

Case Study

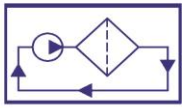
TOPIC: Water and Particulate Contamination In Steam Turbine Lube Oil Reservoir

LOCATION: Power Plant In Nursery, Texas

DATE: February 2, 2012



Problem: South Texas Electric Cooperative (STEC), located near Victoria, Texas, operates three (3) GE LM6000 Gas Turbines and one Dresser-Rand Steam Turbine. The four (4) units put a combined output of approximately 180 MW of power. In January of 2012, the Dresser-Rand Steam Turbine's Rotor was removed for rotor work. The turbine was covered to protect it from the environment, however, a heavy rain storm occurred and rain water entered into the turbine oil reservoir and contaminated approximately 3,000 gallons of ISO 32 Turbine Oil. Water contaminated the turbine and elevated the water in oil concentration to over 6,000 PPM which made the oil look visibly milky. At 6,000 PPM H₂O the rate of oil oxidation and machine bearing wear is increased by a factor of 10. Mr. Roger Bishop, Plant Manager of STEC, called Oil Filtration Systems® and we deployed two (2) Field Service Technicians and one (1) Vacuum Dehydration Oil Purification System (VDOPS).



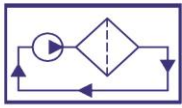
Solution: A VDOPS uses state-of-the-art filtration technology to lower water in oil concentrations in turbine oils to 45 PPM or lower. The system also uses the latest filtration media to lower particulate contamination to meet or exceed new oil cleanliness specifications, typically at ISO 16/13/10 or lower. The VDOPS systems are simple to operate and only use electricity to remove particulate, dissolved gases and water from oils. The systems are virtually maintenance free and are designed to run continuously 24/7 in any environment.



Results: Work started on Wednesday, February 1, and was completed on Friday, February 3. The VDOPS system ran for approximately 36 hours straight, while water levels dropped from over 6,000 PPM to under 45 PPM (see page four (4) for oil analysis water reduction graph). Particulate was lowered from 18/16/14 to 15/13/10; see page (3) for Particulate Removal / Oil Analysis Results. These results were verified by an on-sight Portable Fluid Analysis Kit (PFAK). The PFAK enabled our technicians to know how fast the system was cleaning the fluid and enabled the customer to visually see the results. This on-sight awareness brought confidence to STEC because they could also see the results in real-time and be part of the oil analysis process. STEC witnessed the system purifying the oil both by viewing the VDOPS in operation and also by an On-Sight Fluid Analysis Kit.



Conclusion: STEC was very pleased to have same day response time and to know Oil Filtration Systems' Staff was professional, courteous and will do nothing less than consistently perform professional filtration services each and every time.



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Fluid Analysis Report

Prepared For:	Mr. Roger Bishop		Sample Date:	02/01/12 & 02/03/12
Location:	STEC Nursery		Submitted by:	Darrell Webb
Application:	20 GPM VDOPS	3,000 gallon tank.	Fluid:	ISO 32 turbine oil
Sample Point:	Post filter on VDOPS	Scale Division: 14 Micron Patch Rating: 0.8 Micron Sample Volume: 25 ml	Filter Type & Rating:	840X @ 7 Micron Beta (c) ≥ 1000 6 Micron Beta (c) ≥ 200
Top: Sample 1 Before Filtration	Bottom: Sample 2 After Filtration	Sample 1 Initial Water Content @ 6,000 PPM %0.6 water content. Sample 2 Water Content 45 PPM		



Pre-Filtration/Dehydration ISO Cleanliness Code

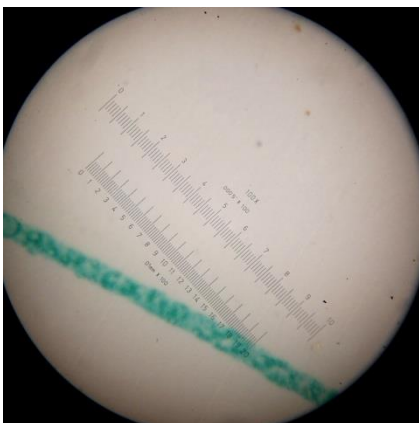
18-16-14

Particle Size

Range of Particles /ml

**>4mm
>6mm
>14mm**

**2,500-1,300
640-320
150-80**



Final Sample ISO Cleanliness Code

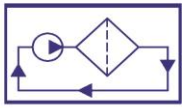
15-13-10

Particle Size

Range of Particles /ml

**>4mm
>6mm
>14mm**

**320-150
80-40
20-10**



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Work Progress Chart

