



26-WDRC-RFP-05

THERMAL OPERATIONS GAS  
MEASUREMENT AND SOURCE  
ATTRIBUTION FOR SCVF/GM (CH<sub>4</sub>/H<sub>2</sub>S)

BUDGET: \$125,000

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## 1. Background & Rationale

Surface casing vent flow (SCVF) and gas migration (GM) remain persistent well integrity and decommissioning challenges. For thermal operations, PTAC/AUPRF committee work over multiple program cycles has repeatedly identified a distinct need to improve (i) best-practice monitoring strategy, (ii) alignment about when to test for SCVF and GM in thermal wells, (iii) accurate determination of flowrate, methane levels, and hydrogen sulphide levels, and (iv) defensible differentiation between shallow and production-zone emissions to support operational decisions and risk assessment.

This project focuses on thermal-specific measurement and attribution standardization, complementing PTAC/AUPRF efforts that have advanced (a) thermal source characterization research and (b) broader SCVF/GM measurement and decision-support approaches. Program work aims to distinguish among shallow H<sub>2</sub>S generation, casing failures, and production zonal isolation problems, and to provide scientifically defensible approaches to evaluate methane emissions and manage well integrity liabilities.

Thermal operations present additional confounders: injected steam and high temperatures can alter reservoir chemistry and may contribute to shallow pathways that can mimic deeper well integrity issues, while the appropriate response differs substantially depending on whether emissions are shallow/near-surface versus integrity-related at depth. In parallel, PTAC/AUPRF have already initiated thermal-related work explicitly targeting best practices for source-attributed methane and hydrogen sulphide presence in thermal operations, reinforcing that thermal CH<sub>4</sub>/H<sub>2</sub>S measurement and attribution remains a priority theme.

In Alberta, Directive 087 (Well Integrity Management) establishes testing, reporting, classification, and record-retention expectations for surface casing vent flow (SCVF) and gas migration (GM), including requirements to obtain stabilized flow rate and stabilized shut-in pressure trending when vent flow is confirmed, and to retain records for the life of the well plus two years. Importantly for thermal operations, Directive 087 explicitly notes that steam and steam condensates (with no hydrocarbons or other fluids present) venting from the annulus of an operating thermal well do not in themselves indicate an SCVF.

This project will therefore require thermal-specific triggers and interpretation logic that distinguish operational steam/condensate effects from integrity-related SCVF/GM signals in a consistent, auditable way.

In parallel, Directive 020 (Well Abandonment) links abandonment planning and reporting to SCVF/GM closure status and includes testing and inspection requirements that interact with SCVF/GM determinations at end-of-life. The project outputs should be suitable for use in regulatory submissions and evidence packages supporting well integrity decisions and decommissioning planning.

Industry best practice for SCVF/GM source identification (e.g., DACC IRP 27) emphasizes use of all available information—including well history review, offset well review, collection and

analysis of vent flow data, carbon isotope data, and relevant logging data—when determining the likely source and remediation approach. The suite delivered under this RFP must operationalize these elements into a standardized minimum evidence set, data dictionary, and decision logic that are practical under thermal operating conditions.

Despite this progress, a persistent cross-cutting gap remains: thermal operations still lack sufficiently standardized, field-ready guidance that combines (a) aligned monitoring/testing triggers, (b) accurate and auditable measurement of flow rate, methane, and hydrogen sulphide under thermal operating conditions, and (c) source-attributed characterization that can distinguish shallow/near-surface emissions from production-zone integrity-related emissions in a consistent, reproducible way across operators.

This RFP is intended to deliver a Thermal SCVF/GM Measurement & Source Attribution Suite that operationalizes these needs into implementable workflows, minimum measurement/QA/QC specifications, evidence-pack templates, and decision logic suitable for producer adoption and regulatory defensibility. This thermal-operations RFP is being issued alongside companion SCVF/GM directed RFPs focused on (i) source/leak-pathway diagnostics workflows and tool selection and (ii) remediation success metrics and verification.

## 2. Benefits to Producers

This project is intended to deliver practical, defensible tools that thermal operators can use to:

- improve consistency and auditability of monitoring and testing decisions for thermal SCVF/GM, aligned with committee-identified needs for standardized triggers and best-practice monitoring;
- reduce misattribution risk by providing a structured approach to distinguishing shallow/near-surface emissions from integrity-related production-zone emissions, a recurring thermal knowledge-gap theme;
- support risk-based operational decisions where CH<sub>4</sub>/H<sub>2</sub>S presence and source depth materially change safety/environmental implications;
- enable comparable, auditable data capture across operators to improve learning and future guidance in thermal operations contexts.

## 3. Research Objectives

Proponents must deliver an integrated “Thermal SCVF/GM Measurement & Source Attribution Suite” consisting of processes, evaluation methods, and tools (templates, protocols, SOPs, decision logic, and/or field-ready workflows) that accomplish the following:

- Thermal Testing Trigger Framework: Define best-practice monitoring and aligned triggers for when to test and re-test SCVF/GM in thermal operations, consistent with committee-identified needs for alignment on “when to test” and best-practice monitoring strategy.

- Accurate Quantification Under Thermal Conditions (Flow + CH<sub>4</sub> + H<sub>2</sub>S): Define a thermal-ready approach to measuring: (a) flow rate, (b) methane levels, and (c) hydrogen sulphide levels, explicitly accounting for thermal/steam confounding noted in the program’s thermal knowledge gaps.
- Source Attribution (Shallow vs Production-Zone): Deliver a defensible, evidence-based source attribution approach that can distinguish shallow/near-surface emissions from production-zone emissions in thermal contexts, consistent with program language emphasizing the need to distinguish shallow H<sub>2</sub>S generation, casing failures, and zonal isolation issues.
  - Evidence, Auditability, and Usable Outputs: Provide evidence-pack standards (templates + minimum metadata requirements) sufficient to support consistent application and auditable documentation, reflecting the program’s emphasis on quantitative, data-logged measurement practices and clear documentation.

#### 4. In Scope

Proposals must address the following in-scope elements:

##### A) Thermal Testing Trigger Framework (Required)

- A clear set of monitoring and testing triggers tailored to thermal operations for SCVF/GM, directly aligned with the stated knowledge gap calling for “alignment about when to test.”
- Mapping of trigger outcomes to recommended actions (e.g., screen → quantify → attribute → escalate), including how thermal operating states affect triggering logic (e.g., conditions that may confound interpretation).

##### B) Minimum Measurement and QA/QC Specification (Required)

The suite must include a minimum measurement specification addressing:

- Measurement objectives by decision stage (screening vs confirmation vs quantification vs trend confirmation), including explicit “go/no-go” criteria for advancing to attribution and escalation steps.
- Thermal-condition performance requirements: define how measurement methods will operate under high humidity, condensate risk, and elevated temperatures typical of thermal well annulus gases, including required sample conditioning (e.g., moisture/condensate management), and demonstrate that the method maintains stable baselines and repeatable results under these conditions.
- Minimum instrument performance and documentation (range, resolution, response time, intrinsic safety where applicable, field suitability), including:

- digital time-stamped data logging for flow, pressure (where used), temperature, and gas concentrations;
- calibration and verification/bump-testing procedures and frequency, including pre/post checks and criteria for invalidating/repeating tests;
- required background correction approach where the measurement method depends on ambient dilution.
- Standardized test conditions suitable for thermal operations:
  - clear stabilization definitions for “stabilized average flow” and “stabilized shut-in pressure” (where applicable) and how these are evaluated from logged data;
  - repeatability and replicate requirements (minimum replicates, acceptance thresholds, and re-test rules);
  - required metadata about well state and operating conditions at time of test (thermal operating mode, pressures/temperatures, recent steaming history, vent configuration, and any temporary controls).
- Data capture requirements (raw time series; instrument configuration; calibration certificates; field notes; chain-of-custody and lab QA/QC when applicable) and a standardized uncertainty statement (what uncertainty components are included, and how uncertainty influences interpretation and decisions).

#### C) Source Attribution

- A decision logic (“selector”) linking thermal operating context + observed measurements to attribution hypotheses (shallow vs production-zone) and recommended follow-up steps to increase confidence.
- Guidance on interpreting CH<sub>4</sub>/H<sub>2</sub>S results in the context of thermal conditions, consistent with program themes emphasizing shallow H<sub>2</sub>S vs casing failure vs zonal isolation distinctions.

#### D) Evidence Pack Templates + Data Dictionary

- Templates for field and interpretation documentation capturing well state, operating conditions, measurement setup, calibration, time series, deviations, and rationale for conclusions, aligned with the program’s emphasis on auditable, comparable decision outputs.

#### E) Case Study Package + Validation Plan

- Worked examples showing end-to-end application of trigger framework + measurement spec + source attribution logic, including explicit handling of uncertainty and decision outputs.

- A validation/ground-truthing plan with measurable acceptance criteria (lab, controlled testing, and/or field demonstrations as proposed) consistent with the program’s intent to produce defensible guidance and testing methods for thermal contexts.

## 5. Out of Scope

- Performing physical well repairs, abandonment operations, or construction work as a primary activity (unless proposed as a limited demonstration strictly to support deliverables).
- Generic LDAR program design unrelated to thermal SCVF/GM measurement and attribution needs.
- Purely theoretical reviews that do not produce implementable workflows, templates, and auditable outputs suitable for adoption.

## 6. Specific Deliverables

The proposals must include a detailed work plan with specific deliverables and outcomes, with time estimates and a completion date. Proposals must commit to producing the following deliverables (producer-ready formats, clear versioning):

- Thermal SCVF/GM Measurement & Source Attribution Suite Framework
- Thermal Testing Trigger and Field Measurement Standard Operating Procedures
- Minimum Measurement & QA/QC Specification
- Source Attribution
- Evidence Pack Templates + Data Dictionary / Minimum Metadata
- Case Study Package
- Final Report + Producer-Facing Summary

## 7. Success Criteria

A proposal will be considered successful if the delivered suite:

- Produces actionable, field-usable outputs that standardize when to test and how to measure SCVF/GM in thermal operations, consistent with the long-standing knowledge gaps documented for thermal surface casing vents.
- Provides auditable measurement methods for flow + CH<sub>4</sub> + H<sub>2</sub>S that account for thermal/steam confounding and support consistent documentation and comparability across operators.

- Produces defensible source attribution (shallow vs production-zone) with explicit uncertainty handling and decision logic that reflects program objectives to distinguish shallow H<sub>2</sub>S generation vs casing failure vs zonal isolation issues.
- Demonstrates reproducibility and usability through case studies and a validation approach with measurable acceptance criteria.
- Ensures compatibility of templates, data dictionaries, and documentation outputs with the concurrently issued SCVF/GM diagnostics and remediation verification RFPs (RFP 26-WDRC-RFP-03 and RFP 26-WDRC-RFP-04).