

360° WASTEWATER BIOREMEDIATION

Luke Air Force Base (LAFB) has improved the traditional methods of Petroleum, Oil and Lubricant (POL) contaminated wastewater, in partnership with *Continental Research Corporation (Bacto-Treat OWS® and ND-365®)* for bioremediation. Through equalized distribution of bacteria into oil water separators (OWSs), holding tanks and grease traps, LAFB has achieved full sustainability of wastewater and eliminated traditional pump and treat methods.

The bacteria injection initiated in October 2013 and results documented herewith in, the first year were astounding. By approaching wastewater from a 360-degree approach, wastewater compliance has been made easy, sustainable, and achieved tremendous cost savings.

Bioremediation is a process that speeds up the separation of oil and water and degrades potentially harmful POL contaminants. The bacteria chemical is injected at the generation point to encourage digestion of POL's (hydrocarbons) and grease (fats). Through active bacteria reproduction, the bacteria digests the contaminants to produce clean water, sustained infrastructure, improved Wastewater Treatment Plant influent, and harmless gases.

Once the water has passed through the bioremediation system, it is transferred to the LAFB water treatment facility for further processing. Due to the effectiveness of the treatment method, LAFB reclassified reuse capabilities to an A+ with ADEQ for expanded redistribution of non-potable water for dust control.

Overall, the initiative proved an effective approach and complete water resource sustainability.

LAFB OWS Holding Tank for Aircraft Wash Rack



PRIMARY BENEFITS

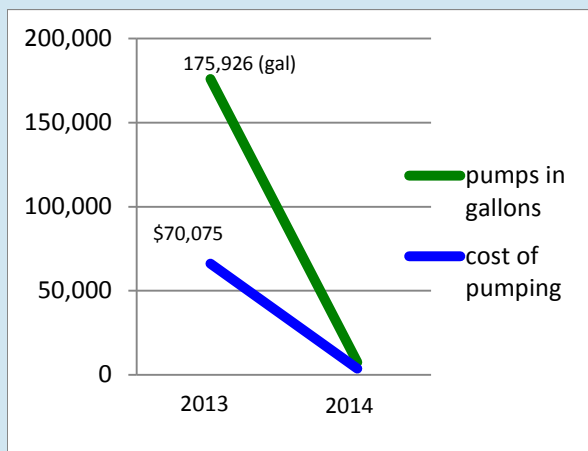
- Reduced maintenance on pipes, pumps and associated infrastructure.
- Significant cost reduction of pumping and transport of contaminated water.
- Reduction of maintenance man-hours.
- Reconditioning and restoration of infrastructure and equipment capabilities.
- Complementary reductions of Wastewater analytics:
 - Nitrates at WWTP less than 1 mg/l
- Significant reduction of grease at lift stations.
- Automatic injection to maintain optimal bacteria levels and service life.

PUMPING AND COST HIGHLIGHTS

Year	Gallons Pumped	Man-hours Used*	Total Cost
2013	175,926	98	\$70,075
2014	7,440**	2.5	\$14,023***
Savings (%)	88%	97%	80%

* Average rate of \$39/hr; **Requires annual pumping due to being a holding tank; ***Includes Bacteria, labor, and pumping

As highlighted in Figure 1, the use of bioremediation and specialized bacteria has demonstrated an extremely efficient and cost effective solution for Luke AFB. Pumping was reduced from 175,926 to 7,440 gallons.



(October 2013-October 2014)

Figure 1

from October 2013 to October 2014. Additional benefits included a reduction in associated man-hours where actual reported time dropped from 98 to 2.5 hours. Overall, Luke AFB has realized an 80% overall cost savings. Other benefits realized (not calculated) include significant emission reductions from pumping trucks, complementary benefits of reduced Nitrates for WWTP influent, and cost avoidance for maintenance/repair of aged infrastructure. Many of the service lines are 20+ years old with flow and backup issues.

After 6-months of treatment, associated piping and pump equipment were “cleaned” and restored to initial design capabilities. Luke AFB also was able to measure actual POL degradation at a 14,000 gallon OWS, based on initial chemical specifications for the Bacto-Treat OWS®. As shown in Figure 2 – Petroleum Degradation, range organics registered at 6 ppm for Gasoline, 0 ppm for Diesel, 2 ppm for Motor Oil, and no residual sludge. after 6-months of bacterial treatment. Registered reading most were a result of on-going operations and contaminated water entering the OWS.

Figure 2
Petroleum Degradation (ppm)

	Gasoline	Diesel	Motor Oil
Untreated	780	442	402
Day 2.5	744	417	380
Day 5	648	295	345
Day 10	426	157	305
3-Months	46	10	66
6-Months	6	0	2

In summary, the OWS and grease trap (not detailed) bioremediation treatments has proven very successful. Luke AFB is expanding the program to add additional complementary applications at sewer lift stations and car washes.



Before Treatment

Based on the results of this study, other entities or stakeholders would likely benefit from the bacterial synthesis to introduce fully sustainable wastewater and economically feasible uses. These may include:



3-Months – After Treatment

- Car Washes
- Vehicle Maintenance
- Restaurant Grease Traps
- Sewer Lift Stations

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