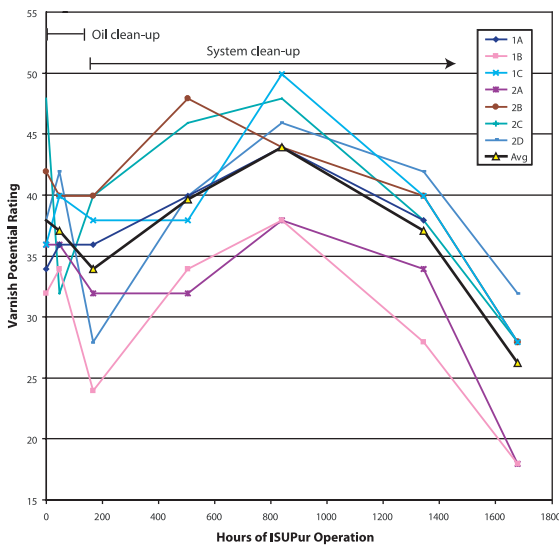


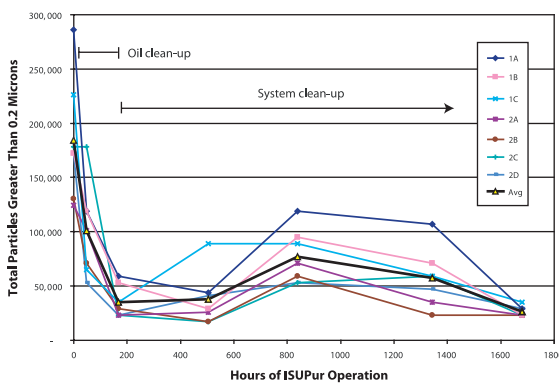


## GE Frame 7FA Gas Turbine Lube Oil Analysis

Varnish Potential Rating



Particulate Greater Than 0.2 Microns Per 100 ml



Details:

- 7 ISOPur MR-Series oil purification systems installed
- Oil type: Group 2 base stock
- 10 weeks of ISOPur operation
- Oil analysis conducted by independent lab

\*Oil analysis conducted by independent lab. GE is a registered trademark of General Electric Company.

## Effective Gas Turbine Varnish Clean-up & Oil Conditioning

ISOPur Fluid Technologies reduces turbine trips by purifying lube oil and removing varnish

### Lubricating Oil Contamination

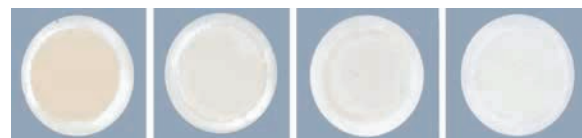
Extreme gas turbine operating conditions cause an increase in lubricating oil degradation and contamination. Ultimately, this high stress on the oil leads to sticky deposits (varnish) on close-clearance mechanical components resulting in servo valve problems and associated turbine trips. It has been conclusively shown that the majority of these varnish deposits originate as sub-micron particles within the oil.

ISOPur's patented Balanced Charge Agglomeration (BCA™) is designed to remove varnish and sub-micron particulate from machinery internals and from oil. By conditioning lubricating oils and scouring the internals of turbomachinery; uptime is increased, oil change-outs are reduced, and equipment life is extended. ISOPur's BCA™ technology is effective on both soft and hard sub-micron particulate. BCA™ is proven to achieve exceptional oil quality well beyond that currently available through the use of other technologies.

### Varnish Potential Patches

The patches are spectrophotometric analysis of an oil sample taken from a GE Frame 7FA Gas Turbine. After only 14 weeks of ISOPur oil conditioning, the Varnish Potential Rating dropped from 38 to an impressive 7. The VPR (0-100 scale) is based on the harmful, varnish producing deposits found in the sample. The higher the rating, the more deposits.

The graphs (left) represent the actual performance of the BCA™ technology on multiple 7FA gas turbines at one location over the course of 10 weeks. These graphs detail the lube oil condition when analyzed for both Varnish Potential (QSA) and particle counts above 0.2 microns. Note the sequence of "oil cleaning" followed by "system cleaning" on **all seven turbines** as BCA™ technology operates. This coincides with the scouring of machinery internals from varnish. After 10 weeks, Varnish Potential ratings were down substantially and particle counts above 0.2 microns were reduced by as much as 90%.



VP=38

VP=28

VP=11

VP= 7



## ISOPur Series



LR-Series



MR-Series



HR-Series

### Specifications

Variable flow  
 Viscosity: 220cSt @ 40C  
 Explosion proof option  
 Fluid temp: 65 to 200 F  
 LR capacity: 120 GPH  
 HR capacity: 1200 GPH  
 MR capacity: 600 GPH

## Balanced Charge Agglomeration (BCA™) Technology

BCA™ is designed to balance the net charge on contamination within the oil. The fluid is split into two equal paths. All fluid particles in one path are given a negative charge and all fluid particles in the other path are given a positive charge. When the two paths of fluid are recombined, the positively and negatively charged particles attract and grow in size, making them easily filterable. The net charges on the particles and the fluid are balanced, creating an environment which both prevents and removes varnish deposits.



Typical operating gas turbine reservoir



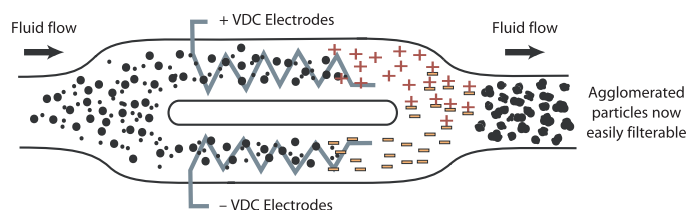
ISOPur BCA treated gas turbine reservoir after just 3 months

BCA™ does not adversely effect additives within the oil because only non-soluable particles are removed. In many cases, the BCA™ technology improves the conditions that most additives are designed to change.

### BCA™ Benefits

- Removal of pre-existing varnish
- Sub-micron particle removal
- Functional with water present
- Enhances current filtration
- Highest flow rates in the industry
- Quicker oil and system clean-up
- Reduced maintenance & repair costs
- Extended equipment life

### BCA™ Process



**1** The fluid enters the ISOPur system containing particles with an unbalanced average electrical charge. The fluid is split into two streams.

**2** Once split, the particles in one fluid path are charged positively and particles in the other path are charged negatively via electrodes.

**3** Oppositely charged particles attract, grow in size and form an agglomerate (larger particulate). These agglomerates continue to combine with other charged particles, creating a scouring effect throughout the lube oil system.