



# **Ryan Schnitzler**

## **Director, Dam and Hydro**

### **Lower Colorado River Authority**

Ryan is responsible for directing field operations and maintenance of six Highland Lakes dams and 13 hydroelectric generators. Ryan has worked in Dam and Hydro for 23 years through various roles and holds a Bachelor of Science in business administration from the University of Phoenix.

# Summer Season GSU Transformer Preparations

---

Weather Emergency Preparedness

Ryan Schnitzler  
Director, Dam and Hydro





# Purpose

- Provide reasonable assurance that the generator step-up transformer will operate reliably through the summer season





# Routine Maintenance

- Substation and switchyard maintenance
  - LCRA Transmission maintenance rounds performed monthly, year-round
  - Data and inspection points captured in computerized maintenance management system

# Routine Maintenance (Continued)

- Dissolved gas analysis
  - Manual samples taken quarterly
  - Continuous monitoring on major GSUs
  - Samples reviewed by Transmission and/or Generation Engineering
- SF6 breaker gas pressure monitoring
- Connections and switches monitored with infrared technology

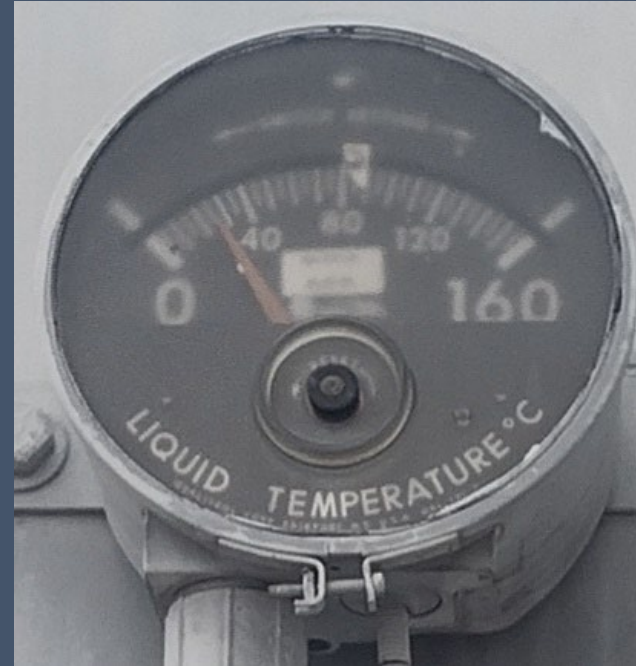


Calisto DGA			
Hydrogen (H2) ppm	4.00	Ethylene (C2H4) ppm	2.20
Methane (CH4) ppm	8.40	Ethane (C2H6) ppm	2.00
Acetylene (C2H2)	0.20	Carbon monoxide (CO) ppm	152.00
TDCG%	0.02	Carbon dioxide (CO2) ppm	855.00

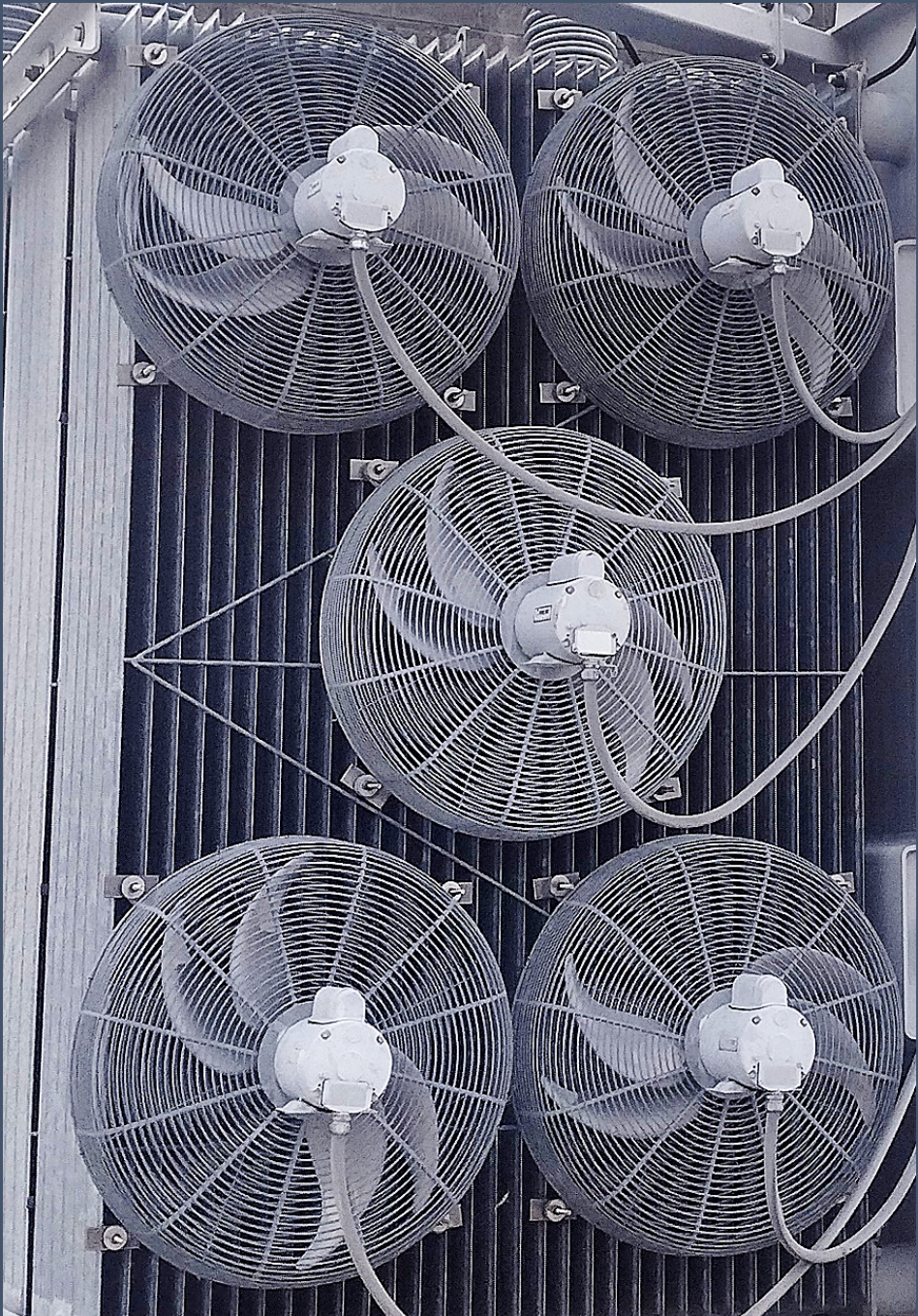
DGA Tools		Key Gas Method	
TDCG (Calc) ppm	168.80	TCG% (Calc)	0.73
<b>DGA Graph</b>			
C2H2/C2H4 (Calc)	0.09	%CH4 (Calc)	77.78
CH4/H2 (Calc)	2.10	%C2H4 (Calc)	20.37
C2H4/C2H6 (Calc)	0.00	%C2H2 (Calc)	1.85
IEC Ratio Method		Duval Triangle Method	

# Summer Scope

- Maintenance and preparations
  - GSU inspections
    - Cooling radiator cleanliness
    - Winding temperatures
    - Cooling/insulating oil temperature
    - IR inspection of components
    - Dissolved gas analysis monthly







# Summer Scope (Continued)

- GSU cooling fan verification
  - Operate cooling fans
  - Verify operating temperature with IR
  - Procedure to address as-found and as-left
- GSU cooling pump verification





# Substation/Switchyard Safety



- Personal protective equipment
  - Provide employees with adequate level of PPE for substation safety and as required for enclosure access and weather-specific situations



# Substation/Switchyard Safety (Continued)

- Substation/switchyard awareness training (in person)
  - Identify electrical hazards
  - Define requirements for entering substation
  - Describe purpose and function of major equipment and components
  - Define minimum approach distances





# Tools and Equipment

- Thermal imaging or infrared thermometer
  - Thermal imaging camera
    - Preferred method due to wide area coverage
    - Easy identification of anomalies
    - Multispectral imaging enhances images for easy identification
    - Can provide snapshots for comparison





# Tools and Equipment (Continued)

- **Thermal imaging or infrared thermometer (continued)**
  - Infrared thermometer
    - Provides point of interest temperature readings
    - Lower cost
- **Binoculars**
  - Enhanced visibility for bushings



## GSU Cooler Inspection and Fan Verification

Document Type: Procedure  
 Document Owner: Timmer  
 Effective Date: 11/1/2024

Review Period: 3 year  
 Location: All Locations  
 Subject: Summer

### 1. Purpose

The purpose of this procedure is to provide reasonable assurance that the generation department's transformer cooling system will operate properly through the summer season.

### 2. Scope

The following procedures are to be performed in the month of June and July with the exception of the summer season inspection requirements of 702.025.05 (4) (A) (1) (1). This procedure applies to the GSU cooling system only and is to be performed by qualified personnel. The inspection and temperature measurements are performed during the month of June and July and are to be performed during the month of June and July.

### 3. Cautions/Warnings

Substation personnel should receive and complete required safety training for entry. All LCRA employees are required to wear proper PPE when working in a substation, which includes but is not limited to working in the control building, or within the substation, the maintenance building.

The OCCC should be notified prior to entering the substation and advised that transformer inspections will be performed. During the inspection, the fans will be manually started.

Substation safety hazards include electrical shock, falling, and contact with the fans to ensure there is no contact.

The substation should be warned of ongoing work so that additional hazards can be identified. Do not work on any conductors that are live and do not work on any conductors that are live.

### 4. Equipment and Supplies

The following items should be used during inspections: FLIR camera.

### 5. References

Refer to Water Services and Transmits on Safety Handbooks for more information.

### 6. Procedure

Conduct a visual inspection of the following items: 1. Do not have any live parts stored in the control building on the station site for the associated facility and immediately notify your supervisor if any live parts are observed.

Proceed to the following page.

# Written Procedure

- Procedural elements
  - Purpose, scope, cautions and warnings, equipment and supplies, required training, and specific procedural steps
- Reporting requirements
  - Provide instruction on what to do if an anomaly or issue is discovered



# Training

- **Training topics**
  - Include safety elements and procedural requirements
- **Initial training in person**
- **Recurring training video preseason**
  - Include visuals for substation equipment and components
  - Include visuals and examples of tools and equipment used during inspections





# LTRA

ENERGY • WATER • COMMUNITY SERVICES

