

Wyoming Department of Environmental Quality
Water Quality Division
PERMIT TO CONSTRUCT

PERMIT NO. 19-283

**RE: Encore Green, LLC – Reisseg 6 Well Produced Water Land Application
Laramie County, SW ¼ NW ¼ Section 27, Township 14 North, Range 60 West
Lat 41.148771 / Long -104.079362**

This permit hereby authorizes the permittee Encore Green, LLC, 11911 Empire Drive, Cheyenne, WY, 82009 for a one-time application of approximately 7,000 barrels of treated produced water according to the procedures and conditions of this permit. This facility is located at the legal description and latitude/longitude listed above, Laramie County, in the State of Wyoming. This land application is a one-time limited quantity of treated water and shall be completed by December 27, 2020. The application of treated water shall not be done when the ground is saturated, frozen, or covered by snow.

The issuance of this permit confirms that the Wyoming Department of Environmental Quality (DEQ) Water Quality Division (WQD) has evaluated the application submitted by the permittee and determined that it meets minimum applicable construction and design standards. The compliance with construction standards and the operation and maintenance of the facility to meet the engineer's design are the responsibility of the permittee, owner, and operator.

Granting this permit does not imply that WQD guarantees or ensures that the permitted facility, when constructed, will meet applicable discharge permit conditions or other effluent or operational requirements. Compliance with discharge standards remains the responsibility of the permittee.

Nothing in this permit constitutes an endorsement by WQD of the construction or the design of the facility described herein. This permit verifies only that the submitted application meets the design and construction standards imposed by Wyoming statutes, rules and regulations. The DEQ assumes no liability for, and does not in any way guarantee or warrant the performance or operation of the permitted facility. The permittee, owner and operator are solely responsible for any liability arising from the construction or operation of the permitted facility. By issuing this permit, the State of Wyoming does not waive its sovereign immunity.

The permittee shall allow DEQ personnel and their invitees to enter the premises where the facility is located, or where records are kept under the conditions of this permit, and collect resource data as defined by Wyoming Statute § 6-3-414, inspect and photograph the facility, collect samples for analysis, review records, and perform any other function authorized by law or regulation. The permittee shall secure and maintain such access for the duration of the permit.

If the facility is located on property not owned by the permittee, the permittee shall also secure and maintain from the landowner upon whose property the facility is located permission for DEQ personnel and their invitees to enter the premises where a regulated facility is located, or where records are kept under the conditions of this permit, and collect resource data as defined by Wyoming Statute § 6-3-414, inspect and photograph the facility, collect samples for analysis, review records, and perform any other function authorized by law. The permittee shall secure and maintain such access for the duration of the permit.

If the facility cannot be directly accessed using public roads, the permittee shall also secure and maintain permission for DEQ personnel and their invitees to enter and cross all properties necessary to access the facility. The permittee shall secure and maintain such access for the duration of the permit.

The permittee shall maintain in its records documentation that demonstrates that the permittee has secured permission for DEQ personnel and their invitees to access the permitted facility, including (i) permission to access the land where the facility is located, (ii) permission to collect resource data as defined by Wyoming Statute § 6-3-414, and (iii) permission to enter and cross all properties necessary to access the facility if the facility cannot be directly accessed from a public road. The permittee shall also maintain in its records a current map of the access route(s) to the facility and contact information for the owners or agents of all properties that must be crossed to access the facility. The permittee shall ensure that the documentation, map, and contact information are current at all times. The permittee shall provide the documentation, map, and contact information to DEQ personnel upon request. On closure of a facility, the permittee shall maintain such records for a period of five (5) years.

Nothing in this permit precludes the institution of any legal action or other proceeding to enforce any applicable provision of law or rules and regulations. It is the duty of the permittee, owner and operator to comply with all applicable federal, state and local laws or regulations in the exercise of its activities authorized by this permit.

The issuance of this permit does not convey any property rights in either real or personal property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

The permittee shall construct and operate the permitted facility in accordance with the statements, representations, procedures, terms and conditions of the permit application, supporting documents and permit. This permit does not relieve the permittee from any duty to obtain any other permit or authorization that may be required by any provision of federal, state or local laws.

In carrying out its activities authorized by this permit, the permittee, owner and operator shall comply with all of the following permit conditions:

- 1 of 16. The permittee will immediately notify WQD of any changes or modifications, which are not consistent with the terms and conditions of this permit. Submit oral or written notice to Dennis Lamb, dennis.lamb@wyo.gov, 152 North Durbin Street, Suite 100, Casper, WY 82601, Phone 307-473-3465, FAX 307-473-3458, in accordance with the provisions of Section 11, Chapter 3, Wyoming Water Quality Rules and Regulations.
- 2 of 16. The permittee will submit a Certificate of Completion signed by the engineer of record or the owner to the engineer listed above within sixty (60) days of completing the land application. A form titled "Certificate of Completion" is available on the WQD Construction Permitting website.
- 3 of 16. DEQ bases the review and approval of this permit upon the items identified in the attached "Statement of Basis".
- 4 of 16. The permittee will notify the CBM / Oil and Gas Group, Water Quality Division, 152 North Durbin Street, Suite 100, Casper, WY 82601, Phone 307-473-3465, FAX 307-473-3458 of the date land application will begin and the estimated completion date.
- 5 of 16. The treated produced water shall be applied uniformly and at an agronomic rate to the land. The application shall not allow the water to pool or runoff the land. The treated water shall not be applied to the ground when it is saturated, frozen, or covered by snow.
- 6 of 16. The application site slope shall not exceed eight per cent (8%) for vehicular application.
- 7 of 16. Only the land designated in this permit is authorized for the application of treated produced water.

8 of 16. Application of treated produced water shall be terminated within 300 feet of the definable highwater mark of perennial and intermittent drainages, irrigation canals, lakes and reservoirs.

9 of 16. All treated produced water that will be used for land application shall not exceed the following water quality criteria:

<u>Constituent</u>	<u>Screening Criteria</u>
pH	4.5 - 9.0 s.u.
TDS	480.0 mg/L
Electrical Conductivity (EC)	750 micromhos/cm@25°C
Sodium Adsorption Ratio (SAR)	8 - 10
Chloride (Cl)	100 mg/L
Sulfates (SO4 2-)	192 mg/L
Bicarbonates (HO3-)	Not greater than 50 percent of the total anion concentration in meq/L
Aluminum (Al)	5 mg/L
Ammonia (NH3-N)	30 mg/L
Antimony	0.006 mg/L
Arsenic (As)	0.01 mg/L
Barium (Ba)	2 mg/L
Beryllium (Be)	0.1 mg/L
Boron (B)	0.6 mg/L
Cadmium (Cd)	0.01 mg/L
Chromium (Cr)	0.1 mg/L
Cobalt (Co)	0.05 mg/L
Copper (Cu)	0.2 mg/L
Cyanide (CN)	0.2 mg/L
Fluoride (F)	4 mg/L
Hydrogen Sulfide(H2S)	4.2 ug/L
Iron (Fe)	5 mg/L
Lead (Pb)	5 mg/L
Lithium (Li)	0.1 mg/L
Manganese (Mn)	0.2 mg/L
Mercury (Hg)	2 ug/L
Molybdenum	0.2 mg/L
Nickel (Ni)	0.2 mg/L
Nitrate (NO3-N)	10 mg/L
Nitrite (NO2-N)	1 mg/L
(NO3+NO2)-N	10 mg/L
Oil & Grease	10 mg/L
Phenol	11 mg/L

Selenium (Se)	0.02 mg/L
Silver (Ag)	0.2 mg/L
Strontium	20 mg/L
Thallium	0.002 mg/L
Uranium	30 µg/L
Vanadium (V)	0.1 mg/L
Zinc (Zn)	2 mg/L
RSC	1.25 meq/L
Combined Total Radium 226 and Radium 228	5 pCi/L
Gross alpha particle radioactivity (including Radium 226 but excluding Radon and Uranium)	15 pCi/L
Volatile Organic Compounds, Semi-Volatile Organic Compounds, Polyaromatic Hydrocarbons	
acrolein	17 ug/L
acrylonitrile	0.17 ug/L
benzene	5 µg/L
bromoform	80 ug/L
carbon tetrachloride	5 ug/L
chlorobenzene	100 ug/L
chlorodibromomethane	80 ug/L
chloroethane	21 mg/L
chloroethylvinyl ether	ND
chloroform	80 ug/L
dichlorobromomethane	ND
1,1-dichloroethane	ND
1,2-dichloroethane	5 ug/L
1,1-dichloroethylene	0.7 ug/L
1,2-dichloropropane	5 ug/L
1,3-dichloropropylene (1,3-dichloropropene)	1 mg/L
1,4-dioxane	1 mg/L
ethylbenzene	700 ug/L
ethylene glycol	70 mg/L
2-ethyl 1-hexanol	0.83 ug/L
MBAS (Surfactants)	0.5 mg/L
methyl bromide	47 ug/L
methyl chloride	ND
methylene chloride	5 ug/L

nitrobenzene	0.7 mg/L
1,1,2,2-tetrachloroethane	0.5 ug/L
tetrachloroethylene	5 ug/L
toluene	1 mg/L
1,2-trans-dichloroethylene	1 ug/L
1,1,1-trichloroethane	0.2 mg/L
1,1,2-trichloroethane	5 ug/L
trichloroethylene	5 ug/L
vinyl chloride	2 ug/L
2-chlorophenol	0.2 mg/L
2,4-dichlorophenol	0.1 mg/L
2,4-dimethylphenol	667 ug/L
4,6-dinitro-o-cresol	1.5 ug/L
2,4-dinitrophenol	39 ug/L
2-nitrophenol	ND
4-nitrophenol	300 ug/L
p-chloro-m-cresol	1.4 mg/L
pentachlorophenol	1 ug/L
phenol	11 mg/L
2,4,6-trichlorophenol	4.1 ug/L
acenaphthene	2 mg/L
acenaphthylene	1 mg/L
anthracene	10 mg/L
benzidine	0.00039 ug/L
benzo(a)anthracene	ND
benzo(a)pyrene	0.2 ug/L
3,4-benzofluoranthene	ND
benzo(g,h,i) perylene	ND
benzo(k)fluoranthene	2.5 ug/L
bis(2-chloroethoxy) methane	59 ug/L
bis(2-chloroethyl) ether	0.0816 ug/L
bis(2-chloroisopropyl) ether	ND
bis (2-ethylhexyl) phthalate	6 ug/L
4-bromophenyl phenyl ether	ND
butylbenzyl phthalate	16 ug/L
2-chloronaphthalene	ND
4-chlorophenyl phenyl ether	ND
chrysene	89.7 ug/L

dibenzo(a,h)anthracene	0.012 ug/L
1,2-dichlorobenzene	600 ug/L
1,3-dichlorobenzene	3 mg/L
1,4-dichlorobenzene	75 ug/L
3,3'-dichlorobenzidine	0.13 ug/L
diethyl phthalate	30 mg/L
dimethyl phthalate	ND
di-n-butyl phthalate	ND
2,4-dinitrotoluene	67 ug/L
2,6-dinitrotoluene	33 ug/L
di-n-octyl phthalate	200 ug/L
1,2-diphenylhydrazine (as azobenzene)	0.078 ug/L
fluroranthene	ND
fluorene	1.33 mg/L
hexachlorobenzene	1 ug/L
hexachlorobutadiene	10 ug/L
hexachlorocyclopentadiene	50 ug/L
hexachloroethane	40 ug/L
indeno(1,2,3-cd) pyrene	897 ug/L
isophorone	7 mg/L
N-nitrosodimethylamine	0.11 ug/L
N-nitrosodi-n-propylamine	0.00128 ug/L
N-nitrosodiphenylamine	18.3 ug/L
naphthalene	700 ug/L
phenanthrene	1 mg/L
pyrene	1 mg/L
toluene	1 mg/L
1,2,4-trichlorobenzene	70 ug/L
tetrachloroethylene	5 ug/L
Pesticides	
aldrin	1 ug/L
alpha-BHC	2 ug/L
beta-BHC	0.050 ug/L
gamma-BHC	0.2 ug/L
delta-BHC	0.2 ug/L
chlordane	2 ug/L
4,4'-DDT	0.264 ug/L

4,4'-DDE	0.264 ug/L
4,4'-DDD	0.374ug/L
dieldrin	2 ug/L
alpha-endosulfan	ND
beta-endosulfan	ND
endosulfan sulfate	110 ug/L
endrin	2 ug/L
endrin aldehyde	2 ug/L
heptachlor	2 ug/L
heptachlor epoxide	0.2 ug/L
PCB-1242	0.5 ug/L
PCB-1254	0.5 ug/L
PCB-1221	0.5 ug/L
PCB-1232	0.5 ug/L
PCB-1248	0.5 ug/L
PCB-1260	0.5 ug/L
PCB-1016	0.5 ug/L
toxaphene	3 ug/L
NOTES:	
1. Laboratory analysis of treated produced water must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been authorized in writing by the department.	
2. Laboratory results for cations, anions and metals are to be reported as Total Recoverable.	
3. Where laboratory methods are not capable of achieving detection at, or below the permissible limit, a result of non-detectable will be accepted provided that the method used is capable of achieving the lowest detection limit.	
4. Pesticide analyses are required unless it is documented that one or more have not been used.	
5. ug/L – micrograms per liter	
6. mg/L – milligrams per liter	
7. ND – non-detect	
8. meq/L – milliequivalents per liter	
9. pCi/L – picocuries per liter	
10. s.u. – standard unit	

10 of 16. Prior to disposal, the permittee shall notify DEQ of the type, quantity or volume, method, and location for disposal on any treatment plant wastes or treated water that does not meet the water quality criteria in Condition 9 as amended by Condition 11.

11 of 16. Prior to testing of treated produced water the permittee shall provide documentation of all chemical compounds, cations, anions, and metals and their respective amounts applied to each well from which produced water is required for treatment, including those applied for well completions, maintenance, workovers, and stimulation. The Water

Quality Division will amend the water quality criteria in Condition 9 to include limits for any constituents determined to be contaminants of concern. Laboratory testing of treated produced water shall include these contaminants of concern.

12 of 16. At a minimum, three consecutive compliant batch water test samples shall be collected, analyzed and submitted to the department's Water Quality Division, Water/Wastewater Section Manager for approval prior to land application. A compliant batch is defined as a maximum of 1000 barrels of continuously treated produced water that meets the water quality criteria in Condition 9, as amended by Condition 11. A water test sample is a composite sample consisting of three separate samples that are representative of the beginning, middle and end of an uninterrupted batch run not exceeding 1000 barrels of treated water. Prior to land application, subsequent batch samples shall be collected and analyzed and shall meet the water quality criteria in Condition 9, as amended by Condition 11, or as otherwise authorized in writing by the Administrator. Failure to do so constitutes a violation of this permit and the permittee shall immediately cease land application and notify the Water Quality Division. These subsequent analytical test results shall be maintained by the permittee and, upon receipt by the permittee, provided to the Water Quality Division, Water/Wastewater Section Manager, Cheyenne, WY.

13 of 16. Storage of treated water to be used for land application shall only occur in containers that are free of contaminants. Prior to storage of treated water, the permittee shall provide documentation that demonstrates that the container(s) are clean and free from all solids, liquids, and residual contamination. Storage of material other than treated produced water in these containers is a violation of this permit.

14 of 16. Land application shall not proceed until the permittee has received a letter of authorization from the Water/Wastewater Section Manager.

15 of 16. A Sampling and Analysis Plan (SAP) must be submitted to DEQ and approved prior to land application. At a minimum, the Sampling and Analysis Plan must describe and include the following:

a. Sample Collection:

- i. Types of media to be sampled
- ii. Sampling points
- iii. Sampling equipment to be used
- iv. Frequency and schedule for sample collection
- v. Preservation, holding times and sample collection containers
- vi. Standard Operating Procedures (SOPs) for:
 1. Decontamination of sampling equipment
 2. Sample collection
 3. Sample shipment and custody
- vii. Collection, sampling, storage and disposal of decontamination rinsate

b. Sample Analysis:

- i. Field screening of samples:
 1. Equipment: identify manufacture, model and serial number, type and screening range of detector, and description of weather, or other, conditions that may affect equipment readings
 2. List of parameters and analytes that can be detected with the equipment, detection limits, and units of measurements
 3. Calibration schedule, procedures, and documentation

- c. Laboratory analysis of samples:
 - i. Parameters and analytes to be measured
 - ii. Laboratory methods to be used
 - iii. Method detection limits
 - iv. Laboratory name and address

d. QA/QC

- i. Percentage (of total samples) and type:
 - 1. Duplicate samples
 - 2. Field blanks
 - 3. Equipment/ decontamination blanks
 - 4. Trip blanks

16 of 16. At a minimum, the monitoring reports must describe and include the following:

a. General information:

- i. Name of facility and WDEQ Permit Number
- ii. Location, date, time, temperature and weather conditions at time of sampling and water level measurement
- iii. Name(s) of individual(s) who performed the sampling or measurements
- iv. Copies of field logs and notes
- v. Narrative description of monitoring activities completed
- vi. Reference to procedures followed for sample collection
- vii. Description of sample color, clarity, viscosity, odor, etc.
- viii. Copy of original lab sheets containing:
 - 1. Date(s) lab analyses were performed
 - 2. Names of individuals who performed the analyses
 - 3. Analytical techniques or methods used and method detection limits
 - 4. Sample results
 - 5. Lab QA/QC qualifiers, including sample holding time exceedances
 - 6. Sample Chain of Custody.
 - 7. Sample condition upon receipt at lab, including temperature

- b. Table illustrating sample results, dates, and method detection limits for each sample
- c. Summary of any deviations from the approved Sampling and Analysis Plan


AUTHORIZED BY:



Kevin Frederick, Administrator
Water Quality Division

January 3, 2020
Date of Issuance

TP/KF/RRC/CF



Todd Parfitt, Director
Department of Environmental Quality

STATEMENT OF BASIS

1. Permit Number: **19-283**
2. Application reviewed for compliance with the following regulations:
Chapters 3, 8 and 11 of the Wyoming Water Quality Rules and Regulations.
3. Does the permit comply with all the applicable regulations identified above?
Yes.
4. If a Chapter 3, Section 17 review is required, indicate how WQD will determine that the permittee will protect groundwater quality.
The opportunity for direct or indirect discharge, percolation, or filtration to groundwater is minimized by agronomically applying the treated produced water and this is a one-time event. No ponding or pooling of the applied water is allowed.
5. Documentation of Statement of Basis: The archive file for this permit includes adequate documentation of all sections of this Statement of Basis.

CERTIFICATION

DEQ issued this permit is based upon a review of the application package submitted in accordance with the requirements of Chapter 3, Section 6, Wyoming Water Quality Rules and Regulations. Richard Cripe, completed this review on December 27, 2019. DEQ recommends issuing this permit based upon the statements, representations and procedures presented in the permit application and supporting documents, permit conditions, and the items identified in this "Statement of Basis."

XC: Lou Harmon, Western R&D, 5908 Yellowstone Road, Cheyenne, WY 82009