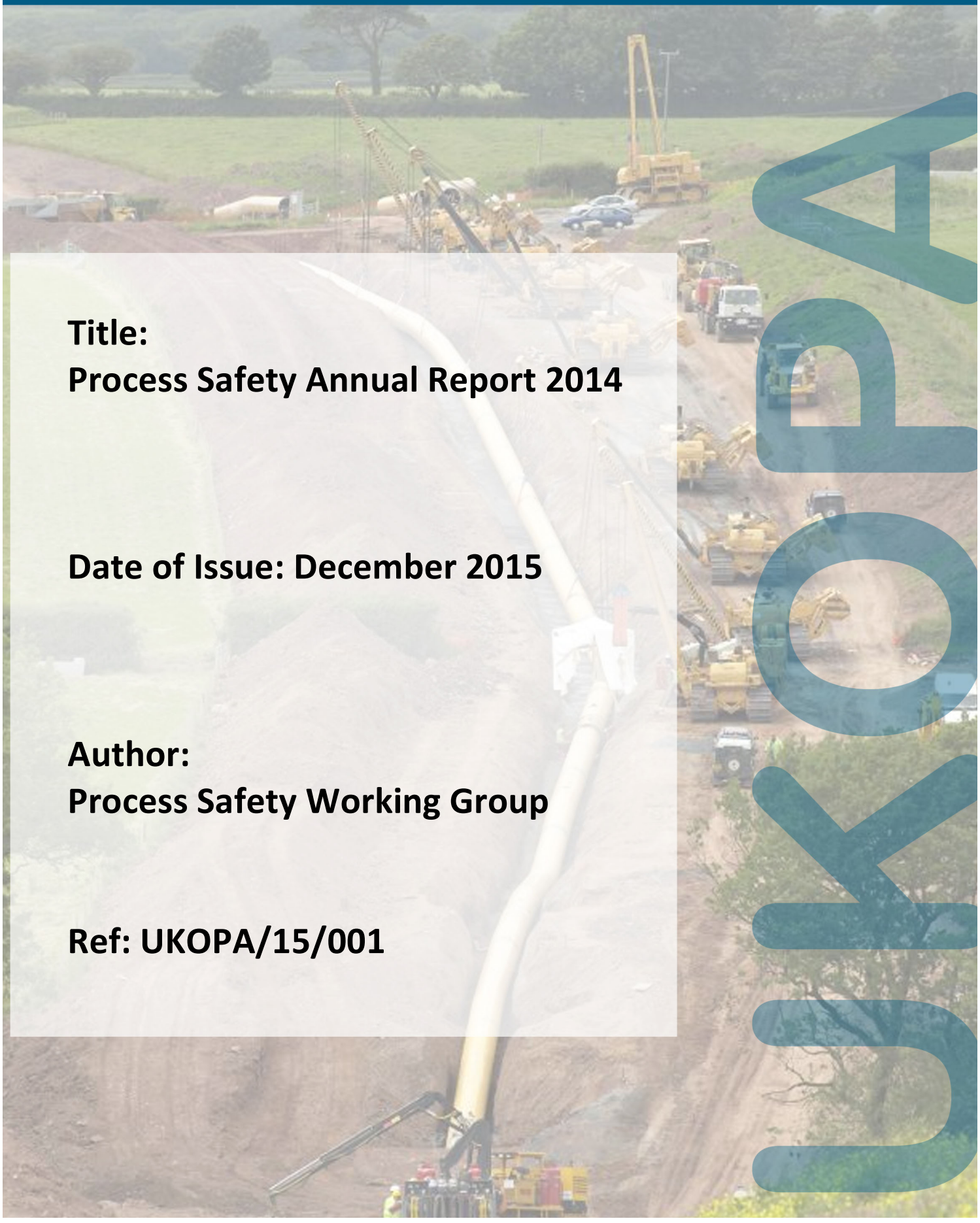
# UKOPA

## United Kingdom Onshore Pipeline Operators' Association



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**Process Safety Annual Report 2014**

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# UKOPA - Annual Process Safety Report 2014

## Summary

This is the seventh annual Process Safety Indicator (PSI) report it shows continued improvement in many of the key areas.

During the period, no pipelines were operated above their safe operating limit, however there were 257 exceedances of normal operating pressure and 204 of these exceeded the pipeline maximum operating pressure. Three quarters of the maximum operating pressure exceedances were on a single members pipeline. These excursions were found during the annual MOP reporting process and not at the time of the excursions. A full investigation has been carried out and it was found that altitude and equipment drift had had an effect on the system pressures. The operator has put processes into place to ensure that this cannot happen again on the affected pipeline and monitoring points at the control centre have been checked to ensure that they are set correctly.

Highlights

- Zero pipelines were operated above their safe operating limit
- 1 incidents of product loss – less than in previous years
- 745 pipeline corridor infringements by 3rd parties – slightly lower than pervious years (plus 23 malicious damage events)
- 4 reports of damage associated with 3rd party work – consistent with previous years
- 2464 km internal in-line integrity inspection – higher than anticipated for the period
- 4611 km external integrity inspection – slightly lower than anticipated for the period
- 88 Emergency exercises carried out in the year – higher than anticipated
- 82 operators trained in Pipeline Emergency Response Officer Role – less than previous years
- 40 Safety Alerts issued on-going sharing taking place

As well as the UKOPA PSI Annual Report, the UKOPA Infringement Working Group (IWG) regularly meets to review infringement data, share good practice between members and participates in external pipeline awareness programme. The IWG produces an annual report (UKOPA/15/002), which considers the infringement data in detail and shares learning from incidents reported in 2014.

## Background

The process safety indicators are used to monitor the performance of UKOPA and its members to achieve its aim of ensuring the ongoing safety of the UK pipeline infrastructure. The data is used to compare year on year performance and helps to influence UKOPA's future work programme.

The information in this report is provided by the member companies and is collated centrally. This year 18 members completed the survey; a list of all members who contributed to the report is provided in Appendix 3.

In 2014, UKOPA members reported operating over 24,863 km of pipelines in the UK which transports over 75% of the energy used in the UK. Over 85% of the pipelines are classified as Major Accident Hazard Pipelines in accordance with the UK Pipeline Safety Regulations 1996. These pipelines are generally routed through the rural areas and transport a number of fuels including natural gas, oil, gasoline, aviation kerosene, ethylene, refined oils, spiked crude and natural gas liquids. The pipelines are managed (operated, maintained, surveyed, etc.) in a way in order control the significant process safety risks associated with their operation.

There were no changes to the questions asked in 2014 to those asked in 2013, and as such there is a direct comparison between the two years. The table in Appendix 2 shows all the measures used over the last 6 years, when they were introduced and when any have been removed. It also provides the data from those 6 years for comparison purposes.

The 2014 PSI data (See Appendix 1) shows members continue to operate and maintain the pipelines within their specification and there was only 1 product loss incidents reported during the year. Members continue to train staff and test emergency plans regularly and the sharing of safety alerts has remained steady with 40 alerts being issued in 2014, compared with 41 in 2013 compared to just 13 in 2012. One of UKOPA's key objectives is to share safety learning amongst its members and we are pleased to see this is continuing. A comparison of the annual reports is provided in Appendix 2.

In addition to this annual report UKOPA uses its Process Safety Self-Assessment Tool (PSAT) for members to assess their risk control measures and share information on how these measures can be improved. This bi-annual survey was conducted at the beginning of 2014 and the results shared with the UKOPA membership. The performance indicators in this report are a sub set of risk control measures which are employed by UKOPA members to manage the pipeline risk and provide an indication of the overall process safety performance.

## Performance Measures

1. **Integrity Management** – The integrity of their pipelines is of utmost importance to UKOPA members. One of the key risks to a pipeline is internal or external corrosion which reduces the thickness of the pipe wall and can ultimately result in a pipeline failure. Data is therefore collected in 5 areas with regards to Integrity Management, these are a) pipeline damage or product loss, b) corrosion repairs, c) pipelines affected by ground movement, d) pipeline inspections – pipelines can be internally and / or externally inspected and e) cathodic protection

   a. UKOPA via the Fault Management and Risk Assessment Working Group (FARWG) records the number of pipeline failures and faults. A failure is defined as a product loss incident and a fault is defined as a record of damage which has been verified by field investigation.

      In 2014 from the length of pipe in operation (recorded in the database as 22,158 km) there was 1 failure and 84 faults. Compared with previous, failures figures have remained around constant, falling between 1 and 4 failures per year. The number of faults recorded from 2013 has decreased slightly from 95.

      The annual failure frequency for 2014 is $4.513 \times 10^{-5}$ which is below the total average rate of $2.18 \times 10^{-4}$ per km yr for the period 1962 – 2014.

      In 2014, along with the one failure on a major accident hazard pipeline (MAHP), there has been an increase in malicious damage events on oil pipelines which in some cases can cause a spillage. These events are being monitored, but not reported, as they are due to a criminal act rather than a managed integrity issue.

      The fault rate for 2014 is $3.79 \times 10^{-3}$ per km.

      The FARWG produce an annual report with fully explains the primary causes of the 84 faults, however as an overview, 39% were due to external corrosion, 14% were due to original construction damage, 13% were due to dents and 9% were due to external interference. The rest were due to such items as ground movement, material defects and girth weld defects.

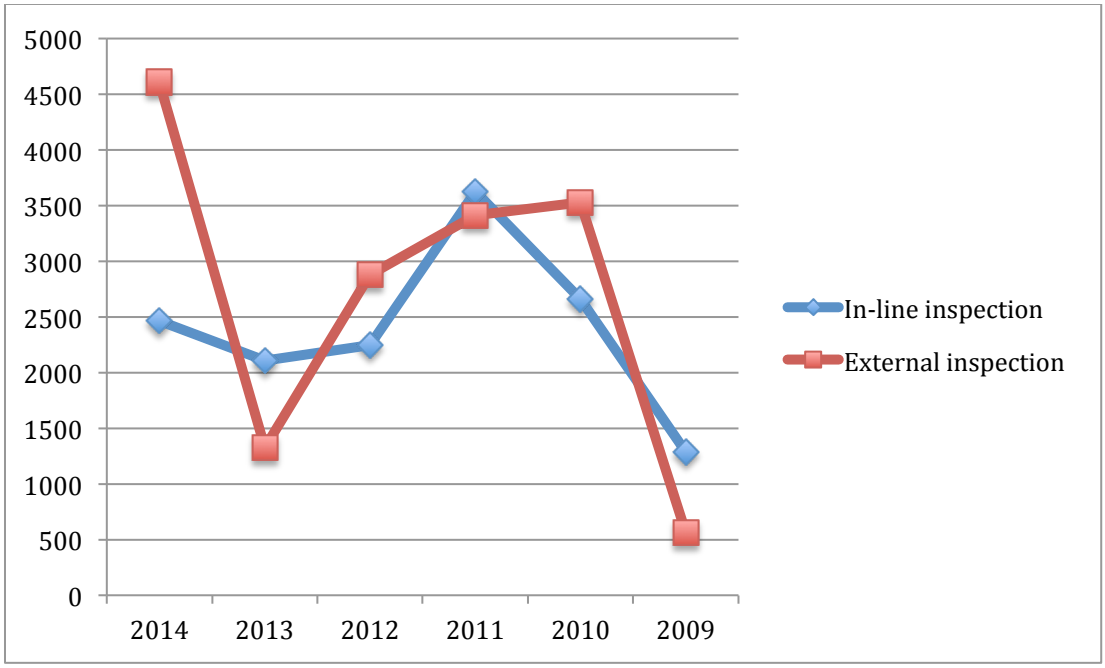
      The FARWG produce the annual UKOPA Pipeline Product Loss Incidents and Fault Report which explains the above results in more detail. The 2014 report is number UKOPA/15/003.

   b. In 2012, a new measure was added to the PSI report to consider the number of corrosion repairs carried out to a pipeline that required additional measures to assure integrity other than just a repair to the coating system (for example a repair shell, a cut out, etc). The introduction came because some members were identifying repair requirements and wanted to know if other members were experiencing the same issues. The number of corrosion repairs carried out during 2014 was 92; which was a reduction of 11 from the figure reported in 2013.

   c. In 2012, a new measure was added to the PSI report to consider, pipelines affected by ground movement. The introduction came because of the number of members who were reporting incidents of ground movement and the impact this was having on their assets. This measure was amended in 2013 to review pipelines that, prior to 2013, were affected by ground movement and already being subject to extra monitoring by UKOPA members and those pipelines that have been newly affected during 2014. From the data collected, UKOPA members are aware off and are

monitoring, 17 pipelines that have been subjected to ground movement prior to 2014. During 2014, 3 different pipelines have been subjected to ground movement and are now included in UKOPA members monitoring processes.

d. Internal and external corrosion measures continue to be recorded in this report, to review the amount of inspection carried out by members to assess the integrity of their pipelines.




Graph 1 – km of pipeline Inspections carried out per year

i. Internal Inspection (in-line inspection) is carried out by a specialist pipeline inspection gauge (PIG). Planned inspections are carried out on a 5 – 15 year frequency, so the number of kilometres inspected per year is expected to be in the range of 7 – 20% of the total population. Typically around 13.5% of the pipeline population is inspected annually.

Of the 21,055 km of UKOPA pipelines reported which can be internally inspected, 2463 km were inspected in 2014 which is 11.7% of the internally inspectable population. This is within the range of the expected planned lengths of pipeline to be inspected. UKOPA members reported that 1967 km of pipelines were due to be internally inspected during 2014 and the actual figure was 20% more than was originally planned. This increase can be attributed to operators having to carry out extra in-line inspections following an increase in malicious damages found by operators during the year. These extra inspections were used to confirm the on-going integrity of the pipelines.

ii. External Inspection utilises a number of above ground surveys to assess the effectiveness of the cathodic protection system which provides corrosion protection to the pipeline, and the condition of the pipeline coating. These techniques measure the electrical potential or the voltage gradient of the current applied to the pipeline by the cathodic protection system to prevent corrosion of any metal in direct contact with water in the soil. The external inspection survey, known as a close interval potential survey (CIPS) or a direct current voltage gradient (DCVG) survey, is carried out along the length of the pipeline. Any

irregularities in the electrical potential or the voltage gradient are detected at specific locations along the pipeline during the survey, these locations are then exposed and the coating and pipe surface is inspected and repaired as required. External inspections are carried out on a planned 5 – 15 year frequency, which depends upon the in-line inspection frequency. The length of pipelines for which external inspection is planned therefore varies between 7-20% of the total population with an average of 13.5% per year, as for planned in-line inspection.

Of the 24,837 km of UKOPA pipelines reported which are subject to external inspection; 4611 km were inspected externally in 2014, which is 18.6% of the pipeline population. The anticipated length of pipeline to be inspected was 5569 km, so 82.8% of planned inspection took place. Those pipelines not inspected have been rescheduled for inspection in subsequent years.

The percentage length of pipelines internally and externally inspected in 2014 28.5%, which is higher than the 7-20% expected. This can be accounted for by the extra inline inspection that took place during 2014 due to the malicious damage incidents. The on-going use of both internal and external inspections continues to demonstrate the commitment of operators to monitor the integrity of the pipelines on a regular basis.

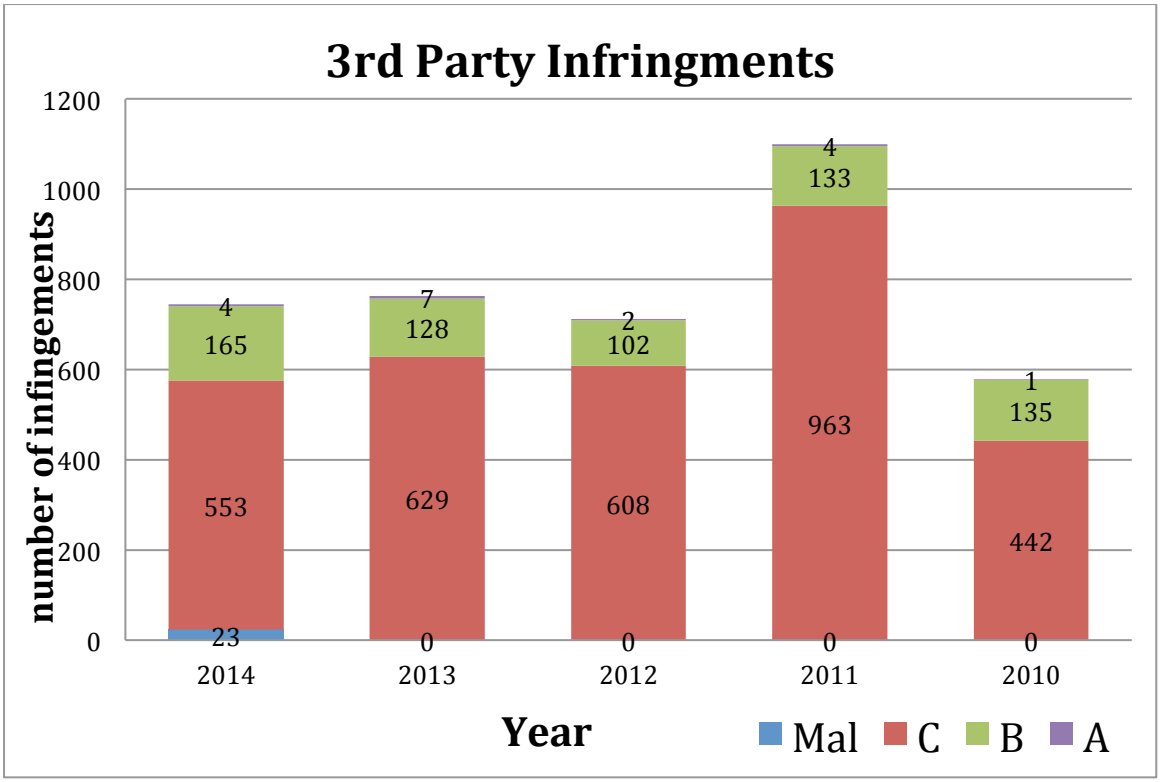
e. Cathodic Protection Systems – This measure was introduced in 2013 and is intended to monitor the CP systems which are used to protect metallic pipelines from corrosion. UKOPA Members use and monitor CP systems on their assets. Where pipelines are not using CP, UKOPA members ensure their pipes are subjected to extra monitoring. During 2014, of the 24,837 km of pipelines included in the PSI report, just 3.86 km had not been subjected to CP for more than 6 months. This figure is much less than the figure of 21.4 km in 2013 and work continues by operators to restore protection on these sections.

The above data is recorded under PSI Number 6, PSI Number 7, PSI Number 8 and PSI Number 9 and PSI Number 11 respectively in Appendix 1.

2. **Route Corridor Management** – Maintaining a safe and undeveloped route corridor is another aspect of pipeline management which is important. UKOPA members carry out a variety of route corridor surveys which include aerial and vantage point surveys.

   UKOPA member pipelines are surveyed by aerial or ground level (vantage point) survey on at least a two-week frequency. This report does not include the length of pipelines surveyed because members had previously reported that all pipelines were surveyed 100% as planned, however the outcome and findings of these surveys is monitored.

   Pipeline operators monitor 3rd party activities which are carried out within pipeline route corridors and record the occurrence of any activities in the vicinity of the pipeline for which the pipeline operator has not been notified. When such an activity is detected, the operator intervenes to ensure the activity is carried out safely and damage to the pipeline is avoided. Un-notified activities carried out in the vicinity of the pipeline are defined as infringements, and are categorised according to their potential to cause damage to the pipeline. The infringement categories, descriptions and numbers which were recorded in 2014 are given in the table 1 below. In 2014, 768 infringements were recorded (including 23 malicious damages – criminal activity/ deliberate damage for criminal gain) and there was a decrease in infringements resulting in damage to 4 of the pipelines, which is 3 lower than in 2013 see details below.




Graph 2 – Number of 3rd Party Infringements by Year

| Infringe-ment Category | Infringe-ment Type | Number of infringe-ments in 2014 | Number of infringe-ments in 2013 | Number of infringe-ments in 2012 | Number of infringe-ments in 2011 | Number of infringe-ments in 2010 |
|---|---|---|---|---|---|---|
| A | Pipeline Damage or Leak | 4 | 7 | 2 | 4 | 1 |
| B | Serious Potential for Damage | 165 | 128 | 102 | 133 | 135 |
| C | Limited Potential for Damage | 553 | 629 | 608 | 963 | 442 |
| Mal | Malicious Damage | 23 | | | | |

Table 1 – Number of 3rd Party Infringements by Year

Following the fundamental re-appraisal of the gas operators reporting mechanism, and the apparent dramatic fall in the number of infringement reports in 2010, the report system was reviewed in 2011 and now recodes infringements as defined by UKOPA, and thus the increase in infringement category C since 2010 is not viewed as significant.

The IWG Infringement report for 2014 (UKOPA/15/002) summaries the data more fully and give explanations of the findings.

In 2013, a new measure was added to the PSWG Annual Report, to investigate the average length of time it took UKOPA members to respond to an initial response for a 3rd party enquiry. It should be noted that UKOPA members have different methods of responding to 3rd party enquiries and also are under different regulatory requirements regarding response times. From the data collected 2014, the average response times vary from between 1 hour to 14 days. The most commonly reported response times from members are between 24 hrs and 2 days.

The data above is recorded under PSI Number 4 and Number 5 respectively in Appendix 1.

3. **Pipeline Operating Limits** - Ensuring a pipeline does not experience pressures or temperatures or flows above its design limits is a significant aspect of pipeline safety management. To avoid exceeding these operating limits Pipeline Operators monitor these parameters and have protective devices to shut down a pipeline or pipeline section to ensure that the pipeline does not experience a pressure, temperature or flow excursion.

   It should be noted that the monitoring and reporting of pipeline operating conditions varies between operating companies. This identified the need to clarify the definition of the primary protective device for a pipeline to be used for the UKOPA report. A specific definition of key protective devices was applied in 2010 and this has influenced the number of exceedances recorded since.

   In 2014 there were no pipelines operated outside their safe operating limits however there were recorded 257 exceedance of the pipeline normal operating pressure. Of these 257, 204 exceeded the pipeline maximum operating pressure, but did not exceed any of the pipelines safe operating limits. This is a significant increase from the 66 and 27 figures respectively reported in 2013.

   One UKOPA member experienced three quarters of the maximum operating pressure exceedences. These excursions were identified via the annual Maximum Operating Pressure reporting process, and not at the time of the excursions. A full investigation was carried out into the excursions and it was found that altitude and equipment drift had had an effect on the system pressures. Processes have been put in place to ensure that this does not happen again on the affected pipeline and monitoring points at the Digital Network Control System have been checked to ensure that they are correctly set.

   The above data is recorded under PSI Number 3 in Appendix 1.

4. **Emergency Management** – Whilst it is every ones aim to avoid an emergency, it is important that all Pipeline Operators have contingency plans in place to deal with a pipeline emergency. These plans are shared with the Local Authority Emergency Planners to ensure that in the event of an incident the Pipeline Operator, Emergency Response Services and the Local Authority understand the risks and how they can be effectively managed.

   UKOPA members invest significant time and effort in training their staff to be able to implement the emergency procedures. A number of UKOPA members hold specific emergency response training courses, in addition to supporting the UKOPA PERO training course provided at the Fire Service College. In 2014, 82 operational staff were trained as Pipeline Emergency Response Officers (PEROs), by attending the UKOPA

PERO training course or enhanced in-house training courses. This figure is lower than in 2013, however as the course has a 5 year renewal schedule, the attendance number will vary from year to year.

The UKOPA Emergency Planning Working Group reviewed and updated the PERO course in 2013 and new scenarios are due to be added to the training in 2016.

In addition to the training, UKOPA members carried out 88 Emergency Exercises. 40 of these were internal table-top exercises; 16 were external table-top exercises; 25 were live internal exercises and 7 were live external exercises. External exercises, whether table top or live are carried out jointly by UKOPA members with Local Authorities and Emergency Services to test the emergency plans and procedures.

The above data is recorded under PSI Number 2 and PSI Number 1 respectively in Appendix 1.

5. **Safety Alerts** - In order to share learning from incidents, UKOPA members share incident and near miss Safety Alerts and discuss these at UKOPA Meetings. During 201 UKOPA focused on increasing awareness of the need to share and discuss incident and near miss Safety Alerts, and as such there was a dramatic increase in the number of Safety Alerts shared across the organisation. In 2014, 40 Safety alerts were issued. This compares with 41 in 2013, 13 in 2012, 11 in 2011, 28 in 2010 and 13 in 2009.

   UKOPA members' continue to be committed to sharing learning and the PSWG reinforced the need to ensure that safety alerts are shared and published through UKOPA. Safety Alerts are now a regular item on the PSWG and members meeting agendas. The above data is recorded under PSI Number 10 in Appendix 1.

# Appendix 1
# UKOPA 2014 Process Safety Indicator (PSI) Report

| PSI Number | Risk Control | Indicator | Safety Performance Indicator |
|---|---|---|---|
| **1** | Emergency Response | Emergency Testing | No of Table Top = 56<br>No of Live Exercises = 32 |
| **2** | Competency and Training | Emergency Response Training | 82 staff trained |
| **3** | Operating Procedures | Exceedances of Safe Operating Pressure | 0 |
| **4** | Route Management | Number of infringements safely managed to avoid pipeline damage | 799 (including 23 malicious damages) |
| **5** | Route Management | Average Response time to 3rd Party Enquiries | Immediate – D+14 (majority 24 – 72 hrs) |
| **6** | Integrity | Number of product loss reports in year:- | 1 |
| | | Number of damage reports in year:- | 84 |
| **7** | Integrity | Number of corrosion repairs | 92 |
| **8** | Integrity | Pipelines affected by ground movement | 17 already known<br>3 found in 2014 |
| **9** | Inspection | In-line inspection:- | 2464 inspected<br>(125.3% of planned) |
| | | External inspection:- | 4610.6 kms inspected<br>(82.8% of planned) |
| **10** | Safety Alerts | Number of safety alerts shared | 40 |
| **11** | Integrity | CP Systems-KM of pipeline not protected by CP for a period more than 6 months | 3.86 |

# Appendix 2
# Comparison of 2009 to 2014 PSI Reports

| PSI No. | Risk Control | Indicator | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 |
|---|---|---|---|---|---|---|---|---|
| Length of pipeline included in report in km | | | 24836 | 22213 | 22912 | 21742 | 21468 | 20469 |
| 1 | Emergency Response | No. Emergency Exercises | 88 | 66 | 46 | 48 | 55 | 43 |
| 2 | Competency & Training | No. Operational staff trained | 82 | 128 | 127 | 129 | 102 | 148 |
| 3 | Operating Procedures | No of Exceedances of Safe Operating Pressure[1] | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | Route Management | No. of infringements[2] safely managed to avoid pipeline damage | 799 | 764 | 712 | 1099 | 578 | 2459 |
| 5 | Route Management | Average Response time to 3rd Party Enquiries | Immediate to D+14 | Immediate to D+14 | New measure not reported in this period | | | |
| 6 | Integrity | No. of product loss | 1 | 2 | 2 | 3 | 1 | 4 |
| | | No. of damage reports | 84 | 95 | 71 | 85 | 45 | 50 |
| 7 | Integrity | No. of corrosion repairs requiring additional measures to correct other than just a recoat | 92 | 103 | 86 | New measures not reported this period | | |
| 8 | Integrity | No. of pipelines affected by ground movement – already known and monitored | 17 | 25 | 7 | New measure not reported this period | | |
| | | No. of pipelines affected by ground movement – found this year | 3 | 5 | New measure not reported this period | | | |
| | Maintenance | Protective devices tested in year[1]:- | Measure removed in 2012 | | | 100% | 100% | 100% |
| 9 | Inspection | Kms In-line inspection:- | 2464 | 2109 | 2249 | 3626 | 2662 | 1287 |
| | | Kms external inspection:- | 4611 | 1326 | 2878 | 3415 | 3530 | 562.5 |
| 10 | Safety Alerts | Number of safety alerts shared | 40 | 41 | 13 | 11 | 28 | 13 |
| 11 | Integrity | CP Systems - KM of pipeline not protected by CP for a period more than 6 months | 3.86 | 21.44 | New measure not reported this period | | | |

Notes:-

1 A more specific definition of key protective devices has been applied since 2010. This influences the number of exceedances recorded however none were above the Safe Operating Pressure of any of the affected pipelines.

2 Infringements are un-notified activities in the vicinity of the pipeline which are managed safely to avoid pipeline damage. A fundamental re-appraisal of the gas operators reporting mechanism in 2010 had resulted in the apparent dramatic fall in the number of infringement reports.

## Appendix 3
## UKOPA Members contributing to the 2014 Report

BP

British Pipeline Agency (BPA)

CLH-PS (OPA in 2014)

Essar

IGas

Ineos

National Grid Gas Distribution

National Grid Gas Transmission

Northern Gas Networks

Penspen

Perenco

PetroIneos

Sabic

SGN

Shell Exploration and Production

Total

Valero – Mainline Pipelines

Wales & West Utilities Ltd