Code of Practice

Upstream Polyethylene Gathering Networks – CSG Industry

Version 4

Companion Paper CP-02-002

Remotely Piloted Aircraft Systems / Unmanned Aerial Systems / Drones Awareness Guideline

Rev 0

May 2020

Important note on use of the *APGA Code of Practice for Upstream Polyethylene Gathering Networks in the Coal Seam Gas Industry*.

This Code of Practice has been developed for the use of organisations involved in the CSG industry, primarily in Australia and New Zealand.

Contents

1 Introduction

This guideline has been developed to assist members of the Australian Pipelines and Gas Association (APGA) and people involved in coal seam gas gathering systems with the safe and effective employment of the disruptive technology of RPAS.

This is a guideline only and the authors, editors and APGA are not responsible in any way for any errors or omissions, nor the result of any actions taken based on information in the guidelines.

2 What is RPAS?

The term RPAS stands for remotely piloted aircraft system (RPAS). It refers to the whole system that is used to launch, fly and land a remotely piloted aircraft (RPA). The system is comprised of the following sub-systems:

- remotely piloted aircraft (RPA) including sensors
- command and control (C2) data links
- remote pilot station (RPS) or ground control station (GCS)
- RPAS Operations Crew
- image storage and exploitation suite.

When planning the use of RPAS, consideration must be given to the operation and the risks associated with each of these sub systems, not just the RPA.

3 Why use RPAS?

RPAS is a disruptive technology that allows an organisation to conduct aerial surveillance in lieu of, or complementary to, traditional aerial and ground surveillance methods.

From a safety perspective, manned aerial pipeline surveillance activities have been one of the highest fatality incident types in oil and gas aviation.

RPAS can also replace or complement land transport means of inspection. In lieu of sending vehicles over long distances, with the associated fatality risk, an RPAS can identify an issue that then is inspected by a ground-based team, increasing safety and reducing time.

4 Regulatory information

The most relevant aviation legislation regarding RPAS is CASR Part 101[1].

It is recommended that prior to starting any RPAS operations at an APGA Member company site, a review of the legislative requirements is undertaken by the company legal representative as well as engagement of an RPAS operator who has a Remote Piloted Aircraft Operators Certificate (ReOC) to review for them.

[1] Civil Aviation Safety Regulations (CASR) Part 101 (https://www.casa.gov.au/standard-page/casr-part-101-unmanned-aircraft-and-rocket-operations)

5 Risk Management

The Joint Authorities for Rulemaking on Unmanned Systems (JARUS) have developed an internationally recognised risk assessment process for RPAS operations called the Specific Operations Risk Assessment (SORA)[2] . It is recommended that any RPAS operation for any APGA member use this process.

It is also recommended that no excluded or landholder category operations are permitted as defined on the CASA Excluded Category rules[3]. Rather, use of operators who use Remote Pilots Licence (RePL) holders who operate under a CASA approved RPA Operators Certificate (ReOC) is recommended.

This is to ensure organisations will use personnel who have conducted a regulatory recognised competency assessment and who operate under a set of operational procedures that have been reviewed and approved by CASA.

For any RPAS operation, it is recommended that a trial of the technology be undertaken, then phase the operational change through the member company management of change process.

Also, any RPAS operator should be audited by an accredited RPAS auditor prior to being contracted to ensure they meet the intent of the guideline as well as any APGA member company specific requirements.

6 Operations

6.1 Visual Line of Sight (VLOS) Operations

The majority of RPAS operations in Australia are in this category, VLOS, which means the remotely piloted aircraft (RPA) is always within visual range. VLOS operations should be within **500m** of the remote pilot on the ground who should also have a competent observer assisting. The types of RPA used in this category are typically the multi-rotor systems.

6.2 Beyond Visual Line of Sight (BVLOS) Operations

For longer distances **greater than 500m** the RPA becomes hard to see from the remote pilot on the ground. At this stage, the operation starts to become a BVLOS operation. This requires more controls as the situational awareness of keeping the RPA in visual range is now lost. The operational safety objectives (OSO) mentioned in the SORA are the type of extra controls required when operating in BVLOS mode to achieve ALARP. One of the key controls will be the ability to detect and avoid other airspace users.

BVLOS operations will need CASA approval as well as company approval.

For long-distance surveillance, BVLOS is going to be the preferred mode of operation. The most efficient RPA for BVLOS operations would be a fixed wing RPA.

The types of operations performed by RPAS both in VLOS and BVLOS modes are being expanded as innovative methods are replacing traditional methods. Some examples are:

[2] JARUS SORA (http://jarus-rpas.org/content/jar-doc-06-sora-package)
[3] CASA Rules (https://www.casa.gov.au/drones/rules)

- visual inspection of assets to determine integrity and compliance using electro optical (EO)/InfraRed (IR) sensors
- subsidence monitoring using light detection and ranging (LiDAR)
- emergency (fire/flood) monitoring, as required
- methane detection
- environmental compliance using multispectral sensors.

For pipelines, trunklines, gathering systems, a BVLOS RPAS operation that can use the EO/IR/LiDAR would be recommended.

7 Emergency Response Plan

RPAS are not as robust as aircraft designed to carry passengers and do not have the same level of redundancy, therefore they will have a higher failure rate.

It is recommended that any RPAS operation has a site-specific emergency response plan (ERP) that addresses the most likely emergency scenarios within the area of operation. This should include at least, but not limited to, the following:

- engine failure
- lost link
- GPS failure
- airframe failure
- other airspace user collision
- collision with property on the ground
- fauna attacks (including raptors)
- Environmental factors including wind gusts, lightning.

For any BVLOS operation it will also be important to consider alternate landing areas within the area of operation.

8 Data Management

8.1 Data Analytics

Most RPAS operators should also provide a data analytics service rather than just pass on raw image product. This can include machine learning change detection, orthorectified imagery, point cloud 3D imagery, LiDAR survey imagery.

It is recommended that the image product provided by the RPAS operator be at the specifications of the GIS/spatial system specifications of the APGA Member company.

8.2 Data workflow

The main reason for starting an RPAS program is to give company management an effective tool to enable better decision making. Therefore, before starting an RPAS program, careful attention should be made to how the output of the program will be used internally.

It is recommended that a clear company workflow of what imagery is required, at what specification, by who and by when is established prior to the first flight.

8.3 Data Security

It is recommended to develop a data custody of transfer process in accordance with company IT processes to ensure that the image data is securely transferred as well as tracked to the correct users within the organisation.

9 Social Risk Management

APGA Members are committed to minimising disturbances to the community. RPAS activities have the potential to affect landholders and member companies have a key role in avoiding or minimising these impacts.

The recommended approach before embarking on a RPAS program is to conduct a social risk assessment led by the social performance teams of each company. This process will help address any concerns about issues such as privacy and what controls the company will put in place to address. Once this has been done, a stakeholder engagement process is recommended prior to the first flight.

It is important to note that not just external stakeholders be considered but internal as well. Some internal stakeholders may perceive RPAS use as a risk to their employment.

10 RPAS use checklist

In summary, RPAS provides an effective tool that will assist in making a pipeline operation safer and more effective. Some of the key points from above are summarised in this RPAS use checklist:

1. Has a legal review of a potential RPAS operation been conducted?
2. Does the APGA Member company have a clear scope of what they want to achieve with RPAS?
3. What imagery outputs are required by the RPAS program and at what specification?
4. Has a workflow for the imagery outputs been determined?
5. Has an ReOC operator with RePL holders been contracted?
6. Has the contracted ReOC operator been able to conduct a SORA?
7. Has the ReOC operator been able to get the required regulatory approvals?
8. Has a social risk assessment and engagement activity been conducted by the APGA member company before starting RPAS operations?
9. Has a trial area been identified and a proof of concept scope developed?
10. Has the APGA member company management of change process commenced?
11. Has a site-specific emergency response plan been developed in conjunction with the ReOC operator and the APGA member company? For BVLOS operations, have alternate landing areas been identified?
12. Has a data management and chain of custody process been developed for the imagery produced?

Appendix 1

Acronyms and definitions

Acronym	Meaning
ALARP	As Low as Reasonably Practicable
APGA	Australian Petroleum and Gas Association
BVLOS	Beyond Visual Line of Sight
CASA	Civil Aviation Safety Association
CASR	Civil Aviation Safety Regulations
C2	Command and Control Data
EO	Electro Optical
ERP	Emergency Response Plan
GCS	Ground Control Station
GIS	Geospatial Information System
GPS	Geographic Positioning System
IR	Infrared
JARUS	Joint Authorities for Rulemaking on Unmanned Systems
LiDAR	Light Detection and Ranging
OSO	Operational Safety Objectives
ReOC	Remote Piloted Aircraft Operators Certificate
RePL	Remote Pilot Licence
RPA	Remote Piloted Aircraft
RPAS	Remote Piloted Aircraft Systems
RPS	Remote Pilot Station
SORA	Specific Operations Risk Assessment
UAS	Unmanned Aerial Systems
VLOS	Visual Line of Sight