

Sanitary Wastewater Management: Cabo San Lucas Country Club Biological Remediation - Sewper Rx application Bacteria/Enzyme Treatment into Primary Waste Water Lagoon No.1



Primary Lagoon 1 has been receiving raw water almost 20 years;
Image above illustrates sludge blanket at normal water levels;
Image below illustrates sludge blanket at low water level 4/10/08



CIASA technicians arrived CSLCC BCS Lagoon WWTP site: 4/29/2008;
Procured materials and provisions to apply bacteria-enzyme product 4/30/08–5/01/08;
450 lbs/204.2kgs Sewper Rx bacteria-enzyme product delivered to site Friday 5/02;
Initiated product mixing & inoculation of first 5m³ container, Saturday 5/03/08;



NOTE: due to hydraulic demand for irrigation water, lagoon levels were 25% below normal, proportionally reducing lagoon volume. Therefore, the recommended **SewperRx** application rate of 1 kilogram per 10,000 gallons of lagoon volume was recalculated for the initial Ph 1 application process, creating additional material available for inoculating Lag No. 2 with an initial treatment application; 30 kgs **SewperRx** was mixed into 100 m³ Flow Stabilization Tank for bacterial inoculation process in Lagoon No. 2;



SewperRx Lagoon 1 sludge treatment program began 5/04/ 2008;
Proceeded with Lagoon 1 bacterial solution application 5/5-10/08;
Completed -terminated injection treatment program 5/12/2008;

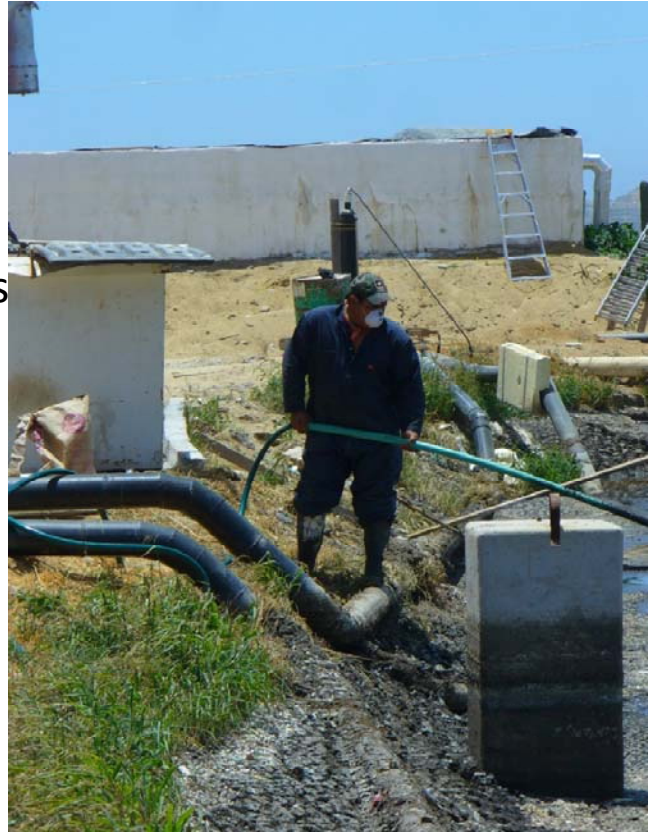
170 kgs dry product pre mixed
and pressure injected as a liquid
slurry into the sludge blanket
surrounding Lagoon 1 perimeter
on alternating - consecutive day s

May 04: 50 kgs

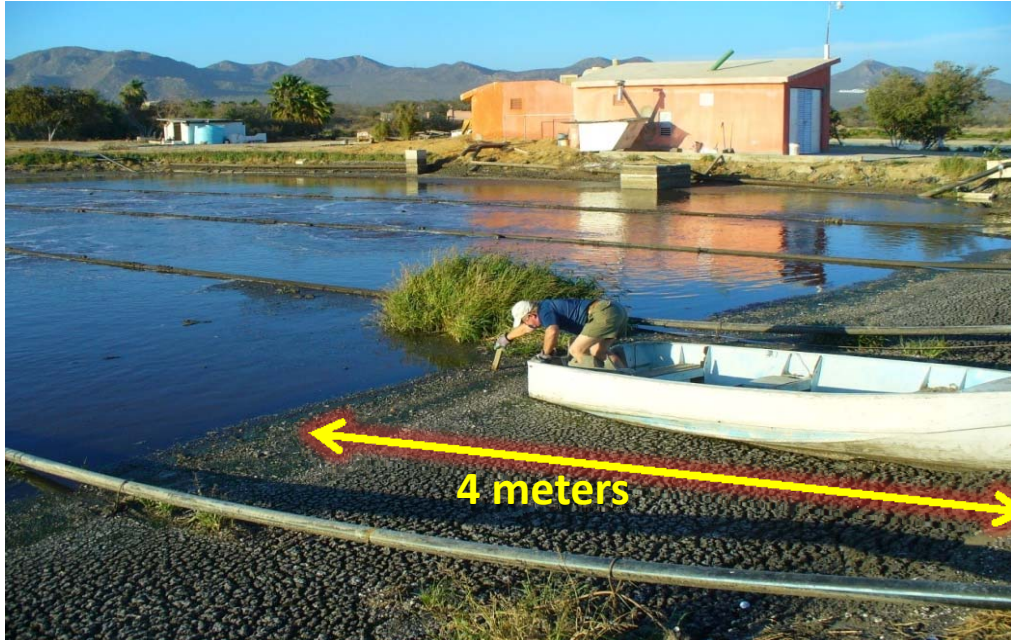
May 07: 40 kgs

May 09: 40 kgs

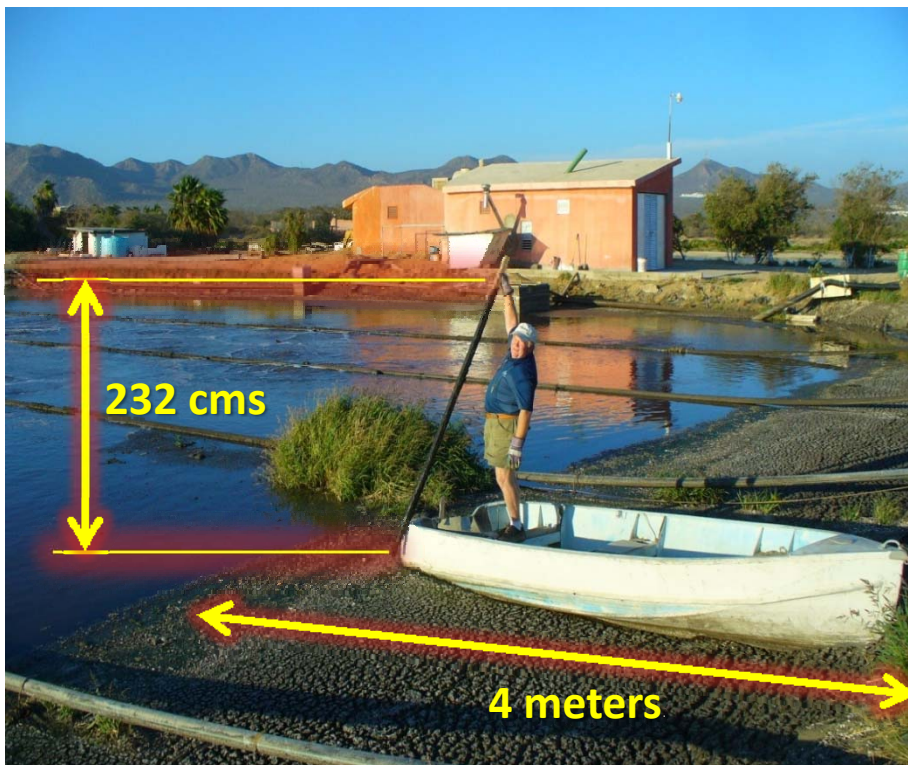
May 11: 40 kgs



On 5/01/08 a 250 cm sludge level marker/indicator stake was installed at the sludge-water interface of Primary Lagoon 1, approx 4 meters from the edge and about 40 meters from the discharge structure:



On that date and at that location, sludge depth was measured and determined to be **232 cms**;



Due to extreme hydraulic loading, Lagoon 1 water levels were too high to read conveniently monitor the original sludge marker/indicator, so on 8/10/08 a new 305 cm long (10 ft) marker was installed at the same location as the original 248 cm marker/indicator post; the exposed height of the new marker post was measured at 75cms (over water level) .



A 30 cm diameter “cork disc plate” was assembled with 30 cm depth indicators; the plate measures the depth (height) of water over the top of the sludge blanket by



lowering the cork disc plate is into the water at the marker/indicator position, until it rests securely on the top layer of the sludge blanket; then water depth is measured and recorded:



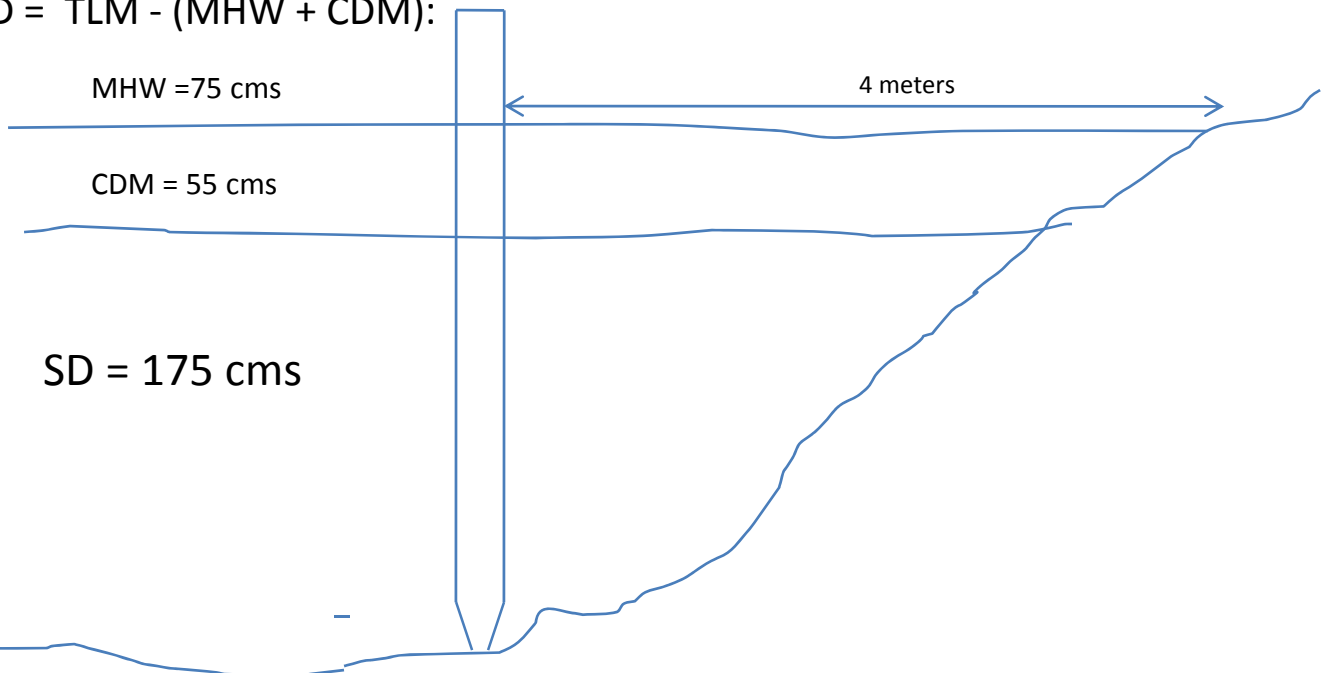


The original marker/indicator stake measured 248 cms total length (TLM); once installed and secured in place in the sludge blanket, the extended length of the marker stake over the top of the sludge was measured on 5/01/08 to be 18 cms, indicating sludge depth at the marker position to be 232 cms;

The new marker/indicator stake measures 305 cms total length (TLM); the exposed height of the new marker, over water level measured 75cms;

On 8/11/08 at the new marker/indicator location, water depth over the sludge was measured with the “cork-disc” method and recorded to be 55 cms;

Sludge Depth (SD) may be calculated by adding the maker height (MHW) exposed over the water, plus the water depth measured by the “cork-disc” method (CDM), the sum is subtracted from the total length of marker (TLM);
 $SD = TLM - (MHW + CDM):$



To estimate the net change of sludge volume (ΔSV) in Primary Lagoon 1 that has occurred from 05/01/08 to 8/11/08, subtract the original 230 cm SD calculation from the most recent 170 cm SD calculation, and multiply by the average surface area of 5000 m²:

$$\Delta SV = (170-230) / 100 \times 5000 = -(.60) \times (5000) = 3000 \text{ m}^3$$



In addition, a ΔSV qualitative analysis of may be observed from visual comparison of the perimeter sludge blanket, before and after;



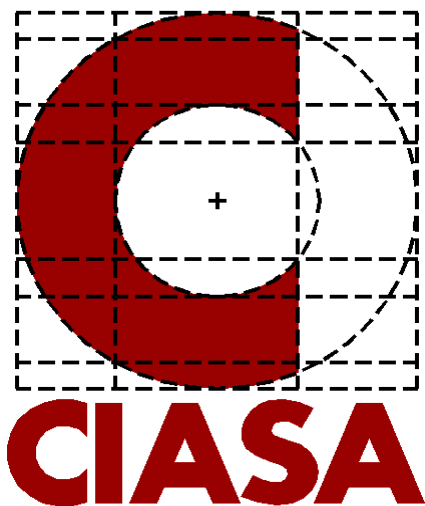
FIELD OBSERVATIONS AT CSLCC

- Sanitary lagoons odors were significantly reduced in Lag No.1 around 5/12-13/08;
- Odors in Lagoon.No. 2 were notably reduced by 5/14-15/08;
- Odors in Lagoon 3 (no treatment) continued to be noticeably significant;
- Odors in old lagoon system, (partially flooded) continue noticeable;
- Nighttime Odors from Lake 7 irrigation system continued to significant & objectionable;
- All blowers were operational in the month of May, but continued problems with the High Voltage electrical system occurred to the point that only one blower could be operated for continuous duty;
- In addition, extremely high hydraulic loading and excessive organic loading has occurred in Primary Lagoon No 1 due to the removal of the LDS flow control valve;
- The opinion has always been that operating with less than 2 blowers will precipitate the presence of excessive sanitary odors from H₂S production;
- Plus continued detection of significant objectionable sanitary odors in the area around the blower house and Lagoon 1, is the result of the discharge air and sanitary gases ventilated from the pressurized Salsnes Filter, through the roof of the treatment building mounted discharge pipe;

PROPOSED PROGRAM CONTINUITY

Recommended repeating SewperRx treatment protocol following reconstruction of HV power system;

Recommend first treatment application in both Lagoon 3 and Lake 7;



Charles Williams