PO18 0HL, IGAS Energy Enterprise Limited,
EPR/CB3191DR/A001: environmental permit consultation

Weald Action Group Comments:
WAG OBJECTS to this APPLICATION FOR A ENVIRONMENTAL PERMIT

Firstly, there is a lack of information provided with this application.
Secondly, the associated experience to date has not been described.
Thirdly, the risks and potential harms have not been outlined.

Introduction

There is a lack of a joined up approach to monitoring and regulation, permitting and guidance regarding contaminated flowback and produced fluids generated in conventional/unconventional oil sites in the Southeast of England.

Part of the trouble is the erroneous and inconsistent definition of the terms used such as conventional/unconventional as well as a lack of clarity in regulatory guidance when defining it for advanced well stimulation technologies in the UK onshore oil and gas sector. Due to the inconsistent terminologies, the wastewater from these operations may be inadequately defined and categorised, risk analysis flawed thus impeding proper mitigation efforts.

This ambiguity also gives regulators broad discretion to determine when restrictions and additional requirements are imposed without reference to clear parameters. This in turn, creates loopholes, leaving our environment and communities at risk.[1]

What guarantees does the EA have that the wastewater from IGAS operations will not include flowback? We recommend that the EA apply the guidance for unconventional reserves/HF to Singleton to mitigate risks for fluid reinjection:

[1] Acid Stimulation: Fracking by Stealth

“The EA will not allow you to re-inject flowback fluid into any geological formation for disposal, whatever its NORM concentration is (EA RPS 392, May 2-17)

The core aspect of Groundwater protection as stated in EA guidelines for planners and developers is the risk-based approach. The aim is to avoid potentially polluting activities being located in the most sensitive locations for groundwater.The site for the proposed permit sits within the most important groundwater reservoir in the UK which has been designated by the Environment Agency as a “Principal Aquifer”, one of only 11 such sites in the UK. It is also within an Aquifer “Source Protection Zone” .

IGAS has not provided proper assessments and adequate information regarding mitigation.

Composition of Flowback

The potential permitting of injection for flowback fluids is particularly concerning as there is a complete lack of research on the composition of the waste water and potential chemical reactions in the subsurface.

As with flowback from shale fracking, the fluids returning from an ‘acid job’ will contain not only chemicals and reaction products of chemicals injected in the treatment fluid but also substances released from the formation drilled in to include: brine, salts of heavy metals, radioactive materials which can be mobilized from the formation, by chemicals in the injection fluid. These flowback fluids are likely to contain additional pollutants and pose additional impacts, especially in the acidizing context.[2]

Quantifying the risk from discharging these fluids is not possible without this information which is not included in the application.

Reinjection wells and earthquakes

The fractured carbonate geology at Singleton is particularly ill suited to subsurface disposal of waste.

Underground wastewater injection can raise pressure on the fault lines, reducing the faults natural friction and can trigger earthquakes. There is concern that seismic activity will impact well integrity and may result in polluting our groundwater.

Before permitting fluid injection, there should be proper assessment of the local stress fields by a structural geologist such as that carried out for the OGA/ BGS workshop into the Newdigate Swarm in Surrey which showed the faults were critically stressed even before the

[2] Acidising

earthquakes started :
https://www.ogauthority.co.uk/media/5152/2-bgs-andy-chadwick-uk_stress.pdf

The late Professor Bruce Sellwood, expert on the Great Oolite of the Weald, said: "Meteoric drive down an aquifer will not necessarily reach deeper parts of the basin, but will trigger pore-fluid movement at depth." [Sellwood et al. 1987]. The implications of this statement are major.

If low pressure, meteoric drive can trigger pore fluid movement at depth (Selwood), what are pressured injected fluids likely to do in a faulted zone such as the Weald?

Wastewater disposal has been proven to be the primary cause of the recent increase in earthquakes in the central United States in states such as Oklahoma.

The fact that increased pore pressure at depth resulting from fluid injection can trigger slip on pre-existing, already-stressed faults is well documented (9–13), and the mechanisms by which triggered fault slip occurs are generally well known (9). Simply put, increased fluid pressure decreases the effective normal stress on a fault.* There is NO technology which can be used to foresee this. [3]

The site is in a seismic zone and is heavily faulted. Detailed seismic data is necessary to determine safety and risks.

If the wastewater from these sites were simply formation waters to be reinjected from where they came, then there would be geochemical equilibrium with the rock-forming minerals they have contacted for millennia. Additionally, the volume would be less than, or similar to, the volumes of pore space underground – as the oil and gas have been removed from the same reservoir into which re-injection occurs.[4]

IGAS is applying for a permit to re-inject waste not only from the formation at Singleton but also from sites some distance away across the Southeast and Holybourne oil storage facility. This should not be permitted due to the effect upon seismicity and the vulnerable hydrogeological catchment area around Singleton.

Well Failure

Although earthquakes associated with re-injection are usually relatively small (4 over 3.8 in US states), they can still cause minor structural damage and of particular concern is the possibility of damaging the well casings thus risking leakage. This did in fact happen after

[3] Walsh, Rall & Zoback, Mark. (2015). Oklahoma's recent earthquakes and saltwater disposal. Science Advances. 1. e1500195-e1500195. 10.1126/sciadv.1500195.

[4] https://energyandcarbon.com/uk-failing-lessons-fracking-waste-water/

the earthquake at Cuadrilla's Preese Hall site in 2011 in Lancashire, UK. The company failed to report the damage and were later rebuked by the then UK energy minister, Charles Hendry.

The oil wells are drilled through the freshwater aquifers. There are concerns about the reliability and longevity of the well casings.

Wells drilled horizontally as well as vertically have a failure rate 4 times higher than for vertical wells in the same area. (FOE/Drilling without fail/well failure, 2014).

Injection wells, into which liquids or gases are pumped, are 2-3 times more likely to leak than conventional wells.(Watson and Bachu, 2009)

Groundwater

In this area, groundwater vulnerability is classified as MAJOR and the site is in Source Protection Zone 3. Sidetrack wells may well traverse through or under Source Protection Zones 2 and 1. A recent hydrogeological report from nearby catchment studies showed that these classifications are inadequate due to the fact that they do not take into consideration the karstic nature of the chalk aquifer in the Weald.[5]

Transport:

- More precise volumes of operations are needed to re-evaluate the tanker trips/ revise transport statement, advise Hampshire CC, WSCC Highways; SDNP
- IGAS should be required to secure a bond for transport of hazardous waste.
- The vulnerability and status of the aquifer beneath Singleton and along the transport route should be reassessed

Risk Analysis/Environment

There is currently no explicit industry guidance relating to the management and/or mitigation of geomechanical risks from re-injection activities for onshore conventional oil and gas operations. As a result, there are no specific requirements for industry to collect or present data to support mitigation methods for such activities.

Analysing chemicals provides only part of the information needed to assess risk. Additional information on concentrations, synergistic interactions, exposures, and more are also needed to assess risks and environmental impacts from well stimulation treatments.

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[5] A Review of Karstic Potential and Groundwater Vulnerability of the Chalk Principal Aquifer in and around Markwells Wood, West Su

CONCLUSION:

Radioactivity in oil-and-gas waste receives little government oversight and the UK NORM Waste Strategy, DECC et al, 2014 expressed concern about the lack of treatment facilities. The consensus of the international scientific community is that there is no safe threshold for radiation. There is no chance of mitigating against Radioactivity involving Ra-226 which has a half-life of 1,600 years should it escape from the well into water supplies.

"This is not alchemy, where lead is magically turned into gold, or in the case of Marcellus shale, where radioactivity below ground, magically disappears when brought to the surface. Contaminated liquids, gases and solids will enter the accessible environment and be taken in by the public, increasing the likelihood of cancers. Radium-226 has a half-life of 1,600 years, so it will be present in the environment for thousands of years. It is also water soluble, meaning it easily travels with water via streams and rivers. One of its decay products, radon, is an inert gas, allowing it to travel with natural gas and enter homes through kitchen stoves,5and from fugitive gas emissions throughout the natural gas distribution network."[6]

There are no published studies on subsurface release mechanisms including no studies of acid wormhole pathways in the rock formation leading to aquifers, fault pathways leading to aquifers, nor on deteriorated abandoned wells leaking into the subsurface, or the failure of production or disposal wells with regard to acidisation.

IGAS has not provided enough details to show a complete understanding of the catchment. Nor has the operator shown a detailed up to date seismic study mapping the faulting in the area of the PEDL.

The proposed activity would take place in a Source Protection Zone and should have greater safeguards that would prohibit a reinjection well used for hazardous wastewater.

Please consider the following statement from Isherwood et al (2016) in their conclusions regarding overall hydrogeological risk for the Wessex and Weald Basins :

"The groundwater resources within southern and south-eastern England are already heavily abstracted, owing in part to the high population density, giving very limited scope for additional groundwater development within the region...Much of the groundwater present within the main aquifers in the Wessex and Weald area is subject to contamination, mainly from surface-derived contaminants from diffuse and point sources....The prevalence of anthropogenic pollution across the Wessex and Weald area makes much of the groundwater in the area very vulnerable to further changes in water chemistry, as it has limited tolerance

[6] Delawareriverkeeper (2015)

for mitigating further effects. With this in mind, it has been assigned a status of 'highly sensitive', relating particularly to areas underlain by the major water supply aquifers. The high dependence of much of the English population on groundwater as a supply of drinking water makes the water resource 'high value'.

The groundwater resource in Wessex and Weald is therefore considered to be at 'high' risk.[7]

The SDNP seeks to promote conservation and sustainable use, to ensure that these essential natural services are protected and enhanced now and for the future. Recognizing the importance of biodiversity in terms of resilience building is at the core of the parks strategy and allowing a site in the SDNP to be turned into a Class 2 Hazardous Waste Disposal Facility and Incineration Plant starkly conflicts with the chief aims of the SDNP.

We contend that the risks to our aquifer are underestimated by IGAS and that any risk, however small, should be avoided, given the significance of the aquifer under Singleton Forest and the importance of woodland environments within the context of the National Park.

Clean groundwater is precious, finite and essential for health, the environment and our infrastructure. Our groundwater catchment is vulnerable and it is our duty to support, conserve and protect this fragile groundwater ecosystem and to promote catchment management approaches that will ensure its purity and longevity.

This permit application should be REFUSED.

Weald Action Group
www.wealdactiongroup.org

Missing Documents:

- Non Technical Summary
- Hydrogeological Risk Assessment
- Field Development Plan
- Assessment of potential risk profile of seismic activity:
- Details of how the reservoirs will be managed, including any initial water injection plans.
- Details of the proposed water injection well locations, the well designs, the formations into which the water will be injected, and the expected rates and pressures
- Injection pressure
- Geological interpretation and reservoir description.
- Well integrity test
- Injection test

[7] Isherwood et al (2016), pgs 246-7

- Updated, high resolution GeoHazards Assessment.
- Mitigation plans for seismic activity
- Copy of plan for prevention of fires, explosions, blowouts, gas escapes.
- Record of a visit by the fire and rescue service to input their safety regime
- Emergency action plan for the site?
- Parish Councils Emergency action plan in relation to oil site

Further queries to show background knowledge and historical records of operator:
How often are facilities inspected? Please show record of inspection by HSE, EA.

Copy of FOI inspection forms.

Where is radioactive solid waste taken to be disposed of?

Do you test for radon at the well heads? The Public Health England report, 2014, on fracking pointed to this as a risk.

Can you calculate the amount of radon at the well head in relation to the radium concentration in the target formation

Tested radon in rock cuttings from the site?

Radiation survey of the material from well casings.

How many site visits by EA to the well pad in Singleton?

How many times has the wastewater been sampled and tested at the site?

Analysis of the samples tested from Holybourne oil storage facility.

Have you tested the wastewater that has been imported from outside the site and what were the levels of radioactivity?

Is there a sampling plan?

The Oolite in this area is not supposed to contain NORM. From what strata is the waste waters from other sites derived?

Copy of the drawings for the reinjection well?

What is the direct gamma radiation limit at the site?

What is the whole body dose (total effective dose equivalent) to individual members of the public from a facility (cannot exceed 100 millirem in a year (10CFR 20.1301(a)(1)

Drinking water standards:
What is the maximum contaminant limit for drinking water[8]r in a public water system for combined Ra-226 and Ra-228?

Have any of your other sites in the Southeast gone off line and have you imported waste water from these sites? List sites and amount reinjected.

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8

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