# Lagoon Liners

# Case study # 1 - Lagoon Liner – Manure Solids Bedding – Vacuum Truck for Manure

- 1500 milking cows
- Manure solids as bedding
- Parlor waste - Separation of solids since 1990, manure from parlor goes over liq-sol separator, then concrete lined settling basin, then to lagoon
- Manure from Barns - is vacuumed and transported to fields or to lagoon
- ~ 6 years ago - Lagoon has concrete bottom with 60 mil poly lined banks (20 ft x 70 ft(x2) x 300 ft)
- Cost to redo lagoons, engineering, dirt work, liners, concrete, 4 lagoons, 12 acre feet, 11 million gallon capacity = $500,000 ($333/cow)
- Use floating pumps to pump manure and avoid liner disturbance

# Case Study # 2 – Sand Bedding – Flush System

- 6000 cows
- Flush system with Biolink system, lots of sand traps, trap dimensions 14 ft wide x 500 ft long (3 of them)
- Sand traps at end of barns, 2 ft x 14 ft x 20 ft
- Processing sand with sand screw
- Getting ready for installation of centrifuge
- Uses DT 360 series of liq-sol separators, 2 screen sizes, 1/8 and 1/16 inch

# Case Study # 2 – Continued

- Lagoons were engineered and clay lined prior to installing liners
- Gas emission lines installed under liner to prevent gassing up of liner
- Year 2000 – 60 mil liners, 9 million gallon each (2) – 20 ft deep
- No concrete ramps, have not entered lagoons, if building new, would put in ramps
- Floating pump and stinger agitator for manure movement, stinger run off of tractor PTO
- Cost – today's prices = $87, 120 = $15/cow

# Case Study #3 – Open lots and Scraped Feed Alleys – Manure Solids as Bedding

- 5800 cows
- Manure solids as bedding, scrape feed alleys
- DT 360 liq-sol separators, 2 screen sizes
- Use of Biolink System for sludge removal, sludge is run across smaller screen size DT 360
- Liquid after separation goes to lagoon, the settling basin, and then to big lagoon
- Lagoon liquid is pumped out via pivots and low pressure nozzles

# Case Study # 3 - Continued

- Material from settling basin is pumped and injected
- Big lagoon – high volume, low pressure pumps, floating
- Settling ponds have concrete ramps to bottom, but not across bottom
- Cost – 2002 – 35 cents per sq ft installed – 25 million gallons (7 acres), 2 settling ponds 1.5 million gallon each, 40 mil poly, 638,000 sq ft = $223,546
- Cost 2014 – 40 cents per sq ft – 40 mil poly - 28 million gallons and a settling pond of 500,000 gallons - $139,513 for 350,000 sq ft
- Cost = $62/cow
- Maintenance on liners done in house

Leak Detection system sum.pdf - Adobe Acrobat Pro

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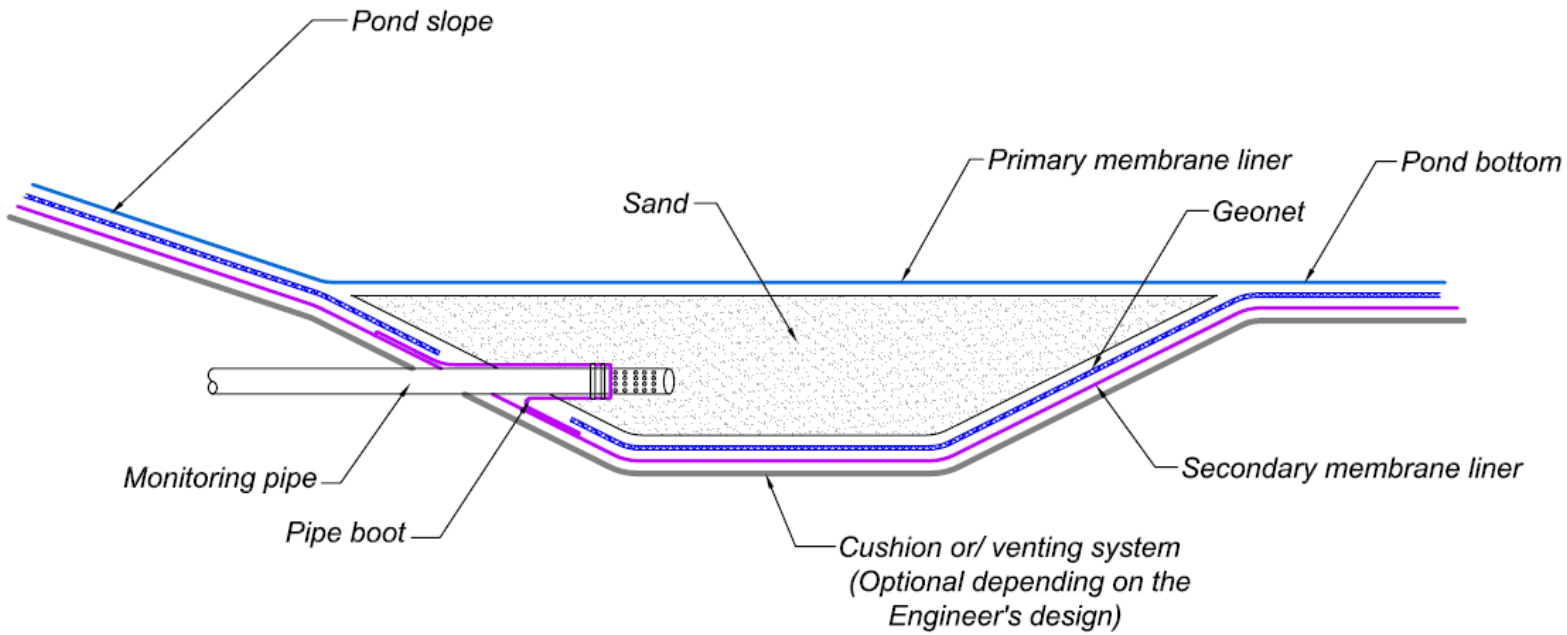


# Typical leak detection system sump detail

NTS

# Double Liner with Leak Detection System

- HDPE 40-MIL $ 0.55 SF Supply and Installation
- HDPE 60-MIL $ 0.70 SF Supply and Installation
- Geonet (leak detection layer) $ 0.45 SF Supply and Installation
- Geocomposite Clay liner $ 0.85 SF Supply and Installation
- ----------
- Total **$ 2.55**

# Western Washington – Lagoon Liners (a bit more water to handle)

| Size of Dairy (cows) | Single Liner | Double Liner with Leak Detection (6.5 multiplier) |
|---|---|---|
| 500 | $26, 130 | $ 169,845 |
| 1000 | $52,272 | $ 339,690 |
| 2000 | $104,544 | $ 679,380 |