

## 施工步骤 7

## Construction steps 7

- **覆盖发酵池：Cover the cell:**
  - 建造盖子  
Fabricate the cover,
  - 焊接盖子  
Weld the cover,
  - 安装盖子  
Install the cover,
  - 固定盖子  
Attach the cover,
  - 在盖子上附加重物  
Add cover weighting,
  - 增加盖子压力系统  
Add cover pressure system.

## 覆盖发酵池 – 建造盖子 Cover the cell - Fabricate The Cover



照片摄于墨西哥  
Picture from Mexico

## 覆盖发酵池- 焊接盖子 Cover the cell - Weld The Cover



照片摄于墨西哥  
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## 覆盖发酵池 – 安装盖子 Cover the cell - Install The Cover



照片摄于墨西哥  
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## 覆盖发酵池- 固定盖子 Cover the cell - Attach The Cover



照片摄于墨西哥  
Picture from Mexico

## 覆盖发酵池– 在盖上附加重物 Cover the cell – Add cover weights



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## 盖子配重

## Cover weighting

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盖子上的重物是装有沙子的管子，用以：

Cover weights are sand weighted pipes put on top of the, cover to:

(1) 将水引导至发酵池的特定地点，便于降雨管理；

help rainfall management by conducting the water to certain point of the lagoon,

(2) 减少风力产生的土工膜压力；

reduce stress of the geomembrane from winds,

(3) 保证对收集沼气的周边产生正压。

ensure positive pressure towards the perimeter where gas is collected.

## 施工步骤 8

## Construction steps 8

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- 安装长明灯和气体滑道
- Install the flare and gas skid



# 安装长明灯和气体滑道1/2

## Install the Flare and Gas Skid 1/2



照片摄于墨西哥  
Picture from Mexico

## 第六部分: 启动、操作和维护

### Section 6: Start-up and O&M

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- 发酵池启动      Digester Start-up
- 发酵池操作      Digester Operation
  - 盖子操作      Cover Operation
  - 污泥清除      Sludge removal
  - 极端事件      Extreme events
- 发酵池维护      Digester Maintenance
  - 日常      Daily
  - 每月      Monthly
  - 季度      Quarterly
  - 年度      Annually

## 发酵池启动

## Digester Start-up

- 接种污泥
- Seed sludge

从运作良好的发酵池中,使用适量接种污泥。最好从先前抽空的发酵池中保存材料。

Use an adequate amount of seed sludge from a digester which is operating satisfactorily. Preferably material saved from the original lagoon that was pumped out

- 受控的自然过程
- Controlled natural process



## 发酵池操作

## Digester operation

### 盖子操作

### Cover Operation

1. 水位：发酵池应在规定的水位操作范围内操作。  
WATER LEVEL: The digester should be operated within the water level operating range specified.
2. 压力: 压载物不能承受盖子下面过大的沼气正压。  
PRESSURE: The ballast weights are not designed to overcome excessive positive gas pressure under the cover.
3. 盖子上的水: 每次降雨后应抽空盖子上的水。  
WATER ON THE COVER: Water should be pumped off of the cover after every rain event.

## 发酵池操作

## Digester operation

### 污泥清除

### Sludge Removal

- 已安装的抽泥管道用于清除发酵池中整层的污泥。
- The installed sludge draw-off pipes are designed to remove sludge across the entire floor of the digester.
- 需要定期清除污泥，以防止发酵池处理量的大幅降低和污泥的淤积。
- The sludge will have to be **removed periodically** to prevent a significant reduction in treatment volume in the digester and accumulation of sludge.
- 理想情况下，污泥在取样和测试后被施用于农田。
- Ideally the sludge should be **applied to cropland** after sampling and testing of the sludge.



## 发酵池操作

## Digester operation

### 极端事件

### Extreme events

#### 1. 强风:

#### HIGH WIND EVENTS:

- 整个盖子将能承受每小时90英里的阵风。
- The cover system will withstand wind gusts up to 90mph.
- 如果出现长时间的连续强风，建议在盖子上加入大量水。
- If prolonged high winds are expected, it is recommended to flood the cover with water.
- 在盖子上加水能保持盖子平衡，保护盖子不受强风和飞扬碎屑的破坏。
- Flooding the cover will provide additional ballast to protect the cover against wind damage and damage from flying debris.

## 发酵池操作

## Digester operation

### 2. 大雨:

#### HEAVY RAIN EVENTS:

- 降大雨时，已安装的潜水泵可能无法跟上降雨量。
- In heavy rain events the installed submersible pumps may not keep up with rainfall.
- 可能出现局部积水。
- Localized ponding can occur.
- 可能需要额外的便携式潜水泵以清除雨水。
- Additional portable submersible pumps may be required to keep up with rainwater removal.



## 盖子上的水 Water on the cover

雨后将水抽出盖子

Pumping the water out of  
the cover after a rain event





## 发酵池操作

## Digester operation

### 3. 停电:

#### POWER OUTAGES:

- 当沼气被鼓风机移除时，停电能使盖子膨胀并被强风破坏。
- When the biogas is removed by a blower, a power outage can result in the cover inflating and being damaged by high winds.
- 严重的天气状况可能导致停电，此时应关掉鼓风机，打开鼓风机旁道和紧急通风口。
- When a severe weather event is forecast, which may result in a power outage, the blower should be shut off, the blower bypass and emergency vent opened.
- 应排放沼气以防止盖子膨胀，并且在盖子上加水以保持平衡。
- The gas should be allowed to vent off to prevent inflation of the cover, in addition to flooding the cover with water to ballast it.

## 发酵池维护

## Digester Maintenance

### 日常      DAILY

- 盖子系统 : Cover system:
  - 检查周边 Inspection around the perimeter,
  - 清除碎屑 Remove debris,
  - 检查坑洞、裂缝或泄露处 Check for holes, tears or leaks,
  - 确保仪表显示正常流量。盖子没有膨胀。 Meter registering normal flow. Cover not inflated.
- 盖子上的水 : Water on the cover:
  - 注意沿压载物周围的水量。抽水泵是必需的。 Note amount of water along ballast weights. Pump as necessary.
  - 过量的积水阻碍沼气流通并产生气泡。 Excessive water ponding can block gas migration and cause bubbles.

## 发酵池维护

## Digester Maintenance

- 设备:
  - Equipment:
    - 脱湿器(P-traps) 中充满水并溢出, Moisture separators (P-traps) are full of water and overflowing,
    - 长明灯照射正常, Flare burning properly,
    - 点火器运作正常。 Igniter working properly.
- 一般
  - General
    - 关闭并锁住沼气设备储存场地的大门, Gate to gas equipment enclosure is closed and locked,
    - 警告标志贴放在适当位置 , Warning signs are in place,
    - 泵输出端口的盖子等处于原位。 Caps on pump out ports etc. are in place.



## 发酵池维护

## Digester Maintenance

### 每月 MONTHLY

除了日常维护步骤之外: In addition to the daily steps:

- 在盖子上走动进行整体检查。
- Observe **cover system** by walking out onto the cover for a general inspection.
- 寻找断裂的压载物和/或捆绑带。
- Look for broken **ballast** weights and/or straps.
- 清除重物周围的任何碎屑。碎屑能加快盖子磨损。
- Remove any **debris** trapped near the weights. This will accelerate cover wear.
- 检查废水收集池, 清除任何碎屑, 清洁水泵过滤器。
- Check **pump** sump, remove any debris, clean pump strainer
- 检查水泵的油量。颜色为乳白色的油代表密封性差。
- Check **oil level** in pumps. Milky oil color indicates seal failure.

## 发酵池维护

## Digester Maintenance

- 检查电线电缆的状况 (水泵、点火器)。
- Check **condition of cables** and wires (pumps, igniter).
  
- 检查电压输出和电池电压 (点火器太阳能电池板、数据记录器太阳能电池板)。
- Check **voltage output and battery voltage** (igniter solar panel, data logger solar panel).
  
- 检查电池/设备架的接地线是否连接到接地棒。
- Check battery/equipment stand **ground wire** connected to ground rod.
  
- 从数据记录器中下载数据。
- **Download the data** from the data logger.

## 发酵池维护

## Digester Maintenance

季度      QUARTERLY

除了日常和每月的步骤之外: In addition to the daily and the monthly steps:

- 检查接缝和之前的补丁以保持完整性。
- Check **seams** and previous **patches** for integrity.
- 检查长明灯的燃烧嘴。如有必要进行清洁。保证它们在同一高度。
- Check the **flare burners**. Clean if required. Verify they are level.
- 更换水泵里的油
- Change **oil in pumps**.
- 检查耐火材料是否在正确位置。
- Verify that the **refractory material** is in its right position.
- 检查污泥的淤积量。
- Check amount of **sludge accumulated**.

## 发酵池维护

## Digester Maintenance

年度      ANNUALLY

除了日常、每月和每季度的维护步骤之外:

In addition to the daily, monthly and quarterly steps:

- 应安排必要的盖子专业检修和维护。
- A professional inspection, and maintenance/repair of the cover system should be scheduled as necessary.
- 如果长明灯的燃烧室周围堆积了煤灰，应及时清理。必须关闭并冷却长明灯。必须用肥皂和清水刷洗表面进行清洁。
- If there is an accumulation of soot on the outside of the combustion chamber of the flare it should be cleaned. The flare must be turned off and allowed to cool. The cleaning can be done by brushing the surface using soap and water.