To the Kern Water Collaborative and the Central Valley Regional Water Quality Control Board:

Our family submits these comments as multigenerational farmers in the Kern Basin who depend on groundwater for irrigation and domestic use, who have farmed alongside oilfield wastewater disposal operations for half a century. We appreciate the stated goals of the Nitrate Control Program and the Kern Water Collaborative (KWC) to ensure safe drinking water and to manage long-term nitrate impairment. However, we are deeply concerned that the proposed Final Management Zone Proposal (FMZP) fails to meaningfully address oilfield wastewater disposal as a source and pathway of nitrate (NO_3-) & ammonium (NH_4+) loading to groundwater, despite acknowledging such discharges and requiring nitrate monitoring of wastewater.

For over 100 years, so-called “produced water” from oil and gas operations in the Kern Basin has been discharged to unlined ponds, spreading basins, and land application areas across large portions of the Westside, Midway-Sunset, Elk Hills, Kern Front, Belridge, and other fields. These disposal practices occurred long before modern groundwater protections existed and continue today at ever-increasing and staggering volumes. In the area of Belridge and Lost Hills alone, as a result of oil company greed and the Regional Water Quality Control Board’s dereliction of their responsibility to protect our state’s groundwater supplies, every year, millions of pounds of nitrate and ammonium are being injected directly into the Tulare Formation, which is the primary source of irrigation and municipal water for farms and families living in Kern County. The cumulative volume of oilfield waste water disposed of in this basin over multiple generations is immense, and is the longest-running and largest groundwater pollution discharge activity in California. It goes unreported in the media and public information sphere and is thus largely ignored in much discourse around groundwater pollution in the Central Valley, but given its importance and vast scale, it must be given special consideration.

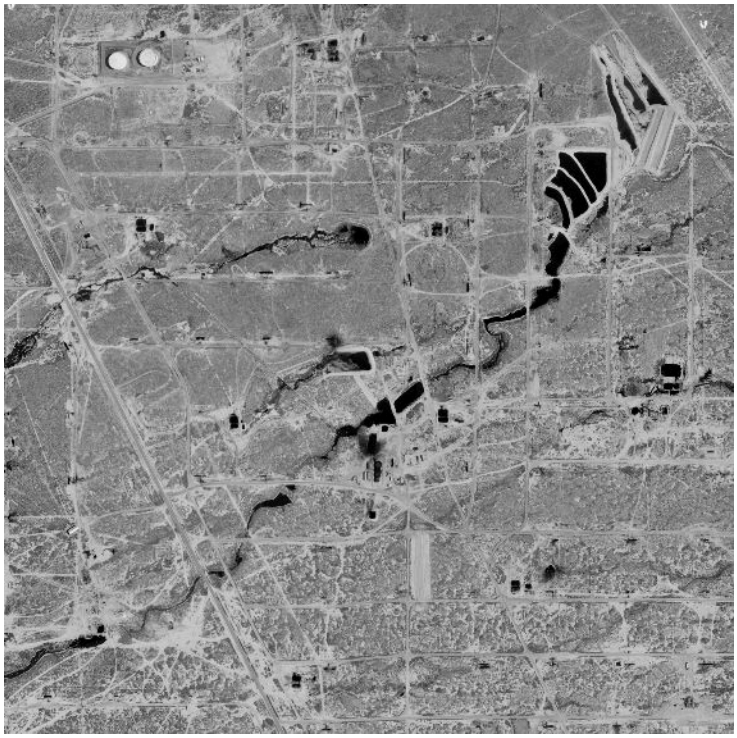

Figure 1: Aerial image from the 1960s of oilfield wastewater discharge into Chico Martinez Creek and other ephemeral streams in the Belridge Oilfield, a few miles west of our farm. Note the construction of unlined ponds to retain wastewater and allow it to percolate into groundwater.

The FMZP itself confirms that wastewater is discharged to ponds and land, and that nitrate is a required monitoring parameter in wastewater discharges. This acknowledgment establishes that oilfield wastewater is treated by the regulatory framework as a nitrate-relevant waste stream. Yet the FMZP contains no analysis of nitrate loading from oilfield wastewater disposal, no mapping or evaluation of oilfield wastewater disposal plumes, no assessment of historical cumulative impacts from decades of oilfield discharges, and no enforceable nitrate-reduction or source-control obligations imposed on oilfield disposal facilities. It also fails to consider that because of the strong reducing qualities of oilfield wastewater, the water is commonly contaminated with reduced nitrogen, ammonium, which rapidly converts to nitrate after discharge/mixing under oxygenated conditions in soil or in the aquifer. We propose that narrowly focusing on nitrate content and not including ammonium monitoring may lead regulators to ignore a very important source of nitrate loading in the context of Kern County's basin. We cite McMahon et al. (2018), which found median ammonium concentrations of 163 ppm of Nitrogen in wastewater in the Lost Hills oilfield, and concentrations of 426 ppm of Nitrogen in wastewater in the Belridge oilfield. These levels are well above the 10 ppm of N in the nitrate form that has been established as the unsafe threshold.

The FMZP proposes to treat compliance on a collective, management-zone basis and to focus almost entirely on interim drinking-water replacement. This approach functionally shields

long-standing industrial nitrate and ammonium dischargers from individual responsibility while shifting the practical burden of groundwater degradation onto rural families and communities that rely on local aquifers.

We want to make special note of major deficiencies with regards to this document with regards to oilfield wastewater disposal activities. For instance, section 4.1.5 “Groundwater Quality Management Plan (GQMP)” discussed trigger events that would require a GQMP to be developed. The triggers only apply to agricultural production, and the oil and gas industry’s discharges are completely ignored. Under this document, there is no enforcement mechanism to restrict oil company discharges into aquifers if they are contributing to elevated nitrate and/or ammonium levels in groundwater.

Figure 2: Oilfield wastewater being discharged into unlined percolation pits a few miles west of our farm. This disposal activity has occurred continuously, 24 hours per day, 365 days per year, for over a century, across much of the west side of Kern County’s groundwater basin.

We know from personal experience, and can cite many examples up to the present day, where the Regional Water Quality Control Board has been aware of oilfield wastewater migration across township and property boundaries, and has taken no action to restrict oilfield wastewater disposal activities. Without an explicit enforcement mechanism, our family has no confidence that agriculture will not be forced to shoulder all responsibility for reducing nitrogen discharge into the basin, when oil companies are major contributors.

We suggest that in cases where oil companies have demonstrably contributed a much greater share of the pollution, it is reasonable that they should shoulder a much greater share of the consequences. In fact, if their discharges have been found to cause nitrate or ammonium levels to exceed safe thresholds, they should be required to reimburse affected farmers financially for

any crop yield losses and added operational costs associated with reduced nitrogen fertilizer usage and regulatory actions required as a result of a GQMP implementation.

Furthermore, the Starrh family would like to note that the FMZP relies fundamentally on the delineation of a shallow “Upper Zone” to define the scope of nitrate regulation and responsibility. That delineation is explicitly based on generalized hydrostratigraphy and the presumed presence and integrity of fine-grained confining or semi-confining units, including Corcoran Clay and Corcoran-equivalent deposits. The FMZP repeatedly references interbedded finer-grained materials and regional geologic units as the basis for truncating nitrate accountability at depth, thereby implicitly treating deeper aquifers as protected from nitrate migration. At the same time, the FMZP admits that groundwater elevation data are insufficient to quantify hydraulic gradients, flow directions, or downgradient nitrate migration, and that determination of potential impacts from nitrate movement is “not possible at this time” due to data limitations. This internal contradiction, drawing a regulatory boundary based on assumed confinement while conceding that flow and migration cannot be evaluated, renders the Upper Zone framework scientifically unsupported and legally arbitrary.

This reliance on presumed confining layers is particularly indefensible on the west side of Kern County, including the Lost Hills, Belridge, Buttonwillow, and Midway-Sunset areas, where Corcoran Clay and equivalent lacustrine units are thin, discontinuous, locally absent, or replaced by interfingered silts and sands. We note that a number of hydrogeologists, including peer-reviewers hired by the RWQCB, Drs. Alberto Bellin, Ph.D. and J. Jaime Gómez-Hernández Ph.D., have noted that the Corcoran Clay Equivalent layer on the westside of the basin is discontinuous and does not appear to act as a confining layer in that area. In these same areas, thousands of historical oil and gas wells, disposal wells, test holes, and abandoned agricultural wells have physically breached whatever confining units may once have existed, creating preferential vertical migration pathways that the FMZP does not evaluate or even acknowledge. By assuming intact confinement and using that assumption to limit regulatory responsibility to a shallow Upper Zone, the FMZP unlawfully ignores vertical nitrate migration, cross-formational flow, and long-term cumulative impacts to deeper aquifers. Any nitrate-management framework that depends on unverified confining layers to shield deeper groundwater from regulatory protection (while admitting that groundwater flow and migration cannot be characterized), fails to satisfy the Basin Plan’s anti-degradation policy and Porter-Cologne’s requirement to prevent further groundwater degradation.

Furthermore, considering the relatively recently-permitted practice of shallow-well wastewater injection on the westside, which annually allows over 20,000 acre-feet of untreated, briny, nitrate and ammonium-containing oilfield wastewater to be directly injected below the Corcoran Clay Equivalent layer, into both the upper and lower Tulare formations, should be enough to dispel the idea that nitrate and ammonium contamination is limited to the alluvial layer. Clearly regulation of disposal activities that occur in the lower formations is necessary too.

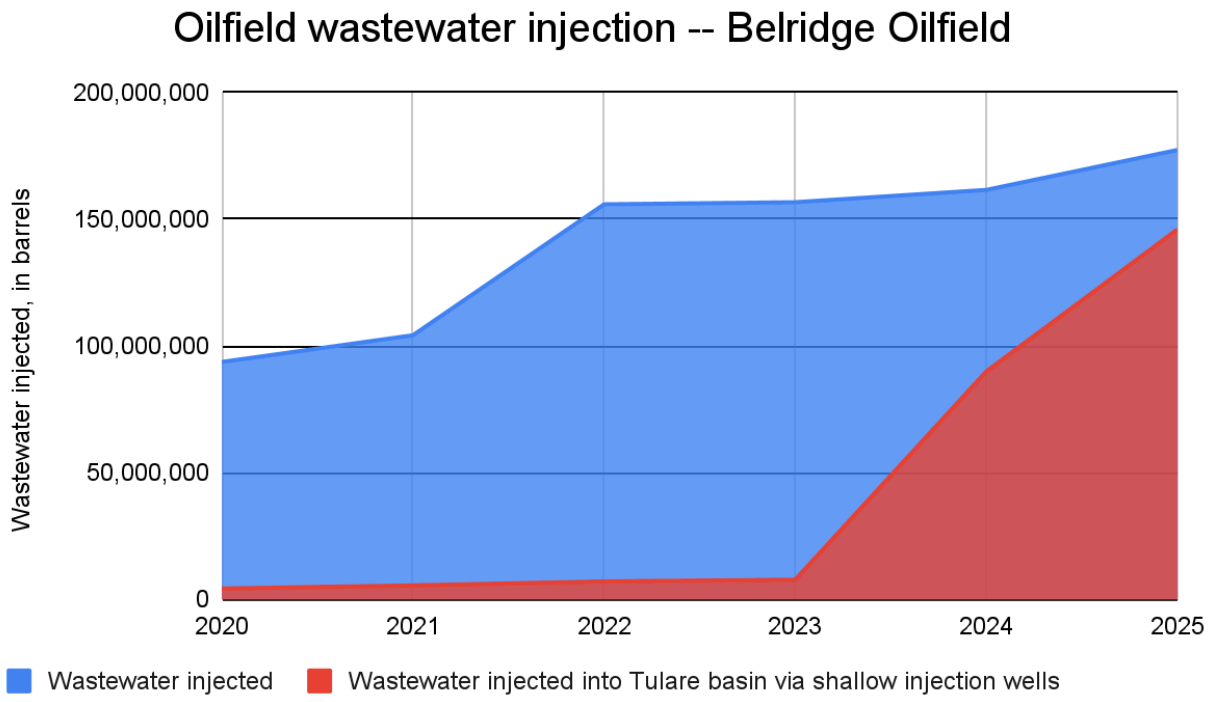

Figure 3: Wastewater injection well data from 2020-2025 in the Belridge Oilfield. Collected and aggregated by the Starrh family from publicly available information available through CalGem. Data for 2025 is an annualized estimate, as quarter 4 data was not yet available at the time this report was being drafted. We define "shallow injection wells" as wells which inject into the upper and lower Tulare formation. 87 new wastewater injection wells have been drilled or activated in the Belridge oilfield west of our farm. Most perforations in these wells start between 305 and 450 feet below ground surface (bgs), and they are permitted to inject as shallow as 200 feet bgs. Our farm's groundwater wells generally have perforations between 300 and 520 feet bgs.

From the perspective of farming families who have stewarded land and water in this basin for generations, this FMPZ does not represent an equitable or scientifically-defensible approach. In effect, it sidesteps the established facts that oilfield wastewater can and does contain nitrate and ammonium, whether from formation water, deliberate injection of nitrate-based treatment chemicals, oxidation of reduced nitrogen species during surface handling and percolation, or mixing with shallow nitrate-impacted groundwater and agricultural return flows. Oilfield nitrate and ammonium discharges have occurred continuously for decades, well before modern agricultural nitrate regulations were adopted, yet the FMZP assigns no historical or prospective accountability to these operations.

The FMZP does acknowledge produced-water/wastewater nitrate monitoring but then fails to use that data for any loading analysis, trend evaluation, plume delineation, or regulatory decision-making. And we further note that the Path B Management Zone framework grants an exception from individual nitrate standards and evaluates compliance on a collective basis,

thereby insulating specific industrial dischargers even if their operations materially and calculably contribute to Upper Zone and Lower Zone nitrate exceedances.

We are particularly troubled that oil and gas disposal facilities are formal participants in the Management Zone while also benefiting from a compliance structure that avoids fault-finding and defers corrective action. This creates a regulatory framework in which some of the longest-operating industrial groundwater dischargers in the basin help govern a program that determines whether they are deemed “in compliance.”

For families like ours, who depend on groundwater for both livelihoods and our homes, this approach undermines confidence in the fairness and integrity of the Nitrate Control Program. It also conflicts with the Basin Plan’s anti-degradation policies and Porter-Cologne’s fundamental requirement to prevent further degradation of groundwater quality.

Accordingly, we respectfully request that the FMZP not be accepted in its current form. We request that the KWC be required to: (1) Quantify nitrate concentrations and mass loading from wastewater disposal facilities within the Management Zone. (2) Analyze historical cumulative impacts from decades of oilfield wastewater disposal. (3) Delineate areas of potential contribution and nitrate plumes associated with waterwater disposal sites. (4) Evaluate waterwater disposal as a contributing source to Upper Zone nitrate impairment. (5) Impose enforceable nitrate-reduction, source-control, or treatment obligations on oilfield disposal operations where nitrate is present or formed during disposal. We also request that the Central Valley Regional Quality Control Board clarify that participation in a Management Zone does not relieve any individual discharger, and particularly oilfield wastewater disposal facilities, of responsibility to prevent further nitrate degradation of groundwater or to correct existing contributions to impairment.

Our family is not opposed to cooperative solutions or collective management where appropriate. But cooperative frameworks cannot be used to erase a century of industrial groundwater discharge history or to sidestep source accountability for nitrate and ammonium pollution. Any nitrate-management program that fails to confront oilfield wastewater disposal as a real, long-standing nitrate pathway in the Kern Basin is incomplete, inequitable, and scientifically unsound.

We submit these comments to protect not only our family’s water supply, but also the long-term viability of agriculture and rural communities throughout the Kern Basin.

Respectfully submitted,

The Starrh and Kroeker families, owners of:

Starrh & Starrh Cotton Growers

Starrh Family Farms

Located in Shafter, CA, submitted on Monday, January 26, 2026

Work cited:

McMahon, PB et al., (2018) “Regional Patterns in the geochemistry of oil-field water, southern San Joaquin Valley, California, USA” Applied Geochemistry, vol. 98, pages 127-140