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Made at Edmonton, in the  
Province of Alberta, on

March 23, 2023

ALBERTA ENERGY REGULATOR

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**Under Sections 113 and 241 of the *Environmental Protection and Enhancement Act (EPEA)***

**Obsidian Energy Ltd.**

200 – 207 9 Avenue SW

Calgary, AB T2P 1K3

WHEREAS Obsidian Energy Ltd. (Obsidian) is the holder of well licence W0443668 issued by the Alberta Energy Regulator (AER) under the *Oil and Gas Conservation Act* at Surface Location 14-18-082-17 W5M, approximately 40 kilometres (km) SE of the Town of Peace River;

WHEREAS the well is authorized for disposal of water via injection into the Leduc formation (the Disposal Operation);

WHEREAS as reported on the Alberta Geological Survey (AGS) Earthquake Dashboard, seismic events occurred on November 29, 2022, approximately 40 km SE of the Town of Peace River, AB, including one event with local magnitude of  $M_L = 5.59$ ;

WHEREAS after the November 29, 2022, seismic events, AGS requested and received operational data from Obsidian for the Disposal Operation;

WHEREAS AGS analysis of the seismic events on November 29, 2022, and the Disposal Operation data did not show a clear correlation between the seismic events and operational changes at the Disposal Operation;

WHEREAS in December 2022, AGS set up a seismic nodal array around the epicentre of the November 29, 2022, seismic events;

WHEREAS between January 2023 and March 16, 2023, AGS analysis started to indicate there may be a connection between the Disposal Operation and seismic events in the area of the Disposal Operation;

WHEREAS as reported on the AGS Earthquake Dashboard, seismic events occurred on March 16, 2023, approximately 42 km SE of the Town of Peace River, AB, including one event with local magnitude of  $M_L = 5.09$ ;

WHEREAS on March 17, 2023, AGS received new information from the seismic nodal array and determined the seismic events that occurred approximately 40 – 42 kms SE of the Town of Peace River between November 29, 2022, and March 16, 2023, were spatially and temporally correlated to the Disposal Operation;

WHEREAS the AER concluded that the Disposal Operation induced the seismic events that occurred approximately 40 – 42 kms SE of the Town of Peace River between November 29, 2022, and March 16, 2023;

WHEREAS the AER is not aware of any adverse effects resulting from the induced seismic events to date;

WHEREAS seismic activity and seismic events are vibrations and/or the release of energy into the environment, and vibrations and the release of energy are defined as substances in section 1(mmm)(ii) of *EPEA* (the Substances);

WHEREAS the Substances, when released, may cause adverse effects as defined in section 1(b) of *EPEA*;

WHEREAS Erik Kuleba, Director, Field Operations South, has delegated authority to issue orders under section 113 of *EPEA* (the Director);

WHEREAS the Director is of the opinion that a release of the Substances has occurred, and that the Substances have caused, are causing, or may cause adverse effects;

WHEREAS Obsidian is a “person responsible” for the Substances as defined in section 1(tt) of *EPEA*;

THEREFORE, I, Erik Kuleba, Director, Field Operations South, under sections 113 and 241 of *EPEA*, do hereby order the following:

**Immediate Action**

1. Within seven (7) calendar days from the date of this Order, Obsidian must do the following:

- a. Identify immediate actions that it can take to reduce the frequency and magnitude of induced seismic events caused by the Disposal Operation (Immediate Action Plan),
  - b. Meet with AER subject matter experts to determine the appropriateness of the proposed Immediate Action Plan,
  - c. Implement the Immediate Action Plan, and
  - d. Confirm in writing to the Director that Obsidian has implemented the Immediate Action Plan.
2. Within fifteen (15) calendar days from the date of this Order, Obsidian must establish real-time passive seismic monitoring in the area surrounding the Disposal Operation. The monitoring network must be capable of detecting all seismic events above 2.0  $M_L$  within a 10 km radius of the Disposal Operation, unless otherwise directed by the AER.
  3. Within fifteen (15) calendar days from the date of this Order, Obsidian must install accelerometers at strategic locations within a 10 km radius of the Disposal Operation, to the satisfaction of the Director.

### **Mitigation Plan**

4. Within fifteen (15) calendar days from the date of this Order, Obsidian must submit, to the satisfaction of the Director, a plan to reduce the magnitude and frequency of induced seismic events caused by the Disposal Operation (Mitigation Plan). At a minimum, the Mitigation Plan must:
  - a. Identify the mitigative measures that will be taken to reduce the magnitude and frequency of the induced seismic events related to the Disposal Operation;
  - b. Provide milestones and/or deadlines for implementation of the mitigative measures; and
  - c. Provide emergency and communication protocols that Obsidian will follow in the event of an induced seismic event that may have adverse impacts on infrastructure or public safety.
5. Obsidian must implement the Mitigation Plan as authorized in writing by the Director.
6. The Director must be notified of, and approve, any proposed deviations to the agreed upon Mitigation Plan.

### **Information for Submission**

7. Within fifteen (15) calendar days from the date of this Order, Obsidian must submit the following data to the Director as a tabular database, unless otherwise authorized by the Director:
  - a. all tubing injection pressure, water injection rate, and cumulative water injected data from the well listed in this Order since the startup of the Disposal Operation to present, and
  - b. all bottomhole reservoir pressure measurements from the well listed in this Order since the startup of the Disposal Operation.
8. Obsidian must submit any real time monitoring data through the Incorporated Research Institutions for Seismology (IRIS) data repository using the protocol outlined in the Scientific Induced Seismicity Monitoring Network (SCISMN) Open File report on the AGS website.
9. Obsidian must submit any other information related to the Disposal Operation and seismic events or activity at the Disposal Operation that the Director requests in writing by the date specified in the Director's request.

### **General**

10. All information and plans to be submitted to the Director under this Order shall be submitted electronically to [fieldopscentral@er.ca](mailto:fieldopscentral@er.ca) and [erik.kuleba@er.ca](mailto:erik.kuleba@er.ca)
11. Where a deadline has been specified in this Order, the Director may authorize in writing a different deadline.
12. This Order will remain in effect until such time as a permanent regulatory instrument is in place or the induced seismic hazard from the Disposal Operation has reduced to the satisfaction of the Director.

Dated at the City of Edmonton in the Province of Alberta, the 23rd day of March, 2023.

< original signed by >

Erik Kuleba  
Director, Field Operations South  
Alberta Energy Regulator

In complying with this order, the party or parties named must obtain all approvals necessary, notwithstanding the above requirements.

This order in no way precludes any enforcement actions being taken regarding this matter under the *EPEA* sections 113 and 241 or any other provincial or federal legislation, or by any other regulator with jurisdiction.

All enforcement actions issued by the AER may be subject to a follow-up review to confirm previous commitments have been completed and measures have been implemented, to ensure similar noncompliances are prevented in the future. The AER may request any information that demonstrates steps have been taken to prevent repeat noncompliances from occurring.

Under the *Responsible Energy Development Act*, an eligible person may appeal decisions that meet certain criteria. Eligible persons and appealable decisions are defined in section 36 of the *Responsible Energy Development Act* and section 3.1 of the *Responsible Energy Development Act General Regulation*. If you wish to file a request for regulatory appeal, you must submit your request according to the AER's requirements. You can find filing requirements and forms on the AER website, [www.aer.ca](http://www.aer.ca), under Regulating Development: Project Application: Regulatory Appeal Process.