

Compliance Assessment Report

Report ID:
CAR_NRW0033396

This form will report compliance with your permit as determined by an NRW officer

Site	Llanelli Plant	Permit Ref	BV4223IE			
Operator/Permit holder	Huntsman Corporation UK Ltd					
Regime	Installations					
Date of assessment	30/04/2018	Time in	10:00	Out	13:30	
Assessment type	Audit					
Parts of the permit assessed	See Below					
Lead officer's name	Dunn, Karen					
Accompanied by						
Recipient's name/position	Grant Wood/ EHS Manager	Date issued	03/07/2018			

Section 1 – Compliance Assessment Summary

This is based on the requirements of the permit under the Environmental Permitting Regulations or the licence under the Water Resources Act 1991 as amended by the Water Act 2003. A detailed explanation is captured in "Compliance Assessment Report Detail" (Section 2) and any actions you may need to take are given in the "Action(s)" (section 4). This summary details where we believe any non-compliance with the permit has occurred, the relevant condition and how the non-compliance has been categorised using our Compliance Classification Scheme (CCS). CCS Scores can be consolidated or suspended where appropriate, to reflect the impact of some non-compliances more accurately. For more details of our CCS scheme, contact your local office.

Permit conditions and compliance summary	CCS Category	Condition(s) breached
A1 - Specified by permit	A	
B4 - Infrastructure - Containment of stored materials	A	
E3 - Emissions - Surface water	A	
G1 - Monitoring and Records, Maintenance and Reporting - Monitoring of emissions and environment	A	
G4 - Monitoring and Records, Maintenance and Reporting - Reporting and notification to Natural Resources Wales	A	
H1 - Resource Efficiency - Efficient use of raw materials	A	
H2 - Resource Efficiency - Energy efficiency	A	

KEY: See Section 5 for breach categories, suspended scores will be indicated as such.

A = Assessed or assessed in part (no evidence of non-compliance), **X** = Action only,

O = Ongoing non-compliance, not scored.

Number of breaches recorded	0	Total compliance score (see section 5 for scoring scheme)	0
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If the Number of breaches recorded is greater than zero, please see Section 3 for our proposed enforcement response

Section 2 – Compliance Assessment Report Detail

This section contains a report of our findings and will usually include information on:

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| ➤ The part(s) of the permit that were assessed (eg. Maintenance, training, combustion plant, etc) | ➤ Information on the compliance score accrued inc. |
| ➤ Where the type of assessment was 'Data Review' details of the report/results triggering the assessment | ➤ Details of advice given |
| ➤ Any non-compliances identified | ➤ Any other areas of concern |
| ➤ Any non-compliances with directly applicable legislation | ➤ Any actions requested |
| ➤ Details of any multiple non-compliances | ➤ Any examples of good practice |
| | ➤ A reference to photos taken |

This was a pre-arranged visit and the company representative present was:

Grant Wood – Environment and Health and Safety Manager

- Reed bed construction and routine or programmed maintenance;
- Reporting Condition 4.2
- Efficient use of raw materials condition 1.3
- Proposed variation / (process configuration)
- AOB – proposed new substance, site visit including the reed bed system

Introduction and Overview

This was a routine NRW site visit of the Huntsman Corporation UK Ltd Bynea, Llanelli plant. The main objective was to review the reed bed construction and its programmed maintenance with the operator. The main aim of the NRW chemical sector group is to audit all effluent treatment plants (ETP) on chemical sites as part of the sector plan. This visit therefore took a broad approach in the absence of an ETP by examining the weak effluent treatment by means of the reed bed system located within the sites installation boundary. The visit began with a discussion on current business at the plant where steps are being taken in line with the corporate strategy, due to a changing worldwide market. Such steps have included the consideration of a new product on site and a new distillation column. An update on current matters concerning the NRW chemical sector group was discussed and summarised below:

Update on NRW Chemical Sector:

Following the publication of the revised Best Available Techniques (BAT) Reference document (BREF) for the 'Production of Large Volume Organic Chemicals' (LVOC) in December 2017. Those installations that are impacted will now be subject to an environmental permit review. The primary BREF for the Huntsman Llanelli plant is the Manufacture of Organic Fine Chemicals (OFC) (yet to be revised). Other BREFs which are complementary to the primary chemical sector include the Common Waste Water / Waste Gas Treatment / Management System in the chemical sector (CWW) and the Common Waste Gas Treatment in the Chemical Sector (WGC) (yet to be compiled).

Also, during the site overview KD enquired over any issues experienced on site due to the unseasonably cold snap that occurred across the UK in March 2018. This exceptional cold weather presented problems to several operators across a range of sectors. The operator advised that some of the plastic nozzles on the reed bed distribution system froze and a couple shattered, these have since been replaced. Other than the usual winter considerations no abnormal matters arose because of the freezing conditions.

Objective 1. To examine the reed bed construction and routine or programmed maintenance.

The reed bed at the plant treats the weak effluent generated by the process and is a vertical flow soil-based reed bed. The operator advised that the reed bed system sits on an ancient river bed

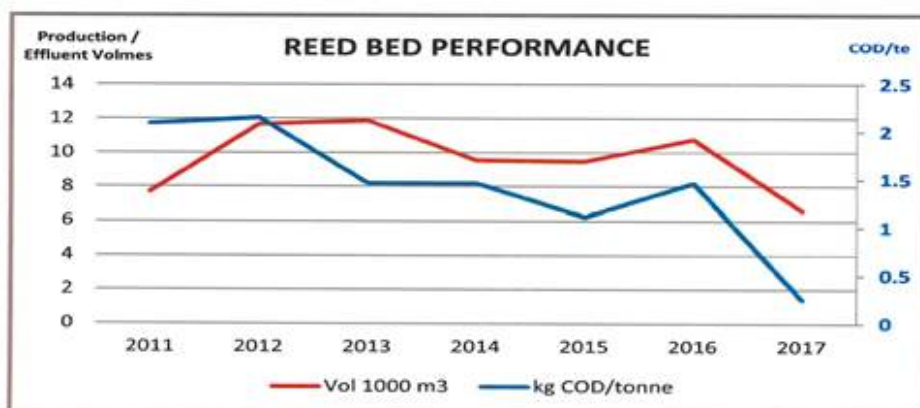
made up of glacial moraine therefore taking advantage of the original clay deposit which forms a natural liner. The reed bed was built in 1995 by consulting engineers Duntech with the supervision of Huntsman. Advice and guidance was provided by Duntech following construction and has since been sought and given on an ad hoc basis. The bed system contains the common reed 'Phragmites australis' which is the genus of four species of the large perennial grass that can be found in wetlands of both temperate and tropical climates.

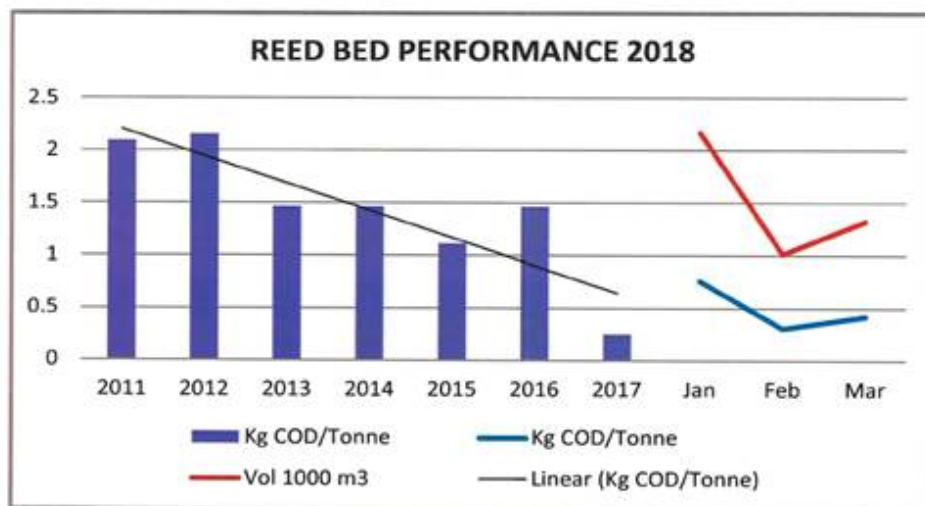
Routine maintenance of the reed beds consists of a visual inspection and any issues noted entered on the sites MAXIMO system and scheduled. The operator confirmed that the site was still working to the 'Maintenance Check List' form LPM 29 which has been reviewed by KD in a previous NRW visit. Maintenance also consists of herbicide spraying once or twice a year dependant on vegetation / weed growth within the system. The herbicide application took place last year in the third week of March and 1 April. Fertiliser was also applied in July 2017 to help with the reed bed growth and their ability to treat the weak effluent. The operator uses an external landscape contractor for this work.

The operator explained however that since the last NRW visit more weak effluent has been sent for incineration. This is tied into the project to install TOC meters in the effluent sumps for better overall management of the weak and strong effluent waste streams. The operator advised that the weak effluent system functions more effectively when the volume of effluent builds up in tank T50 (weak effluent tank) as this allows for better distribution at the reed beds (tank T50 is an open top tank which allows for rain water dilution). This in turn impacts on the efficient use of the pump which feeds the reed bed system. The pressure pump is operated less on an intermittent basis than continuously for a lower volume of effluent making it more efficient. There is an argument that the incineration of the weak effluent is less energy efficient with greater emissions to the environment. This again is tied into the TOC project which has been discussed later in this report.

A question was raised on how the operator ensures that the correct conditions are maintained, to establish attached growth of the nitrifying bacteria for successful removal of Chemical Oxygen Demand (COD) per tonne of effluent. The operator demonstrated the internal tracking of the performance of the reed bed which is good practice to ensure that the beds are treating the weak effluent effectively and to remain within permit compliance. It is recognised that the reed beds were never constructed for removal of ammoniacal nitrogen however there have been no permit breaches in respect of this parameter for a couple of years.

The graphs below reflect the change in the weak and strong effluent treatment particularly over the last year where the operator has sent less weak effluent to the reed bed. The operator advised that COD removal targets were being met and in 2016 improvements were made to the reed beds which included the replacement of the feed lines and the nozzles for better distribution. These changes were evident during the on-site visit.





NB/ The production line has been removed from the graph due to commercial sensitivities.

Objective 2. To review permit condition 1.3 'Efficient use of Raw Materials'

1.3 Efficient use of raw materials

1.3.1 The operator shall:

- take appropriate measures to ensure that raw materials and water are used efficiently in the activities;
- maintain records of raw materials and water used in the activities;
- review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and
- take any further appropriate measures identified by a review.

The operator explained that the process is fixed by the chemistry. Raw material use is therefore directly linked to raw material consumption rates and in turn budgets which are trended for internal efficiencies. The operator demonstrated this to NRW by way of tracked raw material consumption rates. This information is commercially sensitive, so this tracked data has not been shown on this CAR form.

KD requested a copy of the review required in respect of permit condition 1.3.1 (c) which the operator was able to demonstrate and provide during the visit. The 4-year review was undertaken in April 2018 and entitled 'Raw Materials Usage Review' and covers the individual units from 2015 to 2017. The 2018 review has been signed by the EHS Manager, Operations manager and Technical Manager and concludes that the process continues to operate in an efficient manner and raw material usage remains on budget. Actions arose from the review which include monthly meetings and to establish quantity of N-methyl morpholine (NMMO) routed to the strong effluent each month and if it is possible to recycle this material for further treatment.

Water usage savings have been made through plant upgrades which have included a de-aerator on the boiler feed. Air in the feeder water can lead to cavitation and needs to be knocked out of the system as a prevention. In July 2017 the boiler feed was improved which has seen a reduction in water consumption through reduced 'blow down'. The operator was able to demonstrate this on site through trended water usage figures and the provision of the 'Llanelli Plant Energy and Water Reduction Programmes' in line with environmental permit condition 1.2.1 (b). The operator explained they have most recently had an issue involving the DCWW pressure to the site. As the water undertaker has made improvements to the mains they have altered the water pressure to

prevent bursts in the older pipework. The operator was in discussion with DCWW at the time of the visit regarding this pressure issue.

The operator has also carried out more 'flying switches' since the last visit. A 'flying switch' is when the operator switches raw material depending on the product produced rather than having a shut and clean down leading to greater effluent production, water and energy usage and emissions. This may result in being 'off spec' for approximately half a day however when the process is stable anything produced 'off spec' or a 'work in process' (WIP) can be fed back through the process avoiding 'start up' and 'shut down' time. The operator explained that the efficient use of raw materials is closely reviewed and managed on site. Ian Roberts – Process Energy and Water and Nigel Evans as Operations Manager who carefully oversees raw material usage. Grant Wood as EHS Manager considers everything in respect of emissions and environmental permissions.

TOC Meter Project

In a previous visit NRW reviewed both the weak and strong effluent streams, and tank washings particularly the internal percentage threshold (<1% organic content) for the diversion of washings to the weak effluent. An NRW action was placed on the operator to investigate this element of site operations. For better environmental control of the effluent streams for treatment the operator identified a site improvement by means of installing Total Organic Carbon (TOC) meters in the effluent sumps. This was considered an environmental improvement for better management and control of effluent and the project has progressed. Several health and safety matters had to be considered (ATEX) in the proposed installation of the TOC meters including type and their suitability for use in the sumps. Process safety is paramount on site and this has been carefully considered during this project. An update was provided during this visit whereby the cabling and civil engineering has started and the plates and plinths for the meters are now in place. Once fully installed the automated TOC meters will allow for less operative sampling and provide a clear picture of any spikes in the effluent which can be trended and compared to the process tracker. NRW looks forward to the results of this project and it is proposed that this area of work will be revisited during a future visit.

Reporting 4.2

- 4.2.2 report or reports on the performance of the activities over the previous year shall be submitted to the Environment Agency by 31 January (or other date agreed in writing by the Environment Agency) each year. The report(s) shall include as a minimum:
- (a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;
 - (b) the annual production /treatment data set out in schedule 4 table S4.2; and
 - (c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.4 of that schedule.
 - (d) the functioning and monitoring of the incineration plant in a format agreed with the Environment Agency. The report shall, as a minimum requirement (as required by Article 12(2) of the Waste Incineration Directive) give an account of the running of the process and the emissions into air and water compared with the emission standards in the WID.

KD enquired over the interpretive report required in respect of permit condition 4.2.2. It is acknowledged that it requires updating from the use of EA to NRW but is a standard permit condition in the current format which was added during a variation for the inclusion of the thermal oxidiser. The operator provided an annual report for the thermal oxidiser which has been assessed and found to be compliant with the terms and conditions of the permit. The operator was able to demonstrate that advice provided by the inspector at the time of the inclusion of the condition considered that the interpretative report was limited to the thermal oxidiser. KD highlighted during this visit that it is also related to the wider site monitoring requirements in the permit (a) 'a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data'.

Action: Operator to review the reporting conditions under permit condition '4.2 Reporting' and from 31 January 2019 enhance the thermal oxidiser annual report to an annual performance report, inclusive of the wider site reporting requirements.

Proposed Variation / Process Configuration

In February 2018 the operator sought advice over the need for a permit variation for the replacement of an existing distillation column with KD. The emailed proposal was forwarded to NRW permitting for consideration and it was advised that the change could be agreed by exchange of correspondence as there was no emissions to air land and water outside of the currently agreed parameters of the environmental permit.

The increasing global demand for Diglycolamine® (DGA) and decrease in Morpholine has meant that the operator wishes to re-configure by way of a new distillation column. Column F120 is no longer 'fit for purpose' and a new one will provide better metallurgy and improvements to the process. During the on-site tour KD was able to see the proposed location of the new column. GW explained how planning permission was required from an amenity perspective as the top of the column would be visible from the Loughour Bridge. Since the visit NRW as statutory consultees were asked to comment on the planning consultation it was therefore beneficial to have discussed this proposed change during this visit. The old column will remain in place and there will be no process emissions from the replacement column except for the statutory pressure relief valve.

It is proposed that the DGA is produced at the plant in preference of other products. It is anticipated that the new column will increase the production of amines, provide operational flexibility and reduce the energy footprint for this product. The power consumption of the plant would not change from the currently modelled maximum and the main boiler will continue with its current rating. The site thermal oxidiser will also remain unchanged from the worst-case scenario modelled in 2011 with the throughput capped at 2.3 tonnes per hour. The operator also informs NRW that the DGA production will be managed by cutting back energy available from the Morpholine or Jeffamine production. Management techniques, control, instrumentation, installation boundary, waste and effluent treatment also remain unchanged. KD advised that in respect of any impact on the site COMAH tier this will need to be discussed with the competent authority (CA) however GW advised that the COMAH calculation has been considered as part of the management of change and it is expected that there would be no change to the current classification under the regulations. (KD forwarded e-mail regarding the proposal to Gary Evans (GE) the NRW COMAH officer for the installation). It is also expected that this plant improvement will realise less energy per tonne of refined DGA and the site will produce less water / tonne as there will be fewer tank transfers.

Proposed New Substance

A discussion was also had in respect of a proposed new substance for use on site. In brief the proposed project is currently at the scoping / costing stage and the operator wished to raise it with NRW at this early stage in case of any issues or if a permit variation is required which needed to be costed. It maybe that the proposal isn't feasible following this scoping exercise as it is market dependant will involve the storage of 20 to 30 tonnes of a new substance namely Dimethylamine Anhydrous (DMA).

DMA is highly flammable and a gas under pressure, GW provided the safety sheets to KD on site. DMA is currently used at another one of the operator's chemical plants in Europe and the is exploring the transfer of DMA to the Bynea Llanelli plant. The proposed storage volumes of the have been considered by the operator by review of their COMAH calculation. The operator considers that it will not to take them over the threshold however the substance is highly

flammable and falls under the regulations. Again, KD advised that this would be a matter for the COMAH competent authority and would inform GE.

If this project is feasible it would involve containment by means of a 'curbed tank' (as it is a gas under pressure not a liquid) within the current installation boundary. In the use of the DMA there would be no increase required to the current permitted limits i.e. no additional effluent etc.

Following the visit KD emailed GE and permitting for awareness. Permitting advised if there were no emissions to air land and water as a result and there was no change required to the currently agreed parameters again this change can be made through exchange of correspondence.

Site tour

A site tour was carried out which included the areas explored during this visit. The reed beds were visited first as a camera was used and due to site safety, a safe route of access around the plant was taken. The following photographs were taken showing the reed coverage and the improvements made to the system including the nozzles for better distribution and feed lines along with buried cabling and controls that use to flood.



Some of the redundant pipework and controls at floor level were pointed out by the operator as they use to flood but was also highlighted from a health and safety matter on site as they are a trip hazard. The photograph below left shows the operator pointing out the new lines for improved distribution of the weak effluent. The redundant line and controls can be seen at foot level. The photograph below middle shows the improved controls and upgraded aeration system within the reed bed lagoon which was in operation at the time of the visit.

There were some samplings in the reed beds which appeared to have taken hold, the photograph above right shows the largest sampling noted on inspection. The operator stated that the removal of the samplings will be actioned. It was noted that some areas at the far end of the site appeared to show grass and weed growth and there also appeared to be a plastic liner which was thought to be a drain.



Action: Operator to clarify the presence of the liner in the reed bed at the far end of the site and to remove the samplings, grass and weeds noted on the day as part of the routine reed bed maintenance.

Following the visit to the reed beds the camera was returned to the site office and a visit was undertaken of the plant and the proposed location of the new distillation column. The tour extended from the new distillation column location to the ammonia bullet past the control room to the larger of the cooling towers. There were some IBC's of sodium hypochlorite used in the cooling tower which appeared to have been a recent delivery. A question was raised over the storage of the IBC's in this location. New decanting and integrated containment systems for treatment chemicals were in the process of being changed, for the new tower which had resulted in the IBC's present in the location raised. This area is of hardstanding and would if a spillage occurred be contained within the effluent system. Following the visit, the operator telephoned KD to inform that this was the area identified for the storage of the IBC's and confirmed that it is a sealed drainage area.

On site environmental initiatives have also taken place at the site offices in response to the global 'one use' plastic issue. Plastic cups have been removed from the water dispensers and bottles also celebrating 50 years of the Llanelli plant have been issued to staff. This is a clear demonstration of the operator acting in an environmentally conscious way in all aspects of the site.

Conclusion

This visit mainly took a broad approach with a more in depth look at efficient use of raw materials, water, energy use and reporting. The operator continues to make improvements on site and has had to consider the reconfiguration of the process to remain competitive in a changing global market. With the capital investments already made on site energy and water savings have been realised which NRW welcomes. There were no non-compliances identified as part of this visit and NRW looks forward to the results from the TOC project once complete for better management of site effluent.

[End]

EPR Compliance Assessment Report

**Report ID:
CAR_NRW0033396**

This form will report compliance with your permit as determined by an NRW officer

Site	Llanelli Plant	Permit Ref	BV4223IE
Operator/Permit holder	Huntsman Corporation UK Ltd	Date	30/04/2018

Section 3 – Enforcement Response

You must take immediate action to rectify any non-compliance and prevent repetition. Non-compliance with your permit conditions constitutes an offence and can result in criminal prosecutions and/or suspension or revocation of a permit. Please read the detailed assessment in Section 2 and the steps you need to take in Section 4 below.

Section 4 – Action(s)

This section summarises the actions identified during the assessment along with the timescales for when they will need to be completed.

Criteria Ref.	CCS Category	Action required/advised	Due Date
See Section 1 above			

Section 5 – Compliance notes for the Operator

To ensure you correct actual or potential non-compliance we may

- Advise on corrective actions verbally or in writing
- Require you to take specific actions verbally or in writing
- Issue a notice
- Require you to review your procedures or management system
- Change some of the conditions of your permit
- Decide to undertake a full review of your permit

Any breach of a permit condition is an offence and we may take legal action against you

- We will normally provide advice and guidance to assist you to come back into compliance either after an offence is committed or where we consider that an offence is likely to be committed. This is without prejudice to any other enforcement response that we consider may be required.
- Enforcement action can include the issue of a formal caution, prosecution, the service of a notice and/or suspension or revocation of the permit.

See our Enforcement and Civil Sanctions guidance for further information

This report does not relieve the site operator of the responsibility to

- Ensure you comply with the conditions of the permit at all times and prevent pollution of the environment
- Ensure you comply with other legislative provisions which may apply

Non-compliance scores and categories

CCS category	Description	Score
C1	A non-compliance that could have a major environmental effect	60
C2	A non-compliance which could have a significant environmental effect	31
C3	A non-compliance which could have a minor environmental effect	4
C4	A non-compliance which has no potential environmental effect	0.1

Operational Risk Appraisal (Opra) - Compliance assessment findings may affect your Opra score and/or your charges. This score influences the resource we use to assess permit compliance.

Section 6 – General information

Data protection notice

The information on this form will be processed by the Natural Resources Wales (NRW) to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s). The NRW may also use and/or disclose it in connection with:

- Offering/providing you with its literature/services relating to environmental matters
- Consulting with the public, public bodies and other organisations (eg. 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 its service
- Freedom of Information Act/Environmental Regulations request

The NRW may pass it on to its agents/representatives to do these things on its behalf. You should ensure that any persons named on this form are informed of the contents of this data protection notice.

Disclosure of information

The NRW will provide a copy of this report to the public register(s). However, if you consider that any information contained in this report should not be released to the public register(s) on the grounds of commercial confidentiality, you must write to your local area office within fifteen working days of receipt of this form indicating which information it concerns and why it should not be released, giving your reasons in full.

Customer charter

What can I do if I disagree with this compliance assessment report?

If you are unable to resolve the issue with your site officer, you should firstly discuss the matter with officer's line managers using the informal appeals procedure. If you wish to raise your dispute further through our official Complaints and Commendations procedure, phone our general enquiry number 0300 065 3000 (Mon to Fri 08.00 – 18.00) and ask for the Customer Contact team or send an email to enquiries@naturalresourceswales.gov.uk. If you are still dissatisfied you can make a complaint to the Public Services Ombudsman for Wales. For advice on how to complain to the Ombudsman phone their helpline on 0845 607 0987.

Welsh Language

If you would like this form in Welsh please contact your Regulatory Officer.