

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

BEING CHAPTER E-12 R.S.A. 2000 (the "Act")

ENVIRONMENTAL PROTECTION ORDER NO. EPO-2013- 33/NR

Canadian Natural Resources Limited
Suite 2500
855 – 2nd Street SW
Calgary, Alberta
T2P 4J8

WHEREAS Canadian Natural Resources Limited [CNRL] holds *Environmental Protection and Enhancement Act* [EPEA] Approval No. 0011115-03-00, as amended, to operate the Primrose-Wolf Lake enhanced recovery in-situ oil sands and heavy oil processing plant and oil production site [the "Primrose-Wolf Lake Plant"] within the Cold Lake Air Weapons Range at 65 & 66 - 5 & 6 - W4M, 67 – 3, 4 & 5 – W4M, and 68 – 4 & 5 – W4M, in the Province of Alberta;

WHEREAS On June 24, 2013, CNRL discovered and reported to Alberta Environment and Sustainable Resource Development (ESRD) a release of a substance, namely a bitumen emulsion [the "Substance"], within an un-named permanent water body [the "Water Body"], which Water Body covers portions of NE21-67-4-W4M, SE21-67-4-W4M, NW22-67-4-W4M, SW27-67-4-W4M, and SE28-67-4-W4M at 09-21-067-04 W4M, all of which are hereinafter referred to as the "Aquatic Release Site", on the Primrose-Wolf Lake Plant site;

WHEREAS it is unknown how long the release had been occurring prior to June 24, 2013;

WHEREAS the bitumen emulsion consists of a mixture of hydrocarbons and water;

WHEREAS the cause of the release of the bitumen emulsion within the Water Body is unknown;

WHEREAS although CNRL has initiated some temporary containment measures, the bitumen emulsion release into the Water Body is on-going, and CNRL has been unable to determine the exact location and the subsurface conditions under which the release is continuing;

WHEREAS CNRL has advised ESRD that in order for CNRL to assess these underlying conditions of the Substance release into the Water Body and eventually contain the release, stop the release and carry out remedial action, CNRL must dewater a portion of the Water Body;

WHEREAS on September 20, 2013, CNRL submitted to ESRD a Revised Dewatering Feasibility Assessment and Water Management Plan (the "Dewatering Plan"), which proposes that CNRL be

permitted to dewater approximately two thirds of the Water Body and divert that water to a local borrow pit and the remaining one third of the Water Body;

WHEREAS the bitumen emulsion is a "substance" pursuant to section 1(mmm) of EPEA;

WHEREAS pursuant to section 1(tt) of EPEA, CNRL is a 'person responsible' for the Substance;

WHEREAS the Substance may cause and is causing an adverse effect on the environment, including the death of and damage to aquatic and terrestrial vegetation, aquatic and terrestrial invertebrates, aquatic life, amphibians, mammals and birds, and the degradation of water quality;

WHEREAS pursuant to section 112 of EPEA, CNRL has a duty to take all reasonable measures to:

- Repair, remedy and confine the effects of the substance;
- Remediate, manage, remove or otherwise dispose of the substance in such a manner as to prevent an adverse effect or further adverse effect; and
- Restore the environment to a condition satisfactory to the Director;

WHEREAS Michael Aiton, Regional Compliance Manager, [the "Director"], has been designated a Director for the purposes of issuing environmental protection orders under the Act

WHEREAS the Director is of the opinion that a release or a substance into the environment has occurred and is occurring and the release may cause or is causing an immediate and significant adverse effect;

THEREFORE, I, Michael Aiton, Regional Compliance Manager, pursuant to sections 113 and 114 of the *Environmental Protection and Enhancement Act*, DO HEREBY ORDER:

The Comprehensive Plan

1. CNRL shall prepare, in writing for the Director's approval, a Comprehensive Remedial Plan, the constituents of which have due dates set out herein.
2. In the Comprehensive Remedial Plan, CNRL shall include, at a minimum, each of the following:
 - a. Water Management Plan for Dewatering ;
 - b. Water Body Monitoring Plan;
 - c. Erosion and Sedimentation Prevention Plan;
 - d. Phase 2 Environmental Site Assessment Plan
 - e. Bitumen Emulsion Delineation and Containment Plan;
 - f. Amphibian Salvage Plan
 - g. Fish and Fish Habitat Assessment Plan;
 - h. Wetlands Impact Assessment Plan;
 - i. Water Body Restoration Plan.
 - j. Wildlife Management Plan, and
 - k. Waste Management Plan
3. CNRL shall implement of each and every part of the Comprehensive Plan under the direct supervision of a Qualified Aquatic Environmental Specialist, currently registered as a Professional Biologist with the Alberta Society of Professional Biologists.

Water Management Plan for Dewatering

4. CNRL shall, by **September 26, 2013**, submit to the Director for the Director's approval, the written Water Management Plan for Dewatering.
5. In the Water Management Plan for Dewatering, CNRL shall include, at a minimum, each of the following:
 - a. A detailed description of the techniques that will be used for de-watering the Water Body;
 - b. A detailed description of all of the following:
 - i. Pump locations;
 - ii. Pumping rates;
 - iii. Estimated volumes to be removed from the Water Body; and
 - iv. Discharge locations;
 - c. A map depicting all of the following:
 - i. Discharge locations; and
 - ii. Pump locations;
 - d. A detailed description of each of the sites to be used to store liquids removed from the Water Body, including but not limited to:
 - i. Capacity; and
 - ii. Location;
 - e. A detailed description of the water quality monitoring parameters that will be monitored throughout all dewatering activities, including but not limited to
 - i. The frequency, quantity and location of all samples that will be taken and analysed;
 - ii. a comparison of the analytical results, for all parameters monitored to
 - A. the Water Quality Guidelines for the Protection of Freshwater Aquatic Life in the Surface Water Quality Guidelines for Use in Alberta (Alberta Environment - November 1999) [the "Surface Water Quality Criteria"], for all water that will remain in or be returned to any water body; and
 - B. Table C-11 of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (December 2010, Alberta Environment), for all water that will not remain in or be returned to any water body; and
 - iii. A description of how an on-site analytical laboratory will be obtaining and analysing the samples.
 - f. A written commitment to cease all dewatering activities if there is an exceedence of any of the Surface Water Quality Criteria or Table C-11 of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (December 2010, Alberta Environment, unless otherwise authorized by the Director;
 - g. A detailed description of the water treatment techniques and equipment that will be used

- to treat all water in the Water Body that exceeds any of the Surface Water Quality Criteria so that it meets the Surface Water Quality Criteria;
- h. A detailed description of how and to what location any water not meeting the Surface Water Quality Criteria will be disposed of;
 - i. Isolation techniques to be used that will maintain the pre-disturbance water levels in all water-covered areas on the Aquatic Release Site, except for the Water Body; and
 - j. A schedule of implementation for the Water Management Plan for Dewatering, with a dewatering completion date of no later than **October 15, 2013**, unless otherwise authorized in writing by the Director.
6. CNRL shall implement the Water Management Plan for Dewatering in accordance with the Director's written authorization.

Water Body Monitoring Plan

7. CNRL shall by **September 26, 2013**, submit to the Director for the Director's approval the written Water Body Monitoring Plan.
8. In the Water Body Monitoring Plan, CNRL shall include, at a minimum, each of the following:
- a. A detailed description of how the entirety of the Aquatic Release Site will be monitored throughout the implementation of the Comprehensive Plan, including, at minimum:
 - i. The water quality parameters that will be monitored;
 - ii. The locations within the Water Body and Aquatic Release Site from which samples will be collected;
 - iii. The locations downstream of the Aquatic Release Site from which samples will be collected;
 - iv. The points of discharge from the Water Body from which samples will be collected;
 - v. The frequency of the collection and analyses of all samples; and
 - vi. The water levels in the Aquatic Release Site that are isolated from the dewatered areas of the Water Body;
 - b. A detailed description of how, throughout the implementation of the Comprehensive Plan, groundwater infiltration into the Water Body will be monitored; and
 - c. A schedule of implementation for the Water Body Monitoring Plan.
9. CNRL shall implement the Water Body Monitoring Plan in accordance with the Director's written authorization.
10. Beginning on **October 7, 2013**, and continuing on the first Monday of every month thereafter, CNRL shall submit in writing to the Director a Water Body Monitoring Report.

11. In each Water Body Monitoring Report, CNRL shall include a written summary describing the results, including an appendix with all laboratory reports, of all of the information described in clauses 8(a) and 8(b) of this Order.

Erosion and Sedimentation Prevention Plan

12. CNRL shall, by **September 26, 2013**, submit to the Director for the Director's approval the written Erosion and Sedimentation Prevention Plan.
13. In the Erosion and Sedimentation Prevention Plan, CNRL shall include, all of the following:
 - a. A detailed description of how, throughout the implementation of the Comprehensive Plan, erosion of all land impacted in the implementation of the Comprehensive Plan will be prevented, including but not limited to:
 - i. The bed and shore of
 - A. the Water Body;
 - B. the fen that is hydrologically connected to the Water Body;
 - C. all other water covered areas of the Aquatic Release Site; and
 - D. the unnamed tributary to the Wolf River; and
 - ii. The discharge locations described in accordance of clauses 5(b) and 5(c) of this Order;
 - b. A detailed description of how, throughout the implementation of the Comprehensive Plan, siltation of:
 - i. The Water Body;
 - ii. the fen that is hydrologically connected to the Water Body;
 - iii. all other water covered areas of the Aquatic Release Site;
 - iv. The unnamed tributary to the Wolf River; and
 - v. All water bodies downstream of the Water Bodywill be prevented.
 - c. A description of the structures and mechanisms that will be used throughout the implementation of the dewatering process to manage the discharge exiting the Water Body so that none of the downstream water bodies are not impacted;
 - d. A description of the discharge rates to each downstream water body from each discharge location, including an assessment of the potential for erosion down gradient from the release point due to the additional flow;
 - e. A map and any associated hydrology information detailing:
 - i. The pre-disturbance drainage patterns into and out of the Water Body; and
 - ii. The planned changes to the pre-disturbance drainage patterns as a result of implementing the Comprehensive Plan; and
 - f. A schedule of implementation for the Erosion and Sedimentation Prevention Plan.
14. CNRL shall implement the Erosion and Sedimentation Prevention Plan in accordance

with the Director's written authorization.

Phase 2 Environmental Site Assessment and Remedial Plan

15. CNRL shall by, **October 15, 2013**, submit to the Director for the Director's approval the written Phase 2 Environmental Site Assessment and Remedial Plan.
16. In the Phase 2 Environmental Site Assessment and Remedial Plan, CNRL shall include at a minimum, all of the following:
 - a. A detailed plan for the complete delineation of impacts of the release of the Substance to soils and sediments
 - i. on the Aquatic Release Site;
 - ii. Under the Aquatic Release Site; and
 - iii. All lands adjacent to the Aquatic Release Site to which the substance may have migrated;
 - b. A detailed plan for the complete delineation of any impacts of the release of the Substance to all shallow groundwater:
 - i. Under the Aquatic Release Site;
 - ii. Up-gradient of the Aquatic Release Site; and
 - iii. Down-gradient of the Aquatic Release Site;
 - c. A plan to provide to the Director the raw analytical results of all sampling and analyses planned (which analyses must include chromatograms for hydrocarbon analyses) and a comparison of those results to
 - i. At least one off-site control; and
 - ii. The applicable guidelines in the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (December 2010, Alberta Environment) [the "Criteria"];
 - d. A detailed plan for the assessment of the connectivity between shallow groundwater and surface water and subsurface flow rates
 - i. Under the Aquatic Release Site;
 - ii. Up-gradient of the Aquatic Release Site; and
 - iii. Down-gradient of the Aquatic Release Site;
 - e. A detailed plan for the assessment of the subsurface flow rates and direction under the Aquatic Release Site;
 - f. A detailed remedial plan including, at a minimum, all of the following:
 - i. The proposed measures to recover the released Substance from soils and sediments on the Aquatic Release Site;
 - ii. The proposed measures to remedy all soil or sediment contamination resulting from the release of the Substance to meet the requirements of the Criteria, prior to water being restored to the Water Body;
 - iii. The proposed measures to remedy all surface water contamination resulting from the release of the Substance to meet the Surface Water Quality Criteria; and
 - iv. The proposed measures to remedy all the groundwater contamination resulting from

the release of the Substance to meet the requirements of the Criteria; and

- g. A schedule of implementation for the Phase 2 Environmental Site Assessment and Remedial Plan, to begin immediately after the Water Body has been dewatered, but no later than **October 15, 2013**.

- 17. CNRL shall implement the Phase 2 Environmental Site Assessment and Remedial Plan in accordance with the Director's written authorization.

Bitumen Emulsion Delineation and Containment Plan

- 18. CNRL shall by, **October 6, 2013**, submit to the Director for the Director's approval the written Bitumen Emulsion Delineation and Containment Plan.

- 19. In the Bitumen Emulsion Delineation and Containment Plan, CNRL shall include, at a minimum, detailed descriptions of all of the following:

- a. The measures needed to fully identify and characterize the release point for the bitumen emulsion flow to surface;
- b. The methods proposed to be used to gather data on the potential causes of the release;
- c. The preliminary design of measures proposed to contain the flow of bitumen emulsion to surface for the duration of the implementation of the Comprehensive Plan, once dewatering is complete;
- d. The schedule for submission to the Director of a written final design for permanent containment of the bitumen emulsion; and
- e. An overall schedule of implementation for the Bitumen Emulsion Delineation and Containment Plan.

- 20. CNRL shall implement the Bitumen Emulsion Delineation and Containment Plan in accordance with the Director's written authorization.

Amphibian Salvage Plan

- 21. CNRL shall by, **September 26, 2013**, submit to the Director for the Director's approval the written Amphibian Salvage Plan.

- 22. In the Amphibian Salvage Plan, CNRL shall include at minimum all of the following:

- a. A detailed description of a comprehensive sampling program to determine the
 - i. Presence;

- ii. Species; and
 - iii. Quantitiesof amphibians in the Water Body;
 - b. A detailed description of the
 - i. Capture; and
 - ii. Handlingtechniques that will be used in the implementation of the Amphibian Salvage Plan;
 - c. the proposed amphibian relocation strategy, including a map, identifying potential amphibian relocation sites; and
 - d. A schedule of implementation for the Amphibian Salvage Plan,
23. CNRL shall implement the Amphibian Salvage Plan in accordance with the Director's written authorization.

Fish and Fish Habitat Assessment Plan

24. CNRL shall by, **September 26, 2013**, submit to the Director for the Director's approval the written Fish and Fish Habitat Assessment Plan.
25. In the Fish and Fish Habitat Assessment Plan, CNRL shall include at minimum all of the following:
- a. A detailed description of a sampling program to determine the
 - i. Presence;
 - ii. Species; and
 - iii. Quantitiesof all fish in the Water Body while dewatering occurs;
 - b. A detailed description of a proposed fish habitat identification plan for the Water Body; and
 - c. A schedule of implementation for the Fish and Fish Habitat Assessment Plan.
26. CNRL shall implement the Fish and Fish Habitat Assessment Plan in accordance with the Director's written authorization.
27. CNRL shall submit to the Director a Summary Report on Fish and Fish Habitat based upon the implementation of clauses 25(a)-(c), inclusive, by **October 30, 2013**.

Wetlands Impact Assessment Plan

28. CNRL shall by, **September 30, 2013**, submit to the Director for the Director's approval the written Wetlands Impact Assessment Plan.

29. In the Wetlands Impact Assessment Plan, CNRL shall include at minimum, all of the following:
 - a. The classifications of all areas covered by water on the Aquatic Release Site pursuant to the Alberta Wetland Inventory Classification System (Halsey et al. 2004), including detailed description of wetland characteristics supporting the classifications;
 - b. A determination of the area covered by water on the Aquatic Release Site, including but not limited to
 - i. The Water Body;
 - ii. The adjacent fen, and
 - iii. All transition zones from aquatic to terrestrial vegetation;
 - c. A map depicting water depths for the entire Water Body;
 - d. A detailed description of all
 - i. Flora species;
 - ii. Fauna species;
 - iii. Rare species; and
 - iv. Endangered speciespresent on the Aquatic Release Site; and
 - e. A schedule of implementation for the Wetlands Impact Assessment Plan.
30. CNRL shall implement the Wetlands Impact Assessment Plan in accordance with the Director's written authorization.
31. CNRL shall submit to the Director a Summary Report on Wetlands Impacts based upon the implementation of clauses 29(a)-(e), inclusive, by **October 30, 2013**.

Water Body Restoration Plan

32. CNRL shall by **November 30, 2013**, submit to the Director for the Director's approval the written Water Body Restoration Plan.
33. In the Water Body Restoration Plan, CNRL shall include, at a minimum, all of the following:
 - a. A detailed description of how the Water Body will be restored to its pre-disturbance condition;
 - b. A detailed plan and schedule for refilling the restored Water Body, utilizing the stored water;
 - c. A long term monitoring plan for assessing progressive
 - i. habitat restoration
 - ii. re-establishment of fauna;
 - iii. re-establishment of flora; and
 - iv. return to Water Body water levels consistent with pre-disturbance conditions on the Aquatic Release Site;
 - d. A detailed plan for maintaining the downstream fen in an unimpacted state during the implementation of the Water Body Restoration Plan; and

- e. A schedule of implementation for the Water Body Restoration Plan.
34. CNRL shall implement the Water Body Restoration Plan in accordance with the Director's written authorization.
35. At least 60 days prior to CNRL requesting closure of this Order, CNRL shall:
- a. provide to stakeholders and First Nations a Draft Summary Report on Water Body Restoration Status; and
 - b. Compile all comments received.
36. CNRL shall submit to the Director a written Final Summary Report on Water Body Restoration, including all reviewer comments, one month prior to requesting closure of this Order.

Wildlife Management Plan

37. CNRL shall continue to implement the Wildlife Management Plan, dated July 13, 2013 addressing wildlife deterrents, capture and treatment of impacted wildlife and rehabilitation/release options, until otherwise authorized in writing by the Director.

Waste Management Plan

38. CNRL shall continue to implement the Waste Management Plan, dated July 4, 2013, until otherwise authorized in writing by the Director.

Communications Plan

39. CNRL shall, by **October 1, 2013**, submit to the Director, for the Director's approval, a written Communications Plan.
40. In the Communications Plan, CNRL shall include, at a minimum, all of the following:
- a. A description of the monthly update to be posted on CNRL's public website, which shall contain:
 - i. The status of the efforts taken in the dewatered areas of the Water Body;
 - ii. A summary of all monitoring information obtained in the implementation of Plans required under this Order and a comparison of that monitoring information to all applicable Criteria cited in this Order;
 - iii. A description using maps or diagrams of the monitoring locations and their relationships to the monitoring objectives in accepted monitoring plans required by this Order; and
 - iv. Status of restoration of the Water Body once the restoration process begins in 2014.

- b. A plan to prepare a weekly photographic record of Water Body status, starting with the first day of the issuance of this Order, and post it weekly on CNRL's public website;
- c. Other methods to be utilized to communicate, on at least a monthly basis, to stakeholders and First Nations, information on the Aquatic Release Sites status;
- d. A plan to communicate to the Director a summary of any issues raised to CNRL by stakeholders and First Nations throughout the implementation of the Comprehensive Plan, which shall be included in the reports to the Director required by Clause 10 of this Order; and
- e. CNRL shall provide the Summary Report on Fish and Fish Habitat, prepared in accordance with clause 27 of this Order, to stakeholders and First Nations once it is accepted in writing by the Director.
- f. CNRL shall provide the Summary Report on Wetland Impacts, prepared in accordance with clause 31, to stakeholders and First Nations once it is accepted in writing by the Director.
- g. CNRL shall:
 - i. Implement the Communications Plan in accordance with the Director's written authorization; and
 - ii. Notwithstanding clause 41 of this Order, continue implementing the Communications Plan until otherwise authorized in writing by the Director.

General

- 41. Where no other deadlines have been specified in this Order, CNRL shall
 - a. complete all requirements of this Order; and
 - b. complete the implementation of all Plans required by this Order no later than **March 31, 2014**, unless otherwise authorized in writing by the Director.
- 42. CNRL shall begin Water Body restoration work no later than **April 1, 2014** including Water Body recharge from storage sources, unless otherwise authorized by the Director in writing.

Reporting

- 43. CNRL shall, until advised otherwise in writing by the Director, provide to the Director weekly written reports by noon of every Monday, of all steps taken to comply with this Order, unless a different frequency of reporting is authorized in writing by the Director.
- 44. CNRL shall provide to the Director a Final Summary Report, detailing the results and outcomes of all plans submitted as part of the Comprehensive Plan, one month prior to any request for closure of this Order, for the Director's review.

DATED at the City of Edmonton in the Province of Alberta this 24th day of September, 2013.

Original signed by:

Michael Aiton
Regional Compliance Manager

Section 91 of the *Environmental Protection and Enhancement Act* may provide a right of appeal against this decision to the Alberta Environmental Appeals Board. There may be a strict time limit for filing such an appeal. A copy of section 91 is enclosed. For further information, please contact the Board Secretary at #306 Peace Hills Trust Tower, 10011 – 109 Street, Edmonton, Alberta, T5J 3S8; telephone (780) 427-6207; fax (780) 427-4693.

Notwithstanding the above requirements, the Party(ies) shall obtain all necessary approvals in complying with this order.

Take notice that this environmental protection order is a remedial tool only, and in no way precludes any enforcement proceedings being taken regarding this matter under the *Environmental Protection and Enhancement Act* or any other legislation.