Compliance Assessment Report CAR_NRW0045809

Permit being assessed: YP3930EX.

For: Pembroke Refinery, **held by:** Valero Energy Ltd

At: Valero Energy Ltd , Pembroke Refinery, Pembroke, Pembrokeshire, SA71 5SJ.

Type of assessment: Audit,

Reason: Routine.

On: 28/11/2024 between 12:00 and 16:00.

Parts of permit assessed: See details below.

NRW Lead Officer: Michael Launder.

Report sent to: Manager Environmental Engineering, Valero Energy Ltd, on 28/02/2025.

1. Summary of our findings (full details in section 4)

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR1A - Installations - Management - General Management	Assessed (A)	
IR2C - Installations - Operations - Operating techniques	Assessed (A)	
IR3B - Installations - Emissions and monitoring - Emissions of substances not controlled by emission limits	Assessed (A)	
IR4C - Installations - Information - Notification	Assessed (A)	
IR3E - Installations - Emissions and monitoring - Monitoring	Action only (X)	

Result types are explained in more detail in the 'Important Information' section below.

Total non-compliances recorded	Total non-compliance score
0	0

How we use the non-compliance score to calculate your annual fee is explained in the 'Important Information' section below.

2. What action is required?

Criteria	Action needed	Complete by
IR3E	Operator to review Leak Detection and Repair field methodology in the context of BS EN 17628 Standard method to determine diffuse emissions of volatile organic compounds into the atmosphere and BS EN 15446 Measurement of fugitive emission of vapours generating from equipment and piping leaks.	01/07/2025

Compliance criteria codes are listed in the 'Important information' section below.

3. What will happen next?

Any non-compliance we have identified and recorded on this form is an offence. It can result in criminal prosecution and/or suspension or revocation of your permit.

At this time, we do not intend to take any further action.

This statement does not stop us from taking additional enforcement action if further relevant information comes to light or offences continue.

4. Details of our assessment

Introduction

This Compliance Assessment Report was completed to record the outcome of an audit of the Leak Detection and Repair (LDAR) programme at the Valero Pembroke Refinery.

LDAR is a means of identifying and addressing the fugitive release of volatile organic compounds (VOCs). The Best Available Techniques Reference Note (BREF) for Refining of Mineral Oil and Gas specifies, in BAT 18, that to prevent or reduce diffuse VOC emissions sites must use a "risk-based LDAR programme in order to identify leaking components, and to repair these leaks."

In the context of this audit, non-methane VOCs are the focus.

A pipework and LDAR questionnaire was sent to the operator on 6 June 2024 in advance of the site visit, and the completed form was used to inform a further request for information, the coverage and scope of the site visit on 28 November 2024.

Management System and Procedures

The Pembroke Refinery Environmental Management System is based on the ISO14001:2015 standard and is externally accredited. This sits within a wider site operations management system called the Commitment to Excellence Management System (CTEMS), a proprietary system verified through corporate auditing by Valero headquarters.

Activities carried out under CTEMS and the EMS are managed by procedures, subject to document control, review periods and approval. Roles and responsibilities are specified within the procedures reviewed. Specific procedures relating to LDAR are covered below.

An e-learning module on LDAR is included as part of the training programme for

Operations & Maintenance staff at the refinery, which outlines the site programme, resources available and procedures for new starters.

At Valero, the LDAR programme is managed by the Environment Department, with an LDAR Programme Administrator reporting to the Manager Environmental Engineering. The survey work is carried out by a third-party contractor to the Inspection Department.

Standards and Accreditation

The Pembroke Refinery Inspection Department, who are responsible for safety and reliability compliance inspections on refinery equipment, are accredited by UKAS as an Inspection Body under *ISO17020:2012 Conformity Assessment – Requirements for the operation of various types of bodies performing inspection*.

Relevant to LDAR, this accreditation covers a range of in-service inspections to American Petroleum Institute standards (e.g. *API 510 Pressure Vessel Inspector, API 570 Piping Inspector*), European and British Standards (e.g. *BS EN 14015 Specification for tank design*), as well as repair verification and Pressure Systems Safety Regulations inspections.

Leak Detection and Quantification

The procedure *PP-PEM-JBA-0090 Leak Detection and Repair (LDAR) Plan* (dated 21/06/2024) outlines the purpose and scope of the programme, specifying that it applies to process streams >10% VOC by weight, which excludes middle distillates and fuel oils. In the procedure, the major sources of leaks on refinery plant are described, and how they give rise to fugitive emissions. Areas in scope are:

- Process areas
- Fixed and floating roof tanks
- Pipe tracks
- Gas spheres
- Jetty
- Waste Water Treatment Plant
- Refinery lab sump

The operator covers all of these areas with an OGI study annually, with a start-up survey also undertaken following turnaround events.

The methodology for LDAR at the site is to undertake a structured walk through a process unit, where points of interest are examined using an optical gas imaging (OGI) camera. If a leak is detected, the location is recorded and a weatherproof tag attached to the equipment. Where safe to do so, VOC measurements are taken using a PID to quantify the leak. Significant leaks that present a safety risk are reported immediately to the Operations Department.

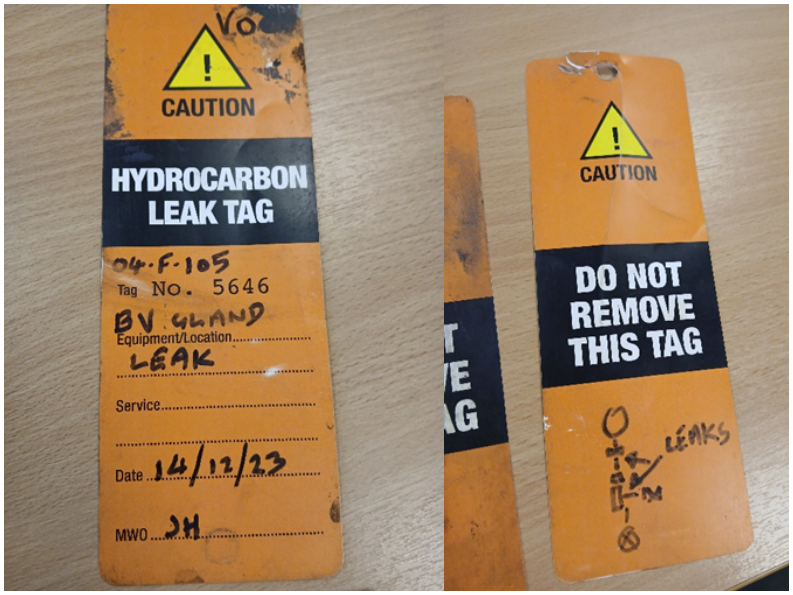
Optical Gas Imaging camera recording, right image showing infrared mode capturing gas leaking from valve (black haze)

Leak Repair

On review of the OGI footage and VOC measurements, each detected leak is given a risk severity rating from 1 (Significant Leak) to 3 (Minor Leak, <500 PPM at source). The Operations Department are informed of each leak and work requests raised for each to be repaired.

Once repairs are completed, the subsequent OGI survey reviews the repair, and the work request can be closed and tag removed once repairs are verified.

The operator has recently developed an LDAR Database, to maintain a centralised record of leaks found during surveys. Based on the severity and duration of the leak, fugitive emissions can be estimated, using the database, for inclusion in the annual UK Pollutant Release and Transfer Register (PRTR) submission.



Example of a leak tag from LDAR survey programme. The back of the tag has been annotated to show the exact location of the leaks

Reporting

As stated in CAR_NRW0044701, the site EPR permit does not specify a minimum limit below which the operator is not required to notify NRW of releases to atmosphere.

Such releases, of any scale, may be in breach of permit conditions 3.1.1 and 3.2.1 relating to emissions of substances not controlled by emission limits. Permit condition 4.3.1 also requires the operator to report to NRW "an incident or accident which significantly affects or may significantly affect the environment".

It was agreed that the inclusion of NRW in reports issued to the Health and Safety Executive under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) would be an appropriate threshold and means of notification.

For the release of gases in the open air, the RIDDOR threshold is 500 kg or more of a flammable gas. This is agreed to be appropriate for most site arising gases such as the VOCs covered by LDAR, but other gases e.g. hydrogen sulphide and hydrogen fluoride, will require a lower threshold for notification to NRW.

As outlined above, the LDAR database is also available for review and is used to collate annual fugitive emissions figures.

Pipework and Valves

Although outside the scope of Leak Detection and Repair, the wider systems and processes around inspection of pipework and valves were also examined.

Procedure *PP-EIS-INS-0021 Pipework Examination and Intervals* describes the inspection process and how risk-based categorisation determines inspection intervals for pipework at the site.

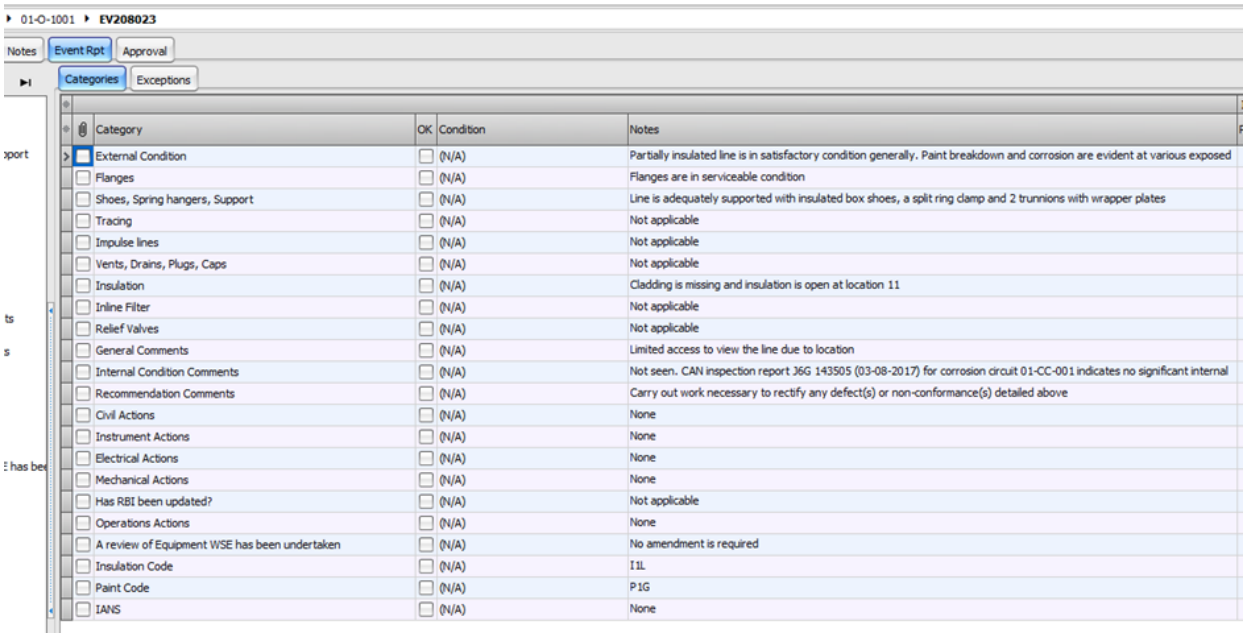
Within the scope of LDAR, pipework containing the most volatile hydrocarbons (LPG, propane etc) are included in the highest risk category and subject to the most frequent inspection cycles of 5 years for both visual examination and ultrasonic thickness measurement, in line with API 570 Standard. Lines where a loss of containment would pollute a sensitive receptor (e.g. jetty) are also specified as subject to the most frequent 5-year inspections.

The site Plant Corrosion Management Software (PCMS) is the database for this information, holding all inspection and repair information. Within PCMS, pipework is allocated to corrosion circuits, grouped by common failure mode into sub-systems for inspection. This is usually based on pipe contents or location, for example pipes carrying corrosive chemicals such as acids are more likely to corrode from the inside out than pipes carrying more benign liquids that are exposed to externally corrosive environments, such as those found at the jetty.

Inspections are carried out against the standard checklist from Valero Job Aid *PP-EIS-JBA-0004 Piping Examination Checklist.* An example inspection report (Event No. EV208023) for an atmospheric residuum line was reviewed.

On completion of the inspection, the annotated P&I drawings of the equipment inspected are scanned and stored. The Chief Inspection Engineer or a deputy signs off on the report

and the inspection schedule is reset for the 5-year cycle.



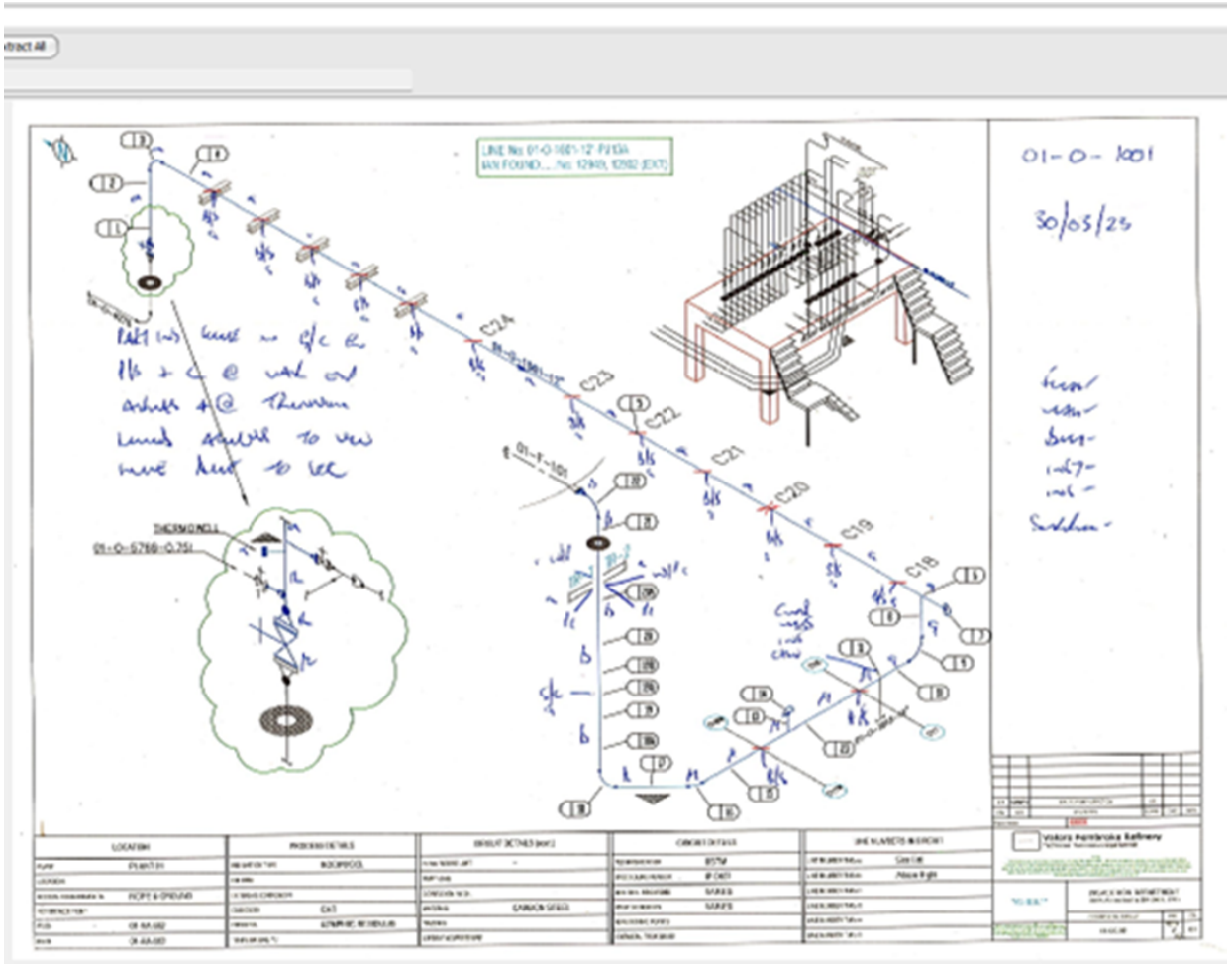
01-O-1001 ▸ EV208023

Notes | Event Rpt | Approval

Categories | Exceptions

Category	OK	Condition	Notes
External Condition		(N/A)	Partially insulated line is in satisfactory condition generally. Paint breakdown and corrosion are evident at various exposed
Flanges		(N/A)	Flanges are in serviceable condition
Shoes, Spring hangers, Support		(N/A)	Line is adequately supported with insulated box shoes, a split ring clamp and 2 trunnions with wrapper plates
Tracing		(N/A)	Not applicable
Impulse lines		(N/A)	Not applicable
Vents, Drains, Plugs, Caps		(N/A)	Not applicable
Insulation		(N/A)	Cladding is missing and insulation is open at location 11
Inline Filter		(N/A)	Not applicable
Relief Valves		(N/A)	Not applicable
General Comments		(N/A)	Limited access to view the line due to location
Internal Condition Comments		(N/A)	Not seen. CAN inspection report J6G 143505 (03-08-2017) for corrosion circuit 01-CC-001 indicates no significant internal
Recommendation Comments		(N/A)	Carry out work necessary to rectify any defect(s) or non-conformance(s) detailed above
Civil Actions		(N/A)	None
Instrument Actions		(N/A)	None
Electrical Actions		(N/A)	None
Mechanical Actions		(N/A)	None
Has RBI been updated?		(N/A)	Not applicable
Operations Actions		(N/A)	None
A review of Equipment WSE has been undertaken		(N/A)	No amendment is required
Insulation Code		(N/A)	I1L
Paint Code		(N/A)	P1G
IANS		(N/A)	None

Example event report checklist following an inspection



Annotated P&I drawings retained in inspection database

Information relating to the site Pressure Safety Valves (PSV) is stored in a separate Valve Asset Management (VAM) Database. Among other information, this records the location, set pressures, date of last inspection, date of last overhaul, and criticality rating which is based on the inherent risk from the fluid within and the unit the PSV is attached to.

When a PSV is due for an overhaul it is sent to an off-site local contractor. Pre-service tests are carried out to test the function of the valve, and repeated after the overhaul is completed. An example of a condensate valve was presented, showing the leak test was failed pre-service and passed after the service was completed.

The engineers working on the VAM are also API accredited.

Conclusion

Natural Resources Wales, working with other UK regulators and industry groups, is in the process of developing a set of regulatory expectations for LDAR programmes at EPR sites. Below is the current list of priority areas, including a commentary on how the operator has been assessed against them.

- LDAR work is delivered through the regulated site's Management system.

  This is managed at Valero through the site management system CTEMS, which is externally verified to ISO14001.

- LDAR work is carried out to a recognised standard such as BS EN 17628 and BS EN 15446.

  Valero apply the API standards and the Inspection Department is also accredited by UKAS. The principles of the British Standards should be reviewed and considered for inclusion by the operator in procedures as a reference document.

- When accreditation schemes are available for LDAR work, we expect staff and companies to have attained those accreditations to carry out LDAR work on regulated sites and activities.

  The Inspection Department undertaking the LDAR surveys are accredited by UKAS. There are currently no specific accreditation schemes available for LDAR but the operator should keep this under review for future learning and development opportunities. Currently, a bespoke e-learning module is available for all Operations & Maintenance staff at the site.

- LDAR work is carried out at a set frequency that is depending on the complexity of the site.

  The LDAR survey is undertaken sitewide annually.

- Each and every potential source of leakage is identified and monitored for the releases that are within the scope of LDAR scheme.

  The scope of survey coverage at refinery is appropriate and covers the relevant

sources of leaks.

- Any leaks detected are compared to a threshold and/or criteria above which a repair is needed.

  The operator uses a matrix of leak concentration for categorisation and prioritising repairs.

- LDAR related repairs are planned, programmed and delivered using the site management's existing maintenance system and the associated maintenance prioritisation scheme

- Where is leak is found and repaired, a second LDAR test should be carried out to confirm the effectiveness of any repair.

- A log is kept of LDAR repairs – this can be using the site's own and/or existing maintenance recording systems.

  The operator now maintains a centralised database of leaks found during LDAR surveys. This is managed by the Environmental Engineering Team and the survey outcomes are shared with relevant works areas at the refinery to get repairs scheduled. Resurveys are carried out following a repair and only in the event of a confirmed, resurveyed repair is the leak tag removed.

- A period 5-year review of the LDAR scheme is carried out – this can be aligned to the periodic review timetable and review frequency of the site's management system.

  The site Leak Detection and Repair plan is subject to annual review, which is tracked by the site document control system, and subject to internal and external audit.

- Chronic VOC releases do not need to be notified to NRW using the notification conditions in your permit. Sudden, unintended (unplanned), uncontrolled VOC releases more than 500kg should be notified to NRW using these conditions.

  Reporting to NRW of VOC releases that are also subject to RIDDOR has been agreed.

- Fugitive VOC releases should be quantified, and the total fugitive VOCs found from the LDAR surveys should be reported along with any notified VOC releases every year as part of the notified VOC release in site's annual PRTR return.

  The operator routinely quantifies fugitive VOC releases. Leaks detected with OGI are assessed with PID for the purpose of risk categorisation, quantification and reporting.

The operator has met or exceeded these expectations. The LDAR programme at the site is a mature process, integrated into both the environmental and inspection management regimes. As demonstrated by the recent addition of the LDAR database, the programme is continually developing.

A final expectation from the list of NRW priority areas is that where LDAR related standards

or accreditation schemes or regulations, change or are introduced, we expect those new standards, accreditations and/or regulations to be used within a reasonable time for their publication. Similarly, if new BAT conclusions become applicable, we expect these requirements to be met on those sites where they are is applicable within 4 years of their publication. Given the place of the LDAR procedures in the management system and accompanying review cycles, this should be achievable for the operator.

If you have any queries about this report, or to discuss completion of any actions, please contact the NRW Officer named above.

Important information

Legal status of this report

Your permit is issued to you under the Environmental Permitting Regulations. You have a responsibility to comply with the conditions of your permit and prevent pollution/harm of the environment. You must also ensure that you comply with any other relevant legislation that may apply to your site's operations.

This report explains the findings of our assessment and any action you are required to take. We categorise non-compliance using our guidance for assessing non-compliance at regulated sites.

When we find potential non-compliance/s we will normally give you advice on how to maintain compliance.

To correct non-compliance, we may:

- require you to take specific actions
- issue a notice
- review the conditions of your permit.

Any advice and guidance we give will be without prejudice to any other enforcement response that we consider may be required.

Assessment results and non-compliance categories (used in section 1):

Assessment result	Description
Assessed (A)	Assessed or assessed in part, no evidence of non-compliance found
Action only (X)	Action only relating to the activity assessment
Ongoing (O)	Ongoing non-compliance, not scored

Non-compliance category	Description	Score
C1 Major	Potential to have a major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	60
C2 Significant	Potential to have a significant impact or effect on the environment, people and/or property	31
C3 Minor	Potential to have a minor or minimal impact or effect on the environment, people and/or property	4
C4 No environmental impact	Non-compliance at a regulated site that cannot foreseeably have any impact on the environment, people and/or property	0.1

How we use assessment scores

The number and severity of non-compliances recorded in a year will affect your annual subsistence fee the following year. A non-compliance factor is added to your site's Operator

Performance Risk Appraisal (OPRA) score when we calculate your fee to reflect the additional resource we use to assess permit compliance.

If your assessment result in Section 1 is suspended, what does this mean?
In line with our guidance, we may suspend scores for up to six months to allow time for remedial action to be taken. Suspended scores will be re-instated if the action is not completed.

Full list of Industry compliance criteria (used in section 1 and 2):

1. Management
- IR1A – General management
- IR1B – Finance (only applicable to Landfill)
- IR1C – Energy efficiency
- IR1D - Efficient use of raw materials
- IR1E - Avoidance, recovery and disposal of wastes produced by the activities
- IR1F - Multiple operator installations

2. Operations
- IR2A – Permitted activities
- IR2B – The site
- IR2C – Operating techniques
- IR2D – Technical requirements
- IR2E – Improvement programme
- IR2F – Pre-operational conditions
- IR2G – Landfill engineering (only applicable to Landfill)
- IR2H – Waste acceptance (only applicable to Landfill)
- IR2I – Leachate levels (only applicable to Landfill)
- IR2J – Closure and aftercare (only applicable to Landfill)
- IR2K – Landfill gas management (only applicable to Landfill)

3. Emission and Monitoring
- IR3A – Emissions to water, air or land
- IR3B – Emissions of substances not controlled by emission limits
- IR3C – Odour
- IR3D – Noise and vibration
- IR3E – Monitoring
- IR3F – Pests
- IR3G – Air quality management plans
- IR3H – Monitoring for the purposes of the Industrial Emissions Directive (this heading includes Large Combustion Plants)
- IR3I – Fire

4. Information
- IR4A – Records
- IR4B – Reporting
- IR4C – Notification

Enforcement response
Any non-compliance with a permit condition is an offence and we may take legal action against you. Action we take can include prosecution, serving a notice on you and/or

suspension or revocation of your permit. See our Enforcement and Sanctions Guidance for further information.

Data protection notice

You should make sure that anyone named in this report knows that the information it contains will be processed by Natural Resources Wales to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s).

We may also use and/or disclose the report in connection with:

- offering or providing you with our literature or services relating to environmental matters
- consulting with the public, public bodies and other organisations (e.g. Health and Safety Executive, local authorities) on environmental issues
- carrying out statistical analysis, research and development on environmental issues
- providing public register information to enquirers
- investigating possible breaches of environmental law
- assessing customer service satisfaction and improving our service
- Freedom of Information Act or Environmental Information Regulations requests.

We may also pass it on to our agents or representatives to do these things on our behalf.

Disclosure of information – this report will be available to view on-line

If you think this report contains commercially confidential information that should not be placed on our public register, you must contact your local Natural Resources Wales office within **fifteen working days** of receiving this report, using the contact details in the accompanying email or letter. You must give a full explanation of why it should not be added to our public register, including specifying which information is commercially confidential. We will assess your request and respond to you within twenty working days to let you know if we agree to your request.

What do I do if I disagree with the report or have a complaint?

If you disagree with this compliance assessment report, you should contact the lead officer without delay to discuss your concerns.

If you are unable to resolve the issue with the lead officer or their line manager you should contact our Customer Contact team on 0300 065 3000 (Monday to Friday 08:00 to 18:00), or email enquiries@naturalresourceswales.gov.uk for details of how to raise your dispute further through our Complaints and Commendations procedure.

If you are dissatisfied with our response, you can contact the Public Services Ombudsman for Wales by phone on 0300 7900203 or by email at ask@ombudsman.wales

Welsh Language Standards

We are committed to establishing Natural Resources Wales as a naturally bilingual organisation. We will provide compliance reports in your preferred language.