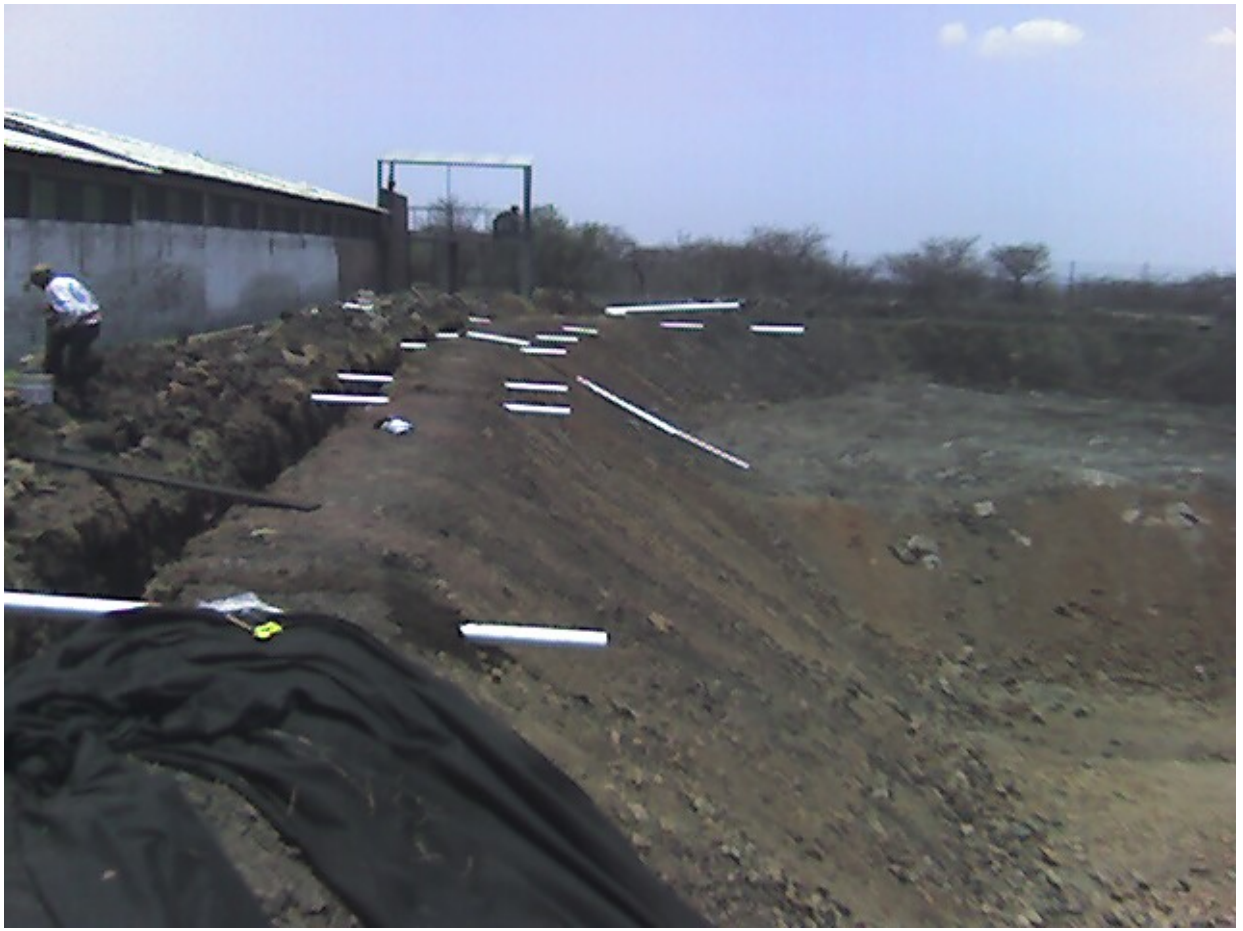
准备工作 – 挖掘地锚沟 2/2
Prepare Terrain – Excavate Anchor Trench 2/2



准备工作 – 安装抽泥管 1/2
Prepare Terrain – Install Sludge Draw-Off Pipes 1/2



准备工作 – 安装抽泥管 2/2
Prepare Terrain - Install Sludge Draw-Off Pipes 2/2



照片摄于墨西哥

Picture from Mexico

施工步骤 2 Construction steps 2

- **密封发酵池: Impermeabilize the cell:**
  - 铺设土工布，install geotextile,
  - 焊接土工布，seam geotextile
  - 敷设内衬，install liner,
  - 焊接内衬，weld liner,
  - 测试焊接 (充气测试、破坏性测试)， test the weld (air testing, destructive test)
  - 防止内衬升起 (见下页)
  - Prevent whaling of liner (see next slides)

Methane to Markets

施工步骤 2　　Construction steps 2

- 防止内衬升起
- Prevent whaling of liner

当土工膜裂缝时，就会产生内衬升起 。废水通过内衬泄露并残留在地基土中。微生物反应持续进行，水与土壤中的有机质发生反应，从内衬下面产生沼气，将内衬抬起。

Whaling occurs when a geomembrane leaks. Wastewater leaks through a liner and remains in the subgrade soil; microbiological reactions continue, water reacts with organic matter in the soil, and biogas is generated under the liner lifting it up.

伊恩·D·佩格斯的"内衬升起"问题

Based on *A 'Whale' of a Problem* by Ian D. Peggs

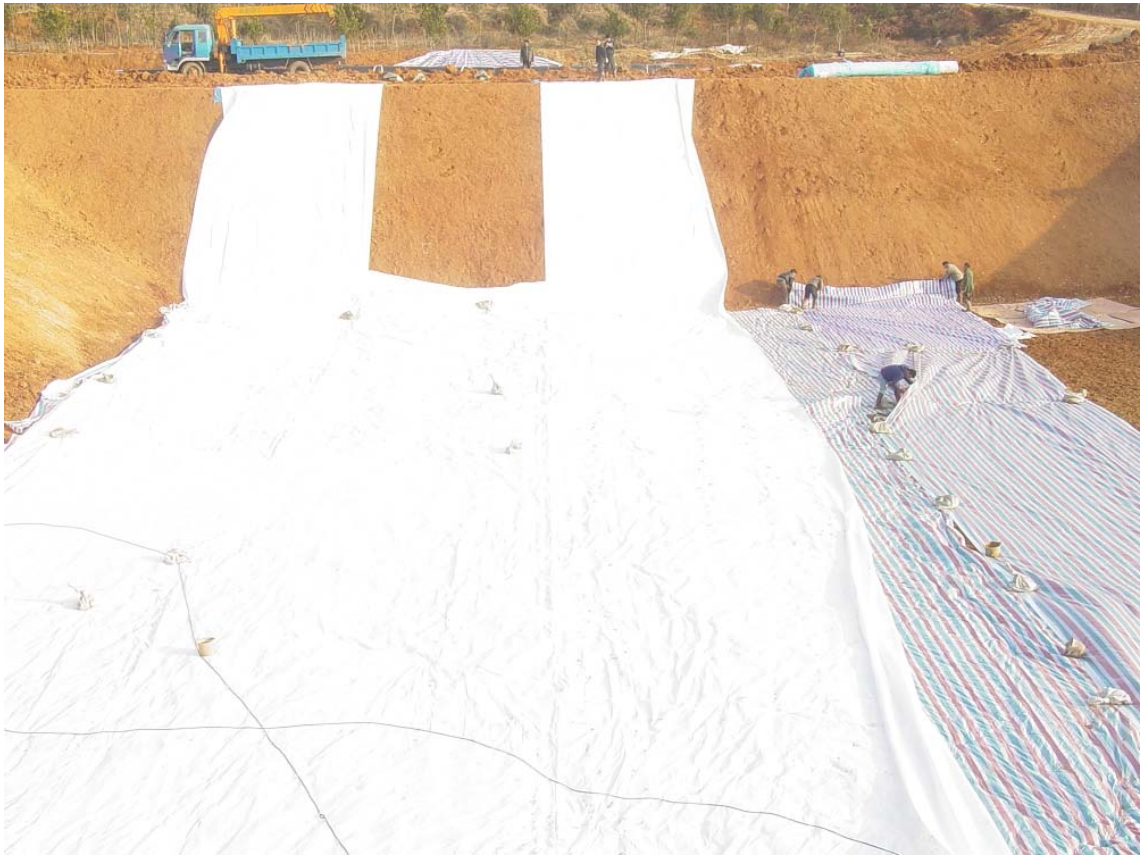
施工步骤 2 Construction steps 2

- 可通过以下方式防止内衬升起 :**Whaling** can be prevented by:
  - 通过良好的施工质量限制泄露数量
  - Limiting the number of leaks through good construction quality assurance (CQA)
  - 为发酵池设计V形底座
  - Designing the lagoon with a sloped bottom
  - 安装地下排水系统
  - Installing a gas venting system

Methane to Markets

内衬翘起　Whaling

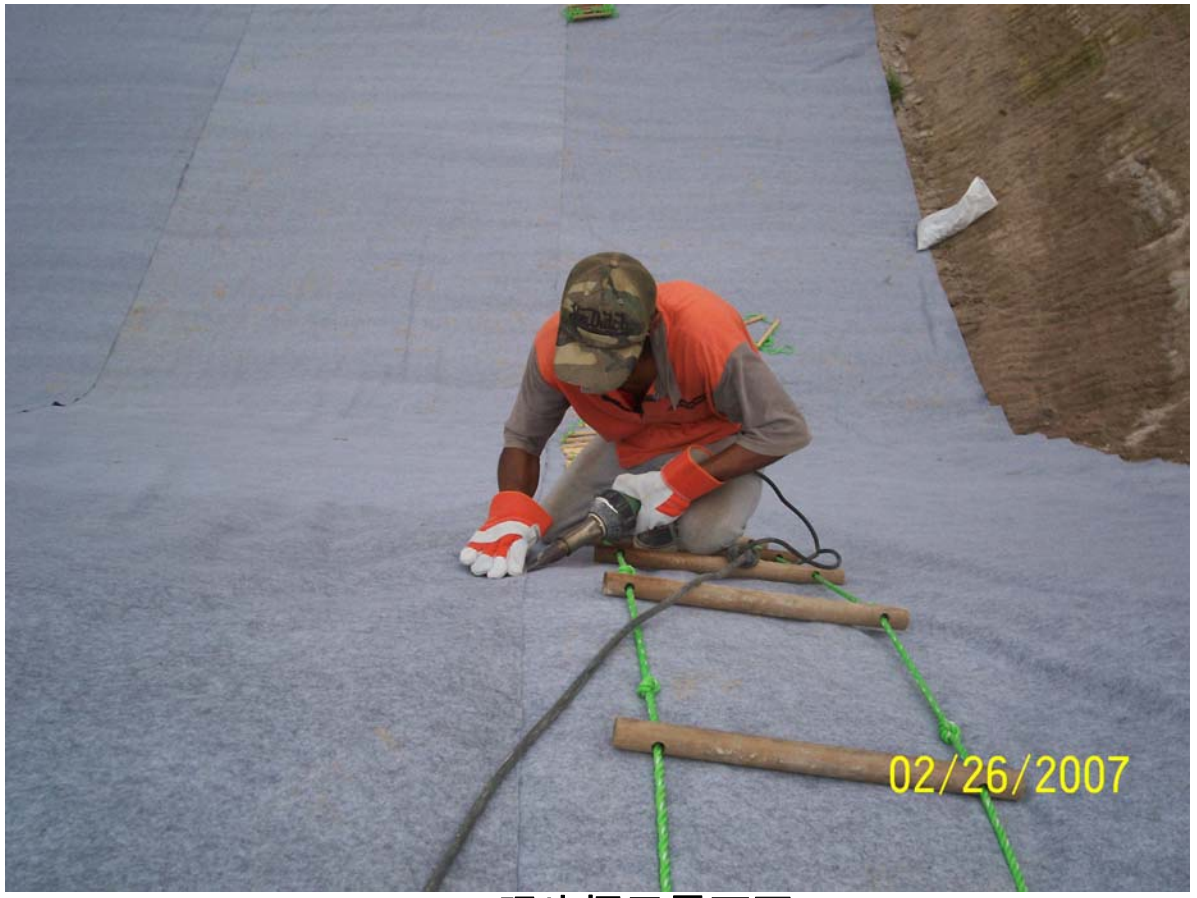
密封发酵池—铺设土工布
Impermeabilize the cell - Install Geotextile



铺设土工布以保护土工膜

Installation of geotextile to protect the geomembrane

密封发酵池 – 焊接土工布
Impermeabilize the cell - Seam the Geotextile



照片摄于墨西哥

Picture from Mexico

密封发酵池 –敷设内衬 1/2
Impermeabilize the cell – Install Liner 1/2

铺设黑色高密度聚乙烯土工膜

Installation of a black HDPE geomembrane

密封发酵池–敷设内衬 2/2
Impermeabilize the cell – Install Liner 2/2