

1.0 PUBLIC EXECUTIVE SUMMARY

Scaling, Corrosion, Precipitates, and Casing defects are all issues storage operators face on a continual basis in managing the integrity of their gas storage assets. These issues often lead to diminished deliverability (5 to 20%), as well as casing integrity issues requiring costly remediation. The mineral scale formation and material defect assessment process in well bores is complicated, time consuming, and costly due to the range of storage conditions and existing technologies.

GTI, in conjunction with partners Envision Product Design and NucSafe, Inc., proposes to study, develop, and conceptually demonstrate a real-time RSD (Radiography by Selective Detection) based tool for in-situ compositional identification and quantification of scale in gas storage wells and pipelines. The RSD tool will also assess and quantify material defects, pitting, and penetrations in casings and associated piping. Radiography by selective detection allows for preferential detection of backscatter components that are responsible for improving image contrast. This is accomplished through a set of specially designed detectors and both fixed and movable detector collimators. NuSAFE's SXI system is a proven technology that has been tested on a wide variety of materials and applications. The focus of RSD has been one-sided detection for applications where conventional non-destructive examination methods either will not work or give poor results. Acquired images have clearly shown, for a variety of conditions, that proper selection of x-ray field scatter components leads to a significant improvement in image quality and contrast. Improvements are significant enough in some cases that objects not visible to conventional x-ray backscatter imaging or transmission radiography become clearly discernable.

The gas storage industry will benefit from this innovative technology as it can provide near real time data and analysis on both scale formation inside the well bore as well as assess the well bore casing integrity itself. The proposed technology can provide this information in a single scan, creating an ideal application of for determining pre and post remedial treatment effectiveness. The assessment process will be significantly streamlined, eliminating the delay for lab analysis and reducing rig time considerably. Cost savings will be in the tens of thousands on an annual basis for a typical integrity management program. The project goals include improved well bore integrity assessment, flow deliverability, and reduced O&M costs. The following table summarizes the team members involved in the proposed project.

Table 1 – Team Member Roles and Qualifications for the Proposed Project

Team Member	Role	Qualification
Gas Technology Institute	Project Manager/Principal Investigator	<ul style="list-style-type: none"> The leading natural gas R&D organization 60 years of developed technology-based solutions for consumers, industry, and government
Envision Product Design	Performing Sub-Contractor	<ul style="list-style-type: none"> 15 years of detector development, isotope and x-ray source experience, deployment of imaging systems and algorithms Equipped with test facilities. Safety and field exp.
NuSAFE Inc.	Performing Sub-Contractor	<ul style="list-style-type: none"> Industry experts in Scatter X-ray Imaging (SXI) mobile systems- Radiography by Selective Detection