

STATE OF ALASKA

ALASKA OIL AND GAS CONSERVATION COMMISSION

SEAN PARNELL, GOVERNOR

333 W. 7th AVENUE, SUITE 100
ANCHORAGE, ALASKA 99501-3539
PHONE (907) 279-1433
FAX (907) 276-7542

ADMINISTRATIVE APPROVAL Area Injection Order 13A.001

Mr. Dave Whitacre
Union Oil Company of California
P.O. Box 196247
Anchorage, AK 99519-6247

RE: Area Injection Order 13A
Request for Administrative Approval
Rule 2: Authorized Injection Strata for Disposal
Swanson River Field

Dear Mr. Whitacre:

In accordance with Rule 9 of Area Injection Order (“AIO”) 13A.000, the Alaska Oil and Gas Conservation Commission (Commission) hereby **GRANTS** Union Oil Company of California’s (Unocal) request for administrative approval revising the authorized injection strata for injection disposal of Class II oil field wastes to the strata that are common to, and correlative with, strata between the measured depths (MD) of 1,745 feet and 3,460 feet in Swanson River Unit (SRU) well No. 32-33 (SRU 32-33).

FINDINGS

1. Within the Swanson River Field, all aquifers deeper than 1,700 feet below ground surface are exempted per 40 CFR 147.102 (b)(1)(i).
2. Strata receiving Class II injected waste materials are sandstones assigned to the “B-series” of the Pliocene-aged Sterling formation. These stacked, fluvial sandstone strata are typically 10- to 50-feet thick, rich in volcanic rock fragments, fine-to coarse-grained, fairly to moderately sorted, and display little detrital or authigenic matrix. Well-log correlations indicate local continuity of the sandstone strata is good.
3. Upper confinement for injected waste is provided by a 30- to 50-foot thick interval of interbedded layers of claystone and siltstone with minor sandstone that lies between 1,695 feet and 1,745 feet MD in SRU 32-33 (see Figure 1, below). This confining interval is present on well logs and appears to be continuous for a radius of ½ mile around the active SRU 31-33WD and SRU 32-33WD disposal wells.
4. Lower confinement for injected waste is provided by a 115-foot thick interval that lies between about 3,460 feet and 3,575 feet MD in SRU 32-33. This interval contains an aggregate thickness of about 55 feet of interbedded claystone, siltstone and coal that will provide an effective bottom seal for the injected fluids. This confining interval appears to be continuous for a radius of ½ mile around SRU 31-33WD and SRU 32-33WD.

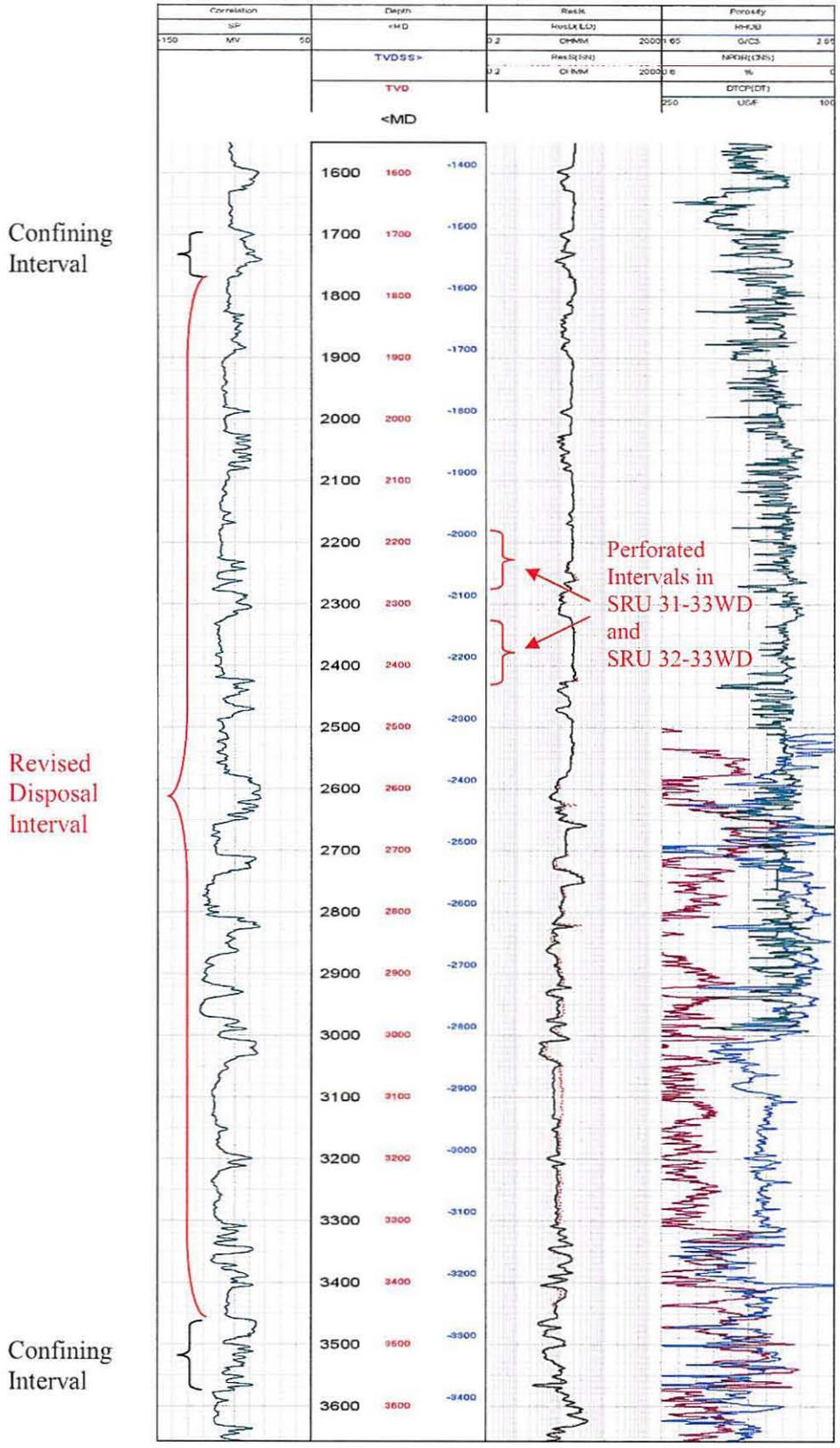


Figure 1. SRU 32-33 Well Log

5. To date, approximately 62.3 million barrels of Class II wastes have been injected into wells SRU 21-33WD, SRU 31-33WD, SRU 32-33WD, and SRU 41-33WD. Wells SRU 21-33WD and SRU 41-33WD have been properly plugged and abandoned, but during disposal injection operations these two wells received 2.7 and 3.7 million barrels of waste, respectively. Wells SRU 31-33WD and SRU 32-33WD are active injection wells that have received 32.7 and 23.2 million barrels of waste, respectively.
6. The cumulative injected Class II waste volume is estimated to extend radially about 800 feet from SRU 31-33WD and about 650 feet from SRU 32-33WD.¹ Waste volumes injected into SRU 31-33WD and SRU 32-33WD are likely in communication with each other.
7. Rule 2 of AIOs No. 13 and 13A defines the authorized injection strata as "...those strata which correlate with strata found in well SRU 32-33 between the measured depths of 2,100 feet and 3,460 feet." The injection strata were defined in accordance with descriptions provided by ARCO Alaska, Inc., operator for the SRU at the time of the original application.²
8. Upper confining intervals for the Sterling injection sands are not precisely defined in the original application for AIO 13. The depth of 1,700 feet is referenced in that application and in AIO 13 as being the upper limit for confinement.³
9. On May 13, 2010, Unocal requested the Commission revise AIO 13 to conform to the well logs.
10. The Alaska Department of Natural Resources' MapGuide Water Rights GIS System (<http://magellan.dnr.state.ak.us/dnrwater/default.cfm>) shows 10 shallow water wells recorded in the SRU area; the deepest is 262 feet below ground level. All wells are registered to Unocal and dedicated to supporting oil and gas activities; no other registered water wells are within 6 miles of the SRU.
11. Active disposal injection wells SRU 31-33WD and SRU 32-33WD recently passed standard mechanical integrity tests.

CONCLUSIONS

1. The proposed, revised injection strata that are equivalent to strata between 1,745 and 3,460 feet MD in well SRU 32-33 are sufficiently thick and laterally continuous and have sufficient reservoir properties to accept additional injected Class II waste fluids.

¹ This estimate is based on the temperature-log-determined waste depths of 1,970 feet MD in 1989 and 1,800 feet MD in 2010, assuming uniform filling of the 170-foot thick interval at 8.1 feet per year, an average porosity of 21.5%, and piston-like displacement of native formation fluids.

² ARCO Alaska, Inc., 1987, Swanson River Unit, Area Injection Order Application for AIO 13. Attachment G-2 is hand-annotated with the injection interval between 2,100 feet and 2,422 feet MD. Attachment G-2 is described on page 12 as "an electric log showing the water injection zones in a typical water injection well." However, page 11 states: "Injection within the Sterling is limited to water wet sandstones within the Sterling B series (as recognized by Chevron Stratigraphy) from 2,100' to 3,500'." AIO 13A expanded the definition of the underlying Hemlock Pool, but it did not alter the definition for the Sterling injection sands or address the associated Sterling confining intervals.

³ ARCO Alaska, Inc., 1987, cited above. Subsection 2, states in part: "Even if the immediate confining zone failed, there are several confining zones between the injection interval and 1700'." Finding 4 of AIOs 13 and 13A states: "Adequate confining strata are present below 1700 feet in the Swanson River Field to prevent upward movement of waste fluid from injection zones into non-exempt fresh water sources."

2. The upper and lower confining intervals designated in the SRU 32-33 well, confirmed on the well logs submitted in support of the original application, are sufficiently thick and laterally continuous to contain injected waste fluids.
3. There is no evidence that injected waste fluids have migrated or will migrate upward beyond the upper confining layer into non-exempt strata. Underground sources of drinking water will not be affected.
4. The active disposal injection wells have demonstrated mechanical integrity.
5. Revising the authorized injection strata will not promote waste or jeopardize correlative rights, is consistent with the well logs submitted in support of the original application, is based on sound engineering and geoscience principles, and will not result in an increase risk of fluid movement into fresh water.

NOW, THEREFORE, IT IS ORDERED THAT the rule governing Class II underground injection operations in the Swanson River Field as described in Rule 2 of Area Injection Order No. 13A be revised as follows:

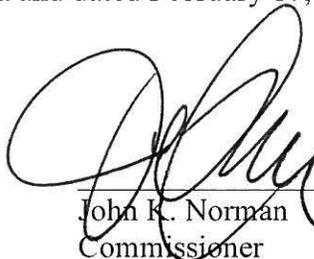
Rule 2 Authorized Injection Strata for Disposal (Revised AIO 13A.001)

Within the affected area non-hazardous oil field fluids may be injected for the purpose of disposal into strata defined as those strata that are common to, and correlate with, strata found in well SRU 32-33 between the measured depths of 1,745 feet and 3,460 feet.

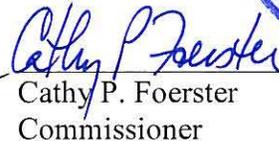
DONE at Anchorage, Alaska and dated February 17, 2011.



Daniel T. Seamont, Jr.
Chair



John K. Norman
Commissioner



Cathy P. Foerster
Commissioner



RECONSIDERATION AND APPEAL NOTICE

As provided in AS 31.05.080(a), within 20 days after written notice of the entry of this order or decision, or such further time as the Commission grants for good cause shown, a person affected by it may file with the Commission an application for reconsideration of the matter determined by it. If the notice was mailed, then the period of time shall be 23 days. An application for reconsideration must set out the respect in which the order or decision is believed to be erroneous.

The Commission shall grant or refuse the application for reconsideration in whole or in part within 10 days after it is filed. Failure to act on it within 10-days is a denial of reconsideration. If the Commission denies reconsideration, upon denial, this order or decision and the denial of reconsideration are FINAL and may be appealed to superior court. The appeal MUST be filed within 33 days after the date on which the Commission mails, OR 30 days if the Commission otherwise distributes, the order or decision denying reconsideration, UNLESS the denial is by inaction, in which case the appeal MUST be filed within 40 days after the date on which the application for reconsideration was filed.

If the Commission grants an application for reconsideration, this order or decision does not become final. Rather, the order or decision on reconsideration will be the FINAL order or decision of the Commission, and it may be appealed to superior court. That appeal MUST be filed within 33 days after the date on which the Commission mails, OR 30 days if the Commission otherwise distributes, the order or decision on reconsideration. As provided in AS 31.05.080(b), "[t]he questions reviewed on appeal are limited to the questions presented to the Commission by the application for reconsideration."

In computing a period of time above, the date of the event or default after which the designated period begins to run is not included in the period; the last day of the period is included, unless it falls on a weekend or state holiday, in which event the period runs until 5:00 p.m. on the next day that does not fall on a weekend or state holiday.