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AGL UPSTREAM INVESTMENTS PTY LTD

Gloucester Gas Project

Annual Leak Detection and Repair Summary Report

Reporting Period: 6 August 2014 to 5 August 2015

AGL Upstream Investments Pty Ltd

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Foreword

| | |
|---------------------------|---|
| PREMISES | Gloucester Gas Project 22 Tate Street GLOUCESTER NSW 2422 |
| LICENCE DETAILS | Environment Protection Licence 20358 |
| LICENCEE | AGL Upstream Investments Pty Limited (AGL) |
| LICENCEE'S ADDRESS | Locked Bag 1837, North Sydney, NSW 2060 |
| REPORTING PERIOD | 6 August 2014 - 5 August 2015 |
| REPORT DATE | 21 August 2015 |
| REPORT PREPARED BY | Ben Eastwood, Field Environment Manager |

1. Introduction

The Gloucester Gas Project (GGP) is owned and operated by AGL and is located in the Gloucester Valley southeast of the township of Gloucester. The GGP includes the Waukivory Pilot Project which is an exploration activity.

This Leak Detection and Repair (LDAR) Summary Report has been prepared to satisfy EPL 20358, Condition R5.1, and relates to the LDAR Program required by EPL 20358 Condition M9.

AGL engaged Heath Pipeline Services Pty Ltd (HPS) to complete gas leakage audit in accordance with the requirements of Condition M9. The annual audit was conducted by HPS on 5 May 2015 for the Gloucester Gas Project.

2. Regulatory Requirements

Regulatory conditions that apply to the LDAR program and where they have been addressed in this report are summarised in **Table 1**.

Table 1 - EPL 20358 Conditions

| Ref | Condition | Section |
|------|---|------------------|
| M9.1 | <i>The licensee must operate a leak detection and repair (LDAR) program for all relevant components of plant and equipment in order to detect gas leaks</i> | Section 1 |
| M9.2 | <i>The LDAR program must, unless otherwise approved by the EPA, monitor for the detection of leaks in accordance with US EPA Method 21-Determination of Volatile Organic Compound Leaks (40 CFR Part 60, Appendix A, Method 21)</i> | Section 3 |
| M9.3 | <i>Leak Detection and Repairs</i> <i>When a gas leak is identified, the licensee must have the component repaired as follows:</i> <ul style="list-style-type: none"> <i>Within a period of 14 days if the concentration of the fugitive VOC's emission is greater than or equal to 1,000 parts per million by volume (ppmv) but not more than 10,000 ppmv (minor leak), as methane, above background.</i> | Table 3 |

| Ref | Condition | Section |
|------|--|-----------------------------------|
| | <ul style="list-style-type: none"> • Within a period of 5 days if the concentration of the fugitive VOC's emission is greater than or equal to 10,000 parts per million by volume (ppmv) but not more than 50,000 ppmv (major leak), as methane, above background. • Within a period of 1 day if the concentration of the fugitive VOC's emission is greater than or equal to 50,000 parts per million by volume (ppmv) but not more than 10,000 ppmv (significant leak >50,000 ppmv), as methane, above background. | |
| R5.1 | <p>The licensee must submit a brief summary report on the Leak Detection and Repair (LDAR) program with the annual return. The summary report must include, but not be limited to:</p> <ol style="list-style-type: none"> The total number of components inspected, as well as the number and percentage of minor, major and significant leaking components found by component types; The type of components and the scale of the leak for any equipment where leaks are found; The emission level of leaking equipment and emission level of re-check after leak was repaired; The repair responses and times as listed in the table below. | Table 2 and Table 3 |

3. Methodology

The survey was completed using a GMI Leaksurveyor using US EPA Method 21. The GMI Leaksurveyor Series is a fast response semiconductor gas detector with a scale sensitivity of 10 Parts Per Million (ppm). All leaks located with the GMI Leaksurveyor Series were confirmed with a bubble test. Seventeen sites were physically inspected and surveyed on 5 May 2015.

4. LDAR Program Results

Table 2 shows the survey results taken at the Waukivory Pilot Project including wellheads, associated above ground facilities and gas gathering lines.

Table 2 - Leak detection results for Gloucester Gas Project

| Component | | Detected Leaks | | | | | |
|------------------------|-----|----------------|---|-------|---|-------------|---|
| | | Minor | | Major | | Significant | |
| Type | Qty | Total | % | Total | % | Total | % |
| Wellhead | 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ground entry Point | 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| Control Panel | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Position Control Valve | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bull Plugs & Caps | 58 | 0 | 0 | 0 | 0 | 0 | 0 |
| Flanges | 124 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gauges | 51 | 1 | 2 | 0 | 0 | 0 | 0 |
| Valves | 108 | 0 | 0 | 0 | 0 | 0 | 0 |

| Component | | Detected Leaks | | | | | |
|----------------------|-----|----------------|-----------------|-------|---|-------------|---|
| | | Minor | | Major | | Significant | |
| Type | Qty | Total | % | Total | % | Total | % |
| Swagelok Fittings | 56 | 0 | 0 | 0 | 0 | 0 | 0 |
| Threaded Connections | 245 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sensor Cable | 3 | 1 | 33 ^a | 0 | 0 | 0 | 0 |

^a: There are three sensor cables installed. One of the sensor cables demonstrated a minor leak (representing 33% of the total sample).

Table 3 lists components in the Gloucester field where leaks were identified. It includes the scale of the leak, the emission level of the leak pre repair and post repair, and the repair response and response time.

Table 3 - Gloucester field leaks and repair response

| Equipment | Component | Leak Scale | Repair Response | Repair Time | Pre Repair (ppm) | Post Repair (ppm) |
|---------------|--------------------------------------|------------|---|-------------|------------------|-------------------|
| Stratford #10 | Down hole sensor cable | Minor | Replaced two ball valves and relocated telemetry line | 6 days | 1890 | <10 |
| Craven #6 | Valve to pressure gauge off wellhead | Minor | Operator tightened valve | Same day | 1500 | <10 |

5. Summary

Seventeen sites were inspected during the LDAR program and 719 components surveyed for gas leaks. There were no significant or major gas leaks detected during the survey. Two minor gas leaks were detected at separate wellheads which were repaired within the timeframe required by EPL20358. AGL complied with Condition M9.3 for leaks detected as part of the LDAR program.

6. References

Heath Pipeline Services Pty Ltd (2015), Gas Leakage Audit, 2015 Final Report for AGL Upstream Investments, Gloucester gas Project.