



נספח א'- מפרט שירותים  
**Israel Natural Gas Lines**

**Project Title : Gas Quality Consultancy**

**Document Title : ANALYTICAL LABORATORY  
SCOPE OF WORK – NATURAL  
GAS TESTING SERVICES**

**Ref:324509**

<b>REV</b>	<b>ISSUE DATE</b>	<b>DESCRIPTION</b>
1	05-Jan-2015	Scope of work- Analytical laboratory

This document details recommended checks for the analysis of Natural Gas quality in laboratory. The report considers differing technologies, techniques and analytical standards.

The contractual scope of work is as detailed to the table. Additional analysis types may be required but these would be negotiated separately between INGL and the service provider or providers.

## **1. Qualifying laboratories must have**

- A minimum of 3 year's experience operating detailed gas chromatographic analysis using gas/solid (packed column) and gas/liquid (open tubular column) techniques in at least one of the following areas
  - Analysis of gaseous or volatile liquid petroleum products
  - Analysis of atmospheric pollutants
  - Analysis of foodstuffs for pesticide residue
  - Analysis of agricultural products for trace additives
  - Analysis of trace contaminants in ground water or potable water
- Accreditation to a national/international (ISRAC or similar) quality standard for testing laboratories or a documented and operational quality management standard such as the ISO 9000 series.
- Experience of obtaining samples from customer plant or sites.
- Documented and implemented health and safety procedures.

## **2. Qualifying laboratories ideally will have**

- Accreditation for testing from an internationally recognized body such as ISRAC that includes in the accreditation analysis by gas chromatography.
- Current involvement, dating back at least three years of participation in international inter-laboratory testing schemes, such as FAPAS, NPL or NMI-Shell, that involve "blind" testing of samples by multiple laboratories. This shall be supported by documented evidence.
- Designated laboratory technical and quality managers, these should be separate persons.

- Current experience, dating back at least three years, of compositional analysis of permanent gas or vapor phase samples by gas chromatography. This shall be supported by documented evidence
- Current experience, dating back at least three years, of trace contaminant analysis of permanent gases or vapor phase samples. This shall be supported by documented evidence
- Current experience, dating back at least three years, of handling and using certified primary reference gas standards. This shall be supported by documented evidence
- Current experience, dating back at least three years, of obtaining flammable and/or high pressure samples. This shall be supported by documented evidence
- Current experience, dating back at least three years, of operating or working with process analyzers. This shall be supported by documented evidence
- Current experience, dating back at least three years, of working to ISO, ASTM or similar documented and nationally/internationally recognized analytical standards and compliance with analytical precision requirements such as repeatability and/or reproducibility validation. This shall be supported by documented evidence
- The lab has a documentation system in place that records all the analysis reports including date of the test, site, etc.

### **3. Third party Supporting Lab**

- The requirements are same as for the conditions as the main lab contract.
- The test samples results are to be returned within an adequate time frame.
- The services of the third party supporting labs are needed in case of troubleshooting when the analytical equipment of the main lab malfunctions or in case there is a doubt of inaccuracy of measurement.

### **4. Bid documents must include the following items:**

- A detailed list by test of the sampling and analysis equipment the bidder will have in place after contract award prior to commencement of the service for the provision of the contracted service to INGL
- A detailed list by test of the sampling and analysis equipment the bidder currently has in place for the provision of the contracted service to INGL

- Identify the origin, grade and certification traceability of all calibration gases to be used in analysis for INGL
- Where the bidder does not currently operate a Natural Gas testing facility covering the scope of work detailed in table 1 at the facility proposed to undertake the proposed services for INGL
  - a. What training will be undertaken to prepare and validate the proposed service?
  - b. Who will provide the training service and detail the scope of the service agreement?
- Identification of the premises in which the work will be undertaken.

**5. The following Tests are required:**

Test	Frequency	SCOPE OF WORK	Equipment	Expected range
<b>5.1 Sampling on location for analysis according to ISO 6974-3</b>	12 a year at minimum	<p><b>Purpose:</b> taking a representative sample of the natural gas from the network of INGL to allow the determination of composition of the sample with emphasis to the amounts of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene by laboratory analysis.</p> <p><b>Applicable International standard:</b> ISO 17015: 2000.</p> <p><b>Location:</b> On site, Ashdod, Ashkelon, Dor or anywhere else according to requirement.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation of the sample cylinder to location.</li> <li>2. Taking a representative sample of natural gas at line pressure in accordance with ISO 17015.</li> <li>3. Transportation of the sample cylinder to the lab and delivery of the sample cylinder to the lab within 24 hours from sampling.</li> <li>4. Transportation and storage shall be done at temperatures above zero degrees Celsius</li> </ol>	Double ended flow through sample cylinders $\geq 250$ ml fitted with self-sealing "quick connect" type connectors and controlling needle valves, with a pressure rating of 100 bar (g). Sample cylinders should be clean and filled with pure nitrogen (99.999 mole %) during transportation to INGL premises. <i>Sample cylinders produced by Proserv, Jiskoot or Welker Engineering will be considered acceptable.</i>	All individual concentrations of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene are below 0.05 mole %

<p><b>5.2 Sampling on location for analysis of sulfuric components</b></p>	<p>12 a year at minimum</p>	<p><b>Purpose:</b> taking a representative sample of the natural gas from the network of INGL to allow the determination of sulfuric components by laboratory analysis.</p> <p><b>Applicable International standard:</b> ISO 17015: 2000.</p> <p><b>Location:</b> On site, Ashdod or anywhere else according to requirement.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation and storage shall be done at temperatures above zero degrees Celsius.</li> <li>2. Transportation of the sample cylinder to location.</li> <li>3. Taking a representative sample of natural gas at line pressure in accordance with ISO 17015.</li> <li>4. Transportation of the sample cylinder to the lab and delivery of the sample cylinder to the lab within 24 hours from sampling.</li> </ol>	<p>Double ended flow through sample cylinders <math>\geq</math> 250 ml fitted with self-sealing "quick connect" type connectors and controlling needle valves, with a pressure rating of 100 bar (g). Sample cylinders and sampling system must be PTFE lined or chemically treated to minimize the reactivity of the cylinder internal walls with H<sub>2</sub>S. Sample cylinders should be clean and filled with pure nitrogen (99.999 mole %) during transportation to INGL premises. DOT 1800 rated sample cylinders from manufacturers will be considered acceptable, these are widely available from many manufacturers including Hoke, Whitey and Jiskoot.</p>	<p>All Sulfur components are below 20 ppm</p>
--	-----------------------------	---	--	---

<p><b>5.3 Analysis of a natural gas sample according to ISO 6974-3</b></p>	<p>12 a year at minimum</p>	<p><b>Purpose:</b> Analysis of the natural gas sample from the network of INGL to determine the composition of the contents including the amounts of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene to verify the absence of Oxygen, to determine the need of a fixed Helium concentration in the field GC's of INGL and to determine the subdivision of the back flush component of the field GC's of INGL.</p> <p><b>Applicable International standard:</b> ISO 6974-3.</p> <p><b>Location:</b> Lab.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation and storage shall be done at temperatures above zero degrees Celsius</li> <li>2. Analysis of the sample according to ISO 6974-3.</li> <li>3. Report to INGL within 14 days of receipt of the sample taken according to task 1: The composition of the sample including the amounts of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene.</li> <li>4. In case of abnormal results, the lab is committed to report immediately to INGL and new routine should be done for analysis. The new Report will be presented to INGL within 14 days of receipt of the sample taken without any additional expense.</li> </ol>	<p>Gas Chromatograph capable of analysing according to ISO 6974-3 including the amounts of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene.</p>	<p>All individual concentrations of Oxygen, Helium, Hexanes, Heptanes, Octanes, Benzene and Toluene are below 0.05 mole %</p>
--	-----------------------------	--	---	---

		<p><b>Lab Requirements:</b> Accreditation by an ILAC-MRA member (e.g. ISRAC) according to ISO 17025. Scope of the accreditation should contain analysis according to ISO 6974-3.</p>		
--	--	--	--	--

<p><b>5.4 Analysis of H<sub>2</sub>S in natural gas sample</b></p>	<p>1 a year at minimum</p>	<p><b>Purpose:</b> Analysis of the natural gas sample from the network of INGL to determine the amounts of H<sub>2</sub>S to verify whether the contractual obligations are met.</p> <p><b>Applicable International standard:</b> ISO 19739: 2004 or ASTM D6228-10.</p> <p><b>Location:</b> Lab.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation and storage shall be done at temperatures above zero degrees Celsius</li> <li>2. Analysis of the sample according to ISO 19739: 2004 or ASTM D6228-10 within 24 hours after receipt of the sample taken according to task 2.</li> <li>3. Report to INGL within 14 days of receipt of the sample taken according to task 2: The amount of H<sub>2</sub>S in the sample expressed in ppm v H<sub>2</sub>S.</li> <li>4. In case of abnormal results, the lab is committed to report immediately to INGL and new routine should be done for analysis. The new Report will be presented to INGL within 14 days of receipt of the sample taken without any additional expense.</li> </ol> <p><b>Lab Requirements:</b>          Accreditation by an ILAC-MRA member (e.g. ISRAC) according to ISO 17025. Scope of the accreditation should contain analysis according to ISO 19739: 2004 or ASTM D6228-10.</p>	<p>Gas Chromatograph capable of analysing according to ISO 19739: 2004 or ASTM D6228-10.</p>	<p>below 2 ppm</p>
--	----------------------------	---	--	--------------------

<p><b>5.5 Analysis of total-S in natural gas sample</b></p>	<p>12 a year at minimum</p>	<p><b>Purpose:</b> Analysis of the natural gas sample from the network of INGL to determine the total amounts of S to verify whether the contractual obligations are met.</p> <p><b>Applicable International standard:</b> ISO 19739: 2004 or ASTM D6228-10.</p> <p><b>Location:</b> Lab.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation and storage shall be done at temperatures above zero degrees Celsius</li> <li>2. Analysis of the sample according to ISO 19739: 2004 or ASTM D6228-10 within 24 hours after receipt of the sample taken according to task 2.</li> <li>3. Report to INGL within 14 days of receipt of the sample taken according to task 2: The total amount of S in the sample expressed in parts per million by volume of total sulphur expressed as hydrogen sulphide.</li> <li>4. In case of abnormal results, the lab is committed to report immediately to INGL and new routine should be done for analysis. The new Report will be presented to INGL within 14 days of receipt of the sample taken without any additional expense.</li> </ol>	<p>Gas Chromatograph capable of analysing according to ISO 19739: 2004 or ASTM D6228-10.</p>	<p>below 20 ppm</p>
---	-----------------------------	--	--	---------------------

		<p><b>Lab Requirements:</b> Accreditation by an ILAC-MRA member (e.g. ISRAC) according to ISO 17025. Scope of the accreditation should contain analysis according to ISO 19739: 2004 or ASTM D6228-10.</p>		
<p><b>5.6 Determination of water dew point on location</b></p>	<p>12 a year at minimum</p>	<p><b>Purpose:</b> Determination of water dew point to verify the correctness of the on-line water dew point analyser.</p> <p><b>Applicable International standard:</b> ASTM D 5454, ASTM D1142, ASTM D 4888-06, ISO 11541 and ISO 18453.</p> <p><b>Location:</b> On site, Ashdod or anywhere else according to requirement.</p> <p><b>Services provided by the lab:</b></p> <ol style="list-style-type: none"> <li>1. Transportation of the analyser/material to location.</li> <li>2. Taking a representative measurement of water dew point or of the water content.</li> <li>3. Recording the reading of the on-line analyser.</li> <li>4. Reporting to INGL within 14 days after taking the measurements. Reporting shall include the measured water content in ppm v and the conversion of that value into water dew point at 80 bar(a) by using ISO 18453 and the</li> </ol>	<ol style="list-style-type: none"> <li>1. A suitable analyser or suitable material that can be used in the field.</li> <li>2. Clear written description of the method used in the field, including requirements to the critical parameters of the method.</li> </ol>	<p>Lower than – 50 degrees Celsius. Typical gas properties: natural gas containing 99 mole% methane.</p>

		<p>associated uncertainty. Reporting shall also include the recorded value of the on-line analyser, a description of the method used and of the parameters used for the conversion into dew point.</p> <p>5. In case of abnormal results, the lab is committed to report immediately to INGL and new routine should be done for analysis. The new Report will be presented to INGL within 14 days of receipt of the sample taken without any additional expense.</p> <p><b>Requirements to the lab:</b> Accreditation by an ILAC-MRA member (e.g. ISRAC) according to ISO 17025. Scope of the accreditation should contain analysis of water dew point by the method the lab applies for the task.</p>		
<p><b>5.7 Determination of hydro carbon dew point on location</b></p>	<p>12 a year at minimum</p>	<p><b>Purpose:</b> Determination of hydro carbon dew point to verify the correctness of the on-line hydro carbon dew point analyzer.</p> <p><b>Applicable International standard:</b> ASTM D 1142 and ISO 6570-3.</p> <p><b>Location:</b> On site, Ashdod or anywhere else according to requirement.</p> <p><b>Services provided by the lab:</b></p> <p><b>1.</b> Transportation of the analyser/material to</p>	<p><b>1.</b> A suitable analyser or suitable material that can be used in the field.</p> <p><b>2.</b> Clear written description of the method used in the field, including requirements to the critical parameters of the method.</p>	<p>About 5 degrees Celsius at 26.4 bar (g). Typical gas properties: natural gas containing 99 mole% of methane.</p>

		<p>location.</p> <ol style="list-style-type: none"> <li>2. Taking a representative measurement of hydro carbon dew point.</li> <li>3. Recording the reading of the on-line analyser.</li> <li>4. Reporting to INGL within 14 days after taking the measurements. Reporting shall include the measured hydro carbon dew point and the associated uncertainty. Reporting shall also include the recorded value of the on-line analyser and a description of the method used.</li> <li>5. In case of abnormal results, the lab is committed to report immediately to INGL and new routine should be done for analysis. The new Report will be presented to INGL within 14 days of receipt of the sample taken without any additional expense.</li> </ol> <p><b>Lab Requirements:</b></p> <ol style="list-style-type: none"> <li>1. Accreditation by an ILAC-MRA member (e.g. ISRAC) according to ISO 17025. Scope of the accreditation should contain analysis of hydro carbon dew point by the method the lab applies for the task.</li> </ol>		
<p><b>5.8 Analysis of a water from heating line (boiler)</b></p>	<p>35 a year at minimum</p>	<p><b>Purpose:</b> Analyse the amount of iron (Fe), Chlorides (Cl), calcium (Ca), hardness (CaCO<sub>3</sub>) and alkalinity (pH 4.45-14.0).</p> <p><b>Location:</b> The sample will take by INGL worker and will be brought to the laboratory.</p>		<p>pH-8; hardness (CaCO<sub>3</sub>)-20ppm; Conductivity-130us/cm; Alkalinity-40ppm</p>

		<b>Service provided by the lab:</b> Water analysis and sends the result to relevant INGL worker.		
--	--	--	--	--

**6. The test reports above shall include the following:**

- Test results.
- Test method utilized.
- Persons performing the tests (including the person who took the samples).
- The dates and times when the samples of natural gas were taken and the tests were conducted.
- Unique sample number.
- Sample vessel unique serial number (all pressure certified sample vessels, as used by contractor or subcontractor must be stamped or etched with a manufacturer's serial number).
- Location along the work, Site where sample was taken, Sample stream and sample point identification ( tag number or unique identifying description)
- Temperature and pressure of the sample stream.
- Any abnormal process conditions known to the person taking the sample or any other observations regarding the nature or condition of the sample.
- Any other information requested by INGL in its sole discretion with respect to the work.

The test report shall be submitted in English.

The test report shall be in form and substance acceptable by INGL in its sole discretion and shall be approved and signed by each of the person that performed the work.