# Central Valley Regional Water Quality Control Board

27 August 2021

Faisal Latif, Regulatory Affairs Manager
California Resources Production Corp.
900 Old River Road
Bakersfield, CA 93311

**CERTIFIED MAIL**
**7018 3090 0001 1080 6907**

**ORDER PURSUANT TO CALIFORNIA WATER CODE SECTION 13267**

**You are legally obligated to respond to this Order. Read this Order carefully.**

California Resources Production Corporation operates 45 water disposal injection wells in the southern portion of the Elk Hills Oil Field. Elk Hills Power, LLP a 550-megawatt, natural gas-fired, power plant facility, jointly owned by California Resources Production Corporation, operates four water disposal injection wells in the southern portion of the Elk Hills Oil Field. The 49 injection wells (hereinafter, "injection wells subject to this Order") are in sections 12 and 13 of township 31 south (T31S), range 23 east (R23E), Mount Diablo Base and Meridian (MDB&M), and in sections 7, 8, 10, 17, and 18 of T31S, R24E, MDB&M. Public information about the injection wells subject to this Order operated by California Resources Production Corporation and Elk Hills Power, LLP (hereinafter, California Resources), from the California Department of Conservation, Geologic Energy Management Division (CalGEM) and the United States Environmental Protection Agency (US EPA) is in Attachment A of this Order.

A publication by the United States Geological Survey (USGS)[1] revealed to the Central Valley Regional Water Quality Control Board (Central Valley Water Board) that injected fluids from injection wells completed in the Tulare Formation in portions of Lost Hills, North Belridge, and South Belridge Oil Fields may have potentially migrated outside of areas of the aquifer that have been exempted from the protections of the federal Safe Drinking Water Act (42 U.S.C. § 300f et seq.). The injection wells subject to this Order have been injecting fluids into the Tulare Formation in the Elk Hills Oil Field, which has

[1] Gillespie et al., Groundwater Salinity and the Effects of Produced Water Disposal in the Lost Hills–Belridge Oil Fields, Kern County, California, Environmental Geosciences, v. 26, no. 3 (September 2019), pp. 73–96

Link to publication –
(http://archives.datapages.com/data/deg/2019/EG032019/eg18009/eg18009.html)

Link to supporting data –
(https://www.sciencebase.gov/catalog/item/5b4d123ce4b06a6dd17c59ab)

similar hydrogeology as the Lost Hills, North Belridge, and South Belridge Oil Fields. Given the similar hydrogeology to the Lost Hills, North Belridge, and South Belridge Oil Fields, the number of injection wells subject to this Order, the proximity to an aquifer exemption boundary, and the duration of injection, Staff is concerned that injected fluids have potentially migrated into waters suitable for drinking water supply and other beneficial uses.

As described further below, for the injection wells subject to this Order or any additional injection wells identified by California Resources, California Resources is required to submit technical reports containing information about (1) the injection wells, (2) the fluids injected in the wells into the aquifer, (3) the quality of the groundwater in the aquifer where fluids have been injected, (4) the lateral and vertical extent of the injected fluids and any potential impacts on groundwater quality in the aquifer, and (5) water supply wells completed in the aquifer.

The Central Valley Water Board's authority to require technical reports derives from section 13267 of the California Water Code, which specifies, in part, that:

> *(a) A regional board...in connection with any action relating to any plan or requirement authorized by this division, may investigate the quality of any waters of the state within its region.*
>
> *(b)(1) In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region…that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.*

The Central Valley Water Board is concerned about the potential threat to human health and potential impacts to water quality posed by the migration of injected fluids into a non-exempt aquifer that may be suitable for drinking water supply and other beneficial uses. This Order is designed to assess the lateral and vertical extent of the fluids injected and address potential water quality impacts. The technical information and reports required by this Order are necessary to assess the potential threat to human health and potential impacts to water quality, particularly in non-exempt aquifers. Information regarding the use of these wells and the materials injected is within California Resource's control. Water supply well information required is necessary to determine potential risk to human health and potential impacts to beneficial use water. The need to understand the potential threat to human health and potential impacts to water quality justifies the need for the information and reports required by this Order. Based on the nature and possible consequences of the discharges of waste on human

health and water quality, the burden of providing the required information, including reporting costs, bears a reasonable relationship to the need for the report, and the benefits to be obtained. California Resources is required to submit this information and reports because it is the operator of the injection wells subject to this Order. If California Resources and its predecessors in interest have never injected fluids into the injection wells subject to this Order, please advise Central Valley Water Board staff of this in writing as soon as possible.

**Under the authority of California Water Code section 13267, the Central Valley Water Board hereby orders California Resources to:**

1. By **22 November 2021**, submit a technical report in the form of a work plan that describes proposed tasks and time schedule to be completed to investigate the lateral and vertical extent of the fluids injected and potential impacts to groundwater quality in the aquifer(s) from the injection of fluids in the injection wells subject to this Order or any additional injection wells identified by California Resources. California Resources shall implement approved tasks in accordance with the time schedule approved by the Executive Officer, as described in more detail below.
2. By **10 January 2022**, for the injection wells subject to this Order or any additional injection wells identified by California Resources, submit a technical report that contains the following information:
    a. Identification of any water disposal injection wells completed within the Tulare Formation in the southern portion of the Elk Hills Oil Field that are owned and/or operated by California Resources that are not identified in Attachment A; including any water disposal wells that are considered to be active, idle, plugged and abandoned, or wells that were converted from a water disposal injection well.
    b. For the fluids being injected into the injection wells, an analysis of a representative sample of those fluids in accordance with the water quality analysis and reporting requirements contained in Attachment B to this Order.
    c. Historical chemical analyses of the fluids injected into each injection well. Analytical results are to be summarized in a table by injection well with analytical laboratory reports provided as an attachment.
    d. Historical analytical data for groundwater samples collected from the injection zone(s) in each of the injection wells. Analytical results are to be summarized in a table by injection well with analytical laboratory reports provided as an attachment.
    e. Historical bottomhole formation pressure data collected from the injection zone(s) in each of the injection wells. Pressure data are to be summarized in a table by injection well with documentation provided as an attachment. Bottomhole pressure gradient maps are to be provided for each year of collected data.

f. A list and location map of all water supply wells within three miles of any injection well.

g. Available information for each identified water supply well, including the well owner name and contact information; type of well (i.e., domestic, irrigation, industrial, etc.); whether any of the water is used for domestic purposes; status (i.e., active, idle, etc.); well construction details; borehole geophysical logs; and all analytical results for any water sample(s) collected from each water supply well.

h. For each injection well, provide the following information. The information for items i-xvi shall be in spreadsheet format. The information for items xvii-xx shall be in attachments:

i. The name of the owner and/or operator of the injection well;
ii. American Petroleum Institute (API) number for the injection well;
iii. Injection well name and number;
iv. Name of the field in which the injection well is located;
v. County in the which the injection well is located;
vi. Latitude and Longitude (decimal degrees) of well head and bottomhole locations;
vii. Latitude and Longitude Datum, indicate “1” for North American Datum of 1983 or “2” for North American Datum of 1927;
viii. Elevation and datum of the well head (feet above mean sea level);
ix. Injection well total depth (feet);
x. Top injection depth (feet);
xi. Formation/Zone name at top injection depth;
xii. Bottom injection depth (feet);
xiii. Formation/Zone name at bottom injection depth;
xiv. Date injection started in the well (Day/Month/Year, xx/xx/xxxx);
xv. Total injection volume in barrels from the date injection began through **26 August 2021**;
xvi. Total injection volume in barrels for the 12-month period from **25 August 2020** through **26 August 2021**;
xvii. Well construction diagram including all perforations, annular material, and seals;
xviii. A description of the sources of fluid injected;
xix. The data maintained in compliance with California Code of Regulations, title 14, section 1724.10, subdivision (h); and,
xx. Documentation associated with each mechanical integrity test undertaken to comply with California Code of Regulations, title 14, section 1724.10, subdivision (i).

The technical reports and information required by items 1 and 2 above must be uploaded to the State Water Resources Control Board’s (State Water Board’s) Geotracker database (https://geotracker.waterboards.ca.gov/esi/login.asp) in an electronic format that follows the requirements of California Code of Regulations, title 23, section 3893 (http://www.waterboards.ca.gov/ust/electronic_submittal/docs/text_regs.pdf). Central Valley Water Board staff has provided, in Attachment A, a unique GeoTracker identifier

(Global ID number). Your state-certified laboratory will need the assigned Global ID number to upload to GeoTracker the certified analytical results for each well. GeoTracker upload instructions are also provided in Attachment A.

Based on the information submitted in the work plan and/or technical report, additional information or action may be required.

All required technical information must be submitted to the attention of:

Alex Olsen
Central Valley Water Board
1685 E Street
Fresno, CA 93706

In addition, all information is to be copied to CalGEM, to the attention of:

Uduak-Joe Ntuk, State Oil and Gas Supervisor
Department of Conservation, Geologic Energy Management Division
801 K Street
Sacramento, CA 95814-3500

Submissions pursuant to this Order need to include the following statement signed by an authorized representative of California Resources:

> *"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."*

Please note that the information produced in response to this Order will be used to ascertain the extent of the migration, as well as the impacts and any necessary remedial actions. Investigative orders are iterative in nature, and subsequent orders may be narrower and more precise in scope.

All technical reports and time schedules required herein are subject to the approval of the Executive Officer. The failure to furnish the required reports by the due dates herein or in a time schedule approved by the Executive Officer, or the submission of a substantially incomplete report or false information, is a misdemeanor, and may result in additional enforcement actions, including issuance of an Administrative Civil Liability Complaint pursuant to California Water Code section 13268. Liability may be imposed pursuant to California Water Code section 13268 in an amount not to exceed one thousand dollars ($1,000) for each day in which the violation occurs.

In accordance with California Business and Professions Code sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain

workplans for investigations and studies, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by California Resources shall bear the professional's signature and stamp.

Any person aggrieved by this Order of the Central Valley Water Board may petition the State Water Board to review the action in accordance with California Water Code section 13320. The State Water Board must receive the petition by 5:00 p.m., within 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations, and instructions applicable to filing petitions are available at the State Water Board's Website or will be provided upon request (http://www.waterboards.ca.gov/public_notices/petitions/water_quality/index.shtml).

Any questions regarding this matter should be directed to Alex Olsen at (559) 445-6076 or at Alex.Olsen@waterboards.ca.gov.

*Original Signed by Clay L. Rodgers for:*
Patrick Pulupa
Executive Officer

Enclosure: Attachment A, Information about the Injection Wells Subject to this Order, Assigned GeoTracker Global Identification Numbers, and GeoTracker Upload Instructions

Attachment B, Water Quality Sampling, Analysis and Reporting

cc by email: David Albright, Manager, Groundwater Protection Section, United States Environmental Protection Agency, San Francisco
Michele Dermer, Groundwater Protection Section, United States Environmental Protection Agency, San Francisco
Uduak-Joe Ntuk, State Oil and Gas Supervisor, California Geologic Energy Management Division, Sacramento
Mark Ghann-Amoah, District Deputy Inland, California Geologic Energy Management Division, Bakersfield
Chris Jones, Supervising Oil and Gas Engineer, California Geologic Energy Management Division, Bakersfield

# ATTACHMENT A
## Information about the Injection Wells Subject to this Order and Assigned GeoTracker Global Identification Number

**Table 1- Assigned GeoTracker Global ID Number- T10000017291**

| Injection Well API No. | Well Number | Latitude | Longitude |
|---|---|---|---|
| 02973097 | 68WD-7G | 35.239746 | -119.43491 |
| 03002301 | 27WD-7G | 35.241505 | -119.44444 |
| 02985821 | 38WD-7G | 35.239632 | -119.44212 |
| 02975252 | 48WD-7G | 35.239876 | -119.43982 |
| 02985822 | 58WD-7G | 35.239883 | -119.43678 |
| 03004029 | 46WD-7G | 35.243183 | -119.43983 |
| 02966689 | 78WD-7G | 35.239639 | -119.43275 |
| 02965495 | 88WD-7G | 35.240116 | -119.43053 |
| 03024632 | 38A-WD-8G | 35.239597 | -119.42362 |
| 02966663 | 18WD-8G | 35.239658 | -119.42854 |
| 02952871 | 38WD-8G | 35.239643 | -119.42375 |
| 02964448 | 56WD-10G | 35.243465 | -119.38335 |
| 03003239 | 66WD-12B | 35.243088 | -119.45329 |
| 03003240 | 86WD-12B | 35.243076 | -119.44884 |
| 03003324 | 22WD-12B | 35.250332 | -119.46249 |
| 03025048 | 25WD-13B | 35.229378 | -119.46305 |
| 03025050 | 47WD-13B | 35.226784 | -119.45837 |
| 03022131 | 57WD-13B | 35.226944 | -119.455 |
| 03021378 | 77WD-13B | 35.22699 | -119.45162 |
| 03027211 | 14WD-13B | 35.232098 | -119.46438 |
| 03026747 | 24WD-13B | 35.231991 | -119.46136 |
| 03025049 | 35WD-13B | 35.229393 | -119.45964 |
| 03027214 | 44WD-13B | 35.232143 | -119.45779 |
| 03022130 | 45WD-13B | 35.229324 | -119.45667 |
| 03027215 | 54WD-13B | 35.232346 | -119.45483 |
| 03022133 | 85WD-13B | 35.229416 | -119.44994 |
| 03021379 | 87WD-13B | 35.22699 | -119.4483 |
| 03025047 | 17WD-13B | 35.226784 | -119.46505 |
| 03024007 | 27WD-13B | 35.226818 | -119.46164 |
| 03022132 | 65WD-13B | 35.229404 | -119.45329 |

| Injection Well API No. | Well Number | Latitude | Longitude |
|---|---|---|---|
| 02967555 | 13WD-17G | 35.234283 | -119.42836 |
| 02961139 | 21WD-17G | 35.237923 | -119.42598 |
| 02973098 | 61WD-18G | 35.23801 | -119.43497 |
| 03021008 | 27WD-18G | 35.226952 | -119.44495 |
| 03021009 | 37WD-18G | 35.226921 | -119.44157 |
| 03031791 | 54XWD-18G | 35.231674 | -119.4372 |
| 03031883 | 56WD-18G | 35.230083 | -119.43572 |
| 03020255 | 57WD-18G | 35.227074 | -119.43837 |
| 03031884 | 64XWD-18G | 35.231216 | -119.43388 |
| 03020256 | 67WD-18G | 35.227165 | -119.43457 |
| 02966694 | 71WD-18G | 35.237877 | -119.43267 |
| 03031877 | 73WD-18G | 35.23394 | -119.43289 |
| 03019512 | 54WD-18G | 35.231655 | -119.43785 |
| 03019381 | 64WD-18G | 35.231323 | -119.4339 |
| 02964449 | 81WD-18G | 35.23782 | -119.43047 |
| 03041542 | 25-18G | 35.23055648 | -119.44472503 |
| 03023952 | 25A-18G | 35.23061371 | -119.4435043 |
| Not Available | 35-18G | 35.23069722 | -119.4414694 |
| 03023953 | 35A-18G | 35.23062134 | -119.4423828 |

GeoTracker Upload Instructions
(https://www.waterboards.ca.gov/ust/electronic_submittal/)

Work plans, and technical reports and associated data shall be uploaded in an electronic format compatible with the State's GeoTracker system. To begin the process:

- Log in or create a password
- Claim your site(s) (i.e. global ID)
- Add field point name(s)
- Upload the following:
  - -Work plan/Technical report and associated data (GeoReport)
  - -Laboratory report (EDF)
  - -Site Maps (GeoMAP)

For more information, contact the GeoTracker Help Desk at Geotracker@waterboards.ca.gov.

# ATTACHMENT B
# Water Quality Sampling, Analysis, and Reporting

## Water Quality Sampling

All groundwater sampling is to be performed by a qualified person. A qualified person is any person with the knowledge and training in proper sampling methods, chain of custody, and quality assurance/quality control protocols.

## Water Quality Analysis

Groundwater samples collected from wells and injection zones shall be analyzed by a laboratory certified by the Environmental Laboratory Accreditation Program. The methods of analysis and the detection limits used shall be appropriate for the expected concentrations. The analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any matrix effects or interferences. Analyze samples for the following:

A. Total dissolved solids
B. Metals listed in California Code of Regulations, title 22, section 66261.24, subdivision (a)(2)(A)
C. Benzene, toluene, ethylbenzene, and xylenes
D. Total petroleum hydrocarbons for crude oil
E. Polynuclear aromatic hydrocarbons (including acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene)
F. Radionuclides listed under California Code of Regulations, title 22, Table 64442, which includes Gross Alpha particle activity (excluding radon and uranium), Uranium, Radium-226, and Radium-228.
G. Methane
H. Stable oxygen and hydrogen isotopes
I. Major and minor cations (including sodium, potassium, magnesium, and calcium)
J. Major and minor anions (including nitrate, chloride, sulfate, alkalinity, and bromide)
K. Trace elements (including lithium, strontium, boron, iron, and manganese)

## Water Quality Reporting

Water quality information shall be submitted in a technical report that includes, at a minimum:

A. Site plan with locations of well(s) sampled.

B. Description of field sampling procedures.

C. Table(s) of analytical results organized by well number (including API number).

D. Copies of analytical laboratory reports, including quality assurance/quality control procedures and analytical test methods.

E. Waste management and disposal procedures.