



November 11, 2015

via electronic mail and U.S. mail to:

San Luis Obispo
Department of Planning and Building
Planning Commission Secretary
976 Osos Street
San Luis Obispo, CA 93408
Planning@co.slo.ca.us
RHedges@co.slo.ca.us

Re: Freeport-McMoRan Oil & Gas, LLC, Arroyo Grande Oil Field, Application to Extend Phase IV CUP # D010386D - Supplemental Information

Dear Planning Commission,

The Center for Biological Diversity ("Center") is submitting these comments to supplement the comments submitted to this Commission on October 21, 2015, incorporated by reference herein.¹ At the Planning Commission meeting held on October 22, 2015, the Planning Commission ("Commission") held over a decision on Freeport-McMoran Oil & Gas, LLC's ("FMOG") request for an extension of their CUP to build 31 wells until November 12, 2015. The Commission did this in order to gain more clarity, particularly on whether there would be any impacts to surrounding groundwater and potential sources of drinking water. Since that time, the Center has reviewed Low Carbon Fuels Standard ("LCFS") data, and retained an independent, certified professional hydrogeologist, Matt Hagemann, to review the documents submitted as part of the Phase IV CUP application (including the Final Environmental Impact Report), as well as the aquifer exemption documents under review by the State Division of Oil, Gas, and Geothermal Resources ("DOGGR") and the State Water Resources Control Board ("SWRCB").² Based on

¹ And attached.

² Mr. Hagemann's review and his CV are attached to this letter.

these reviews, the Center requests that the Commission deny FMOG's request to extend its CUP at this time.

At the outset, it is important to note that FMOG is relying on increasing energy and water intensity to produce oil at Arroyo Grande Oil Field ("AGOF"). This information was not and could not have been analyzed in the decade-old final Environmental Impact Report ("FEIR"). According to data collected by the California Air Resources Board ("CARB") for implementation of the LCFS (adopted after the FEIR),³ in 2012 AGOF had 83 oil production wells and 8 injection or water disposal wells that produced 17,372 barrels per day of water ("bpd") and 998 bpd of oil. Its water to oil ratio was 17.58. According to FMOG's data in its aquifer exemption application,⁴ current production from 221 active production wells is 29,750 bpd of water and 1,350 bpd of oil.⁵ Its water to oil ratio is therefore now 22.⁶ Over that period--during which time FMOG claims it was "dewatering the basin" to increase efficiency of oil production⁷--the average bpd of oil extracted per well at AGOF decreased by 50%, from approximately 12 bpd⁸ to 6 bpd. Meanwhile, the water to oil produced ratio has increased by 25%. In other words, despite the extra injection wells and production wells built, the efficiency of oil production at AGOF is decreasing, requiring larger volumes of water to produce smaller amounts of oil.⁹ The decreasing efficiency of production means that the oil field's energy intensity and water usage is going to increase, as it takes ever larger amounts of steam to produce oil. Indeed, the ratio of steam injection wells to production wells has increased significantly since 2012, and promises to increase even more with the construction of the 31 new wells (8 of which are steam injection). The

³ Available at: <http://www.arb.ca.gov/fuels/lcfs/crude-oil/crude-oil.htm> (OPGEE Version 1.1E) ("LCFS data 2012").

⁴ Available at:

ftp://ftp.consrv.ca.gov/pub/oil/Aquifer_Exemptions/County/San_Luis_Obispo/Arroyo_Grande_Oilfield/Dollie_Sand_s_Pismo_Formation/Arroyo%20Grande%20Oilfield%20Edna%20Member%20Dollie%20Sands%20Pismo%20Formation%20Aquifer%20Exemption%20Application%20Complete.pdf.

⁵ *Id.* at 17.

⁶ For comparison, the average water to oil ratio for California oil fields in 2012 was a little over 15. (LCFS data 2012.).

⁷ *Ibid.*

⁸ LCFS data 2012.

⁹ At these rates--assuming water to oil ratio stays the same--if FMOG reaches its Phase IV target of 5,000 bpd of oil produced with 241 total production wells and 59 injection wells, it will have increased the amount of water produced from 29,750 bpd (1,249,500 gallons per day) to 110,200 bpd (4,628,400 gallons). (5,000 bpd target is stated in Phase IV Final EIR, submitted with Oct. 21, 2015 Center comments, at 2-1.) If oil production merely doubles over current production--to 2,700 bpd of oil--produced water volumes will increase to 59,508 bpd, or 2,499,336 gallons per day of water.

Commission must, at a minimum, evaluate and consider the costs of this increasing energy and water usage and decreasing oil field efficiency on the health of San Luis Obispo County residents and its environment before considering FMOG's request.

With respect to concerns about groundwater flow and impacts to surrounding groundwater--including drinking water--as Mr. Hagemann explains in the attached letter, there is not enough critical and commonly used information about the groundwater here for the County to be able to approve FMOG's request at this time. The extension relies on an FEIR that spent one paragraph discussing impacts on water wells based on extremely limited data, and includes no analysis of impacts to drinking water wells on adjacent properties. In order to allow the Commission to properly evaluate any impacts on surrounding groundwater, FMOG must supply basic and "fundamental" information it has so far inexplicably failed to provide. For example, Mr. Hagemann notes that in the aquifer exemption application, FMOG presents data--though incomplete--that there are at least 24 domestic water wells in the Edna Member of the Pismo Formation--at similar depths and in the same formation as is proposed for the aquifer exemption. The data on which FMOG relies, however, is incomplete and fails to include critical information such as: well completion data of all of the nearby wells; the exact spatial locations of all nearby wells; and, geological cross sections showing the relationship between the drinking water wells and the injection wells located in the same unit.

The Center is particularly concerned about the fact that FMOG has not disclosed the chemicals it uses in its operations, including those used during drilling and well maintenance. Many of these chemicals are not known to regulators, and therefore are not monitored. The wastewater and water used for steam injection do not pass through the water reclamation facility and almost certainly contain toxic chemicals. Mr. Hagemann notes that FMOG's assertion that the aquifer underneath the oil field which it uses for injection is a hydrologically isolated bowl is not supported by clear, objective data. This includes a lack of objective data demonstrating that the portion of the "Edna Member that is targeted for injection" is isolated from the area of the same Member that "is tapped by at least 24 adjacent drinking water wells." If FMOG wants to assert hydraulic isolation, it must submit a "numerical groundwater model to estimate response in the aquifer to Project injection and pumping" to support this assertion. Despite the fact that these models are

"commonly used to simulate the flow of groundwater," and that nearby residents have repeatedly raised concerns about the effects of AGOF operations on their groundwater, FMOG has inexplicably failed to provide a numerical groundwater model.

We have learned a significant amount about groundwater modeling for oil and gas operations, about the effects of oil and gas operations on climate change, and about the lack of oil and gas regulation in the state since the FEIR was certified a decade ago. In addition, the regulatory environment has changed significantly with the passage and implementation of AB 32, the LCFS, and water restrictions due to the drought, all of which must inform the Commissioners' current decision. The Commissioners should not approve an extension of time for the addition of 31 wells of this energy- and water-intensive oil field, especially in the absence of clear and convincing, professionally accepted and commonly used data demonstrating the safety of its operations on groundwater, our climate, and the health and environment of San Luis Obispo. FMOG has not provided this, so its request must be denied.

Sincerely,

/s/

Maya Golden-Krasner
Climate Staff Attorney

cc: Commissioner Jim Irving, via Vicki M. (Shelby) Fogleman
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Commissioner Eric Meyer
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November 10, 2015

Maya Golden-Krasner
Center for Biological Diversity
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Subject: Comments on the Land Use Permit Application Amendment to CUP #010386D

Dear Ms. Golden-Krasner:

I have reviewed the Land Use Permit Application Amendment to CUP #010386D for impacts to underlying drinking water resources. The approval of CUP #010386D in 2005 authorized Freeport McMoRan Oil and Gas, LLC, ("Applicant") to construct 95 production wells, 30 steam injection wells, 3 steam generators, 4 well pads, and to modify 31 existing well pads. Since approval, 63 production wells, 31 steam injection wells, and 5 water disposal wells have been installed as part the of Phase IV development. On December 9, 2014, the County issued final the notice to proceed for the applicant's Phase IV Drilling Program ("Project"), which approved 31 wells including 20 production wells, 8 steam injection wells and 3 water disposal wells which have yet to be installed. Under terms of the Land Use Permit Application Amendment to CUP #010386D, a three-year extension is sought by the applicant to complete the Project.

The approval of CUP #0010386D in 2005 was based on a Final Environmental Impact Report (FEIR) that was prepared in September 2004. The FEIR lacks key information about drinking water wells and impacts to drinking water resources. In fact, there is no discussion in the FEIR about potential impacts to surrounding drinking water wells. The only discussion included in the FEIR about potential drinking water impacts is limited to one brief paragraph on p. 5.7-6 that states water supply wells on the Project site have not been impacted by steam or wastewater injection. This conclusion was reached in the FEIR through the analysis of two water supply wells on the Project site. The FEIR made no analysis of impacts to drinking water wells which are located adjacent to the Project. Prior to allowing the construction of the remaining wells to proceed under an amendment to CUP #0010386D, the County should require the Applicant to evaluate impacts on drinking water aquifers and water supply wells.

Since the Project was approved in 2005, a new light has been cast on impacts from oil company operations on water resources. One of the key concerns that has been raised in California is the impact of injection of produced water and well stimulation fluids in aquifers that are sources of drinking water. The U.S. EPA has recently stated the California program under which injection of oil field related fluids

has “serious deficiencies” and is in the process of determining if the program meets regulatory requirements for the Class II Oil and Gas Underground Injection Program. An underlying foundation to the program is that the injection of water into aquifers is not allowed unless the groundwater has been exempted as a source of underground drinking water. The Project applicant is currently seeking such an exemption from the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR).

Because the aquifer exemption has not been granted, the Project, which involves the extension of time for completion of 8 steam injection wells and 3 water disposal wells, should be reevaluated for potential impacts to drinking water prior to approval. To adequately evaluate these impacts, fundamental information is needed, including information on where drinking water wells are located and how the aquifer will respond to injection of fluids.

Some information has been presented through the aquifer exemption application process that shows 105 drinking water wells to be located within a one-mile radius of the area that has been proposed for exemption. Of these wells, 24 are known to have been completed in the Edna Member of the Pismo Formation. (This is a minimum number because well completion data has only been obtained for about half the 105 wells known to be within a one-mile radius of the Project.) The Edna Member, as defined by the U.S. Geological Survey, is the same stratigraphic unit as the Dollie Sands, the specific unit proposed for aquifer exemption.

No map has been prepared for inclusion in the public record for the exemption process or for the Project to accurately show where the 105 drinking water wells are located in an aerial sense. The only map that has been prepared shows well locations in a very general sense. The map, included as Attachment 1, depicts the 105 drinking water wells on a scale that does not allow for accurate location and uses only dots that are gradational in scale to schematically identify the location of the 105 wells that lie within the one-mile radius of the Project.

Despite the proximity of the 105 drinking water wells to the Project and the fact that at least 24 wells draw from the same water bearing unit at similar depths, no geologic cross sections that would depict the relationship of drinking water wells to the injection wells has been completed. The need for cross sections to depict the injection wells and the drinking water wells is critical because the wells tap the same vertical interval of the Edna Member. According to information included in the aquifer exemption package¹, some wells in the Edna Member produce drinking water from depths up to 510 feet. Injection into the Edna Member occurs at depths as shallow as 600 feet (p. 17/594, pdf). No stratigraphic barriers (aquitards) are known to exist that would prevent the vertical migration of fluids at these depths in the Edna Member. Prior to allowing for further completion of 8 steam injection wells and 3 water disposal wells, an accurate map should be prepared to show where the drinking water wells are located in relation to oil field activities including Project wells. Cross sections should also be prepared to depict Project wells in relation to adjacent drinking water wells.

The exemption application materials claim that the drinking water aquifer and wells are isolated from oil field activities by a fault to the north, the discontinuity of the Edna Member to the south, and a tar seal and loss of permeability to the east and west. This claim that the aquifer that is proposed for exemption is hydraulically isolated from drinking water sources and drinking water wells has been supported by the

¹ http://www.conservation.ca.gov/dog/Pages/Aquifer_Exemptions.aspx

applicant on the basis of stratigraphic interpretation, physical aquifer characteristics, and chemical and thermal data. This evidence is highly interpretive and by no means definitive. A key question that remains is the lateral hydraulic continuity of the oil producing area with aquifers that are used for drinking water, including the Edna Member that is targeted for injection and is tapped by at least 24 adjacent drinking water wells.

These boundary conditions need to be evaluated through use of a numerical groundwater model to estimate response in the aquifer to Project injection and pumping. Numerical (computer-based) models of groundwater systems are commonly used to simulate the flow of groundwater, including the response of water levels across aquifer boundaries under conditions of injection and pumping.

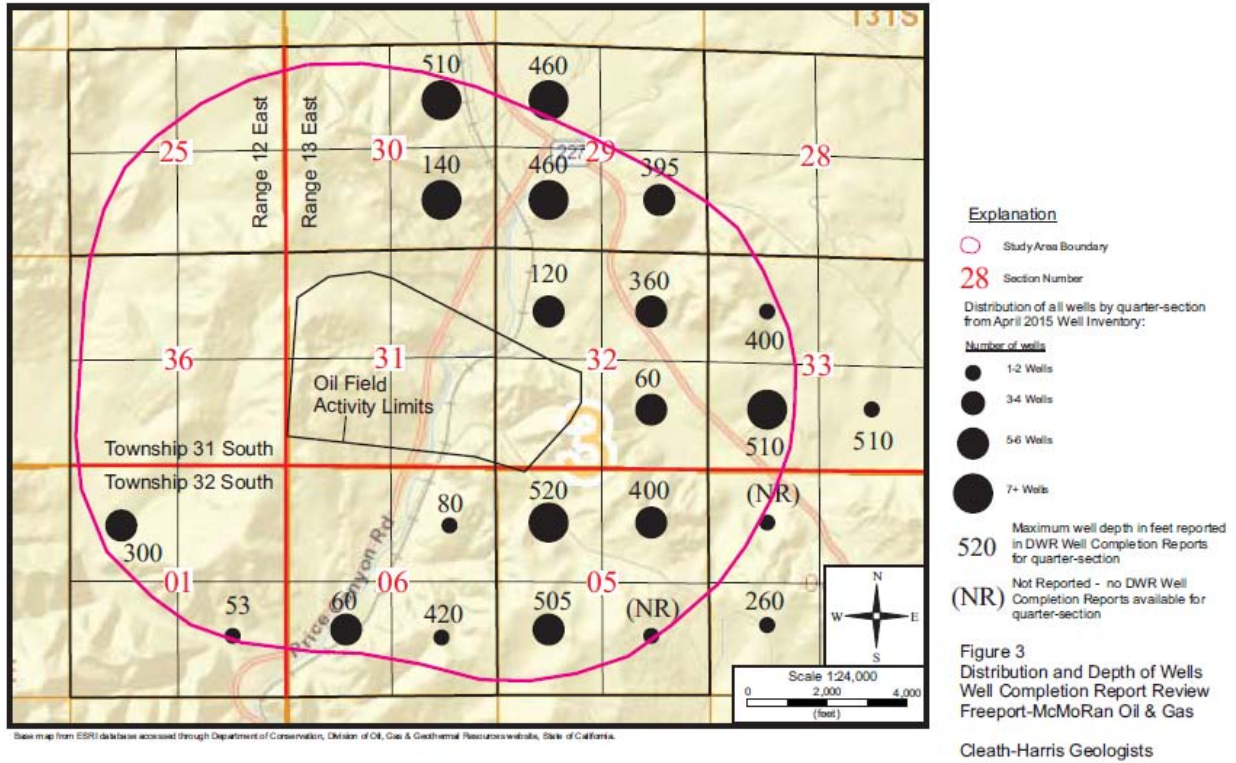
The record on the potential impacts to groundwater from the Land Use Permit Application Amendment to CUP #010386D is insufficient for decision making. Approval of the Project should be withheld until fundamental information on drinking water wells, including locations and cross sectional correlations to injection wells, is presented for public evaluation. A numerical groundwater model should also be completed to evaluate potential hydraulic interconnections along Project boundaries with groundwater used for drinking water.

Sincerely,



Matt Hagemann, P.G., C.Hg.

Attachment 1: Map obtained from Appendix G-1-1, Aquifer Exemption Package,
http://www.conservation.ca.gov/dog/Pages/Aquifer_Exemptions.aspx, p. 259/573 pdf.





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**Geologic and Hydrogeologic Characterization
Industrial Stormwater Compliance
Investigation and Remediation Strategies
Litigation Support and Testifying Expert
CEQA Review**

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.

B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

Professional Certifications:

California Professional Geologist

California Certified Hydrogeologist

Qualified SWPPP Developer and Practitioner

Professional Experience:

Matt has 25 years of experience in environmental policy, assessment and remediation. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) while also working with permit holders to improve hydrogeologic characterization and water quality monitoring.

Matt has worked closely with U.S. EPA legal counsel and the technical staff of several states in the application and enforcement of RCRA, Safe Drinking Water Act and Clean Water Act regulations. Matt has trained the technical staff in the States of California, Hawaii, Nevada, Arizona and the Territory of Guam in the conduct of investigations, groundwater fundamentals, and sampling techniques.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2014;
- Senior Environmental Analyst, Komex H2O Science, Inc. (2000 -- 2003);

- Executive Director, Orange Coast Watch (2001 – 2004);
- Senior Science Policy Advisor and Hydrogeologist, U.S. Environmental Protection Agency (1989–1998);
- Hydrogeologist, National Park Service, Water Resources Division (1998 – 2000);
- Adjunct Faculty Member, San Francisco State University, Department of Geosciences (1993 – 1998);
- Instructor, College of Marin, Department of Science (1990 – 1995);
- Geologist, U.S. Forest Service (1986 – 1998); and
- Geologist, Dames & Moore (1984 – 1986).

Senior Regulatory and Litigation Support Analyst:

With SWAPE, Matt’s responsibilities have included:

- Lead analyst and testifying expert in the review of over 100 environmental impact reports since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, Valley Fever, greenhouse gas emissions, and geologic hazards. Make recommendations for additional mitigation measures to lead agencies at the local and county level to include additional characterization of health risks and implementation of protective measures to reduce worker exposure to hazards from toxins and Valley Fever.
- Stormwater analysis, sampling and best management practice evaluation at industrial facilities.
- Manager of a project to provide technical assistance to a community adjacent to a former Naval shipyard under a grant from the U.S. EPA.
- Technical assistance and litigation support for vapor intrusion concerns.
- Lead analyst and testifying expert in the review of environmental issues in license applications for large solar power plants before the California Energy Commission.
- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.
- Expert witness on two cases involving MTBE litigation.
- Expert witness and litigation support on the impact of air toxins and hazards at a school.
- Expert witness in litigation at a former plywood plant.

With Komex H2O Science Inc., Matt’s duties included the following:

- Senior author of a report on the extent of perchlorate contamination that was used in testimony by the former U.S. EPA Administrator and General Counsel.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of MTBE use, research, and regulation.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of perchlorate use, research, and regulation.
- Senior researcher in a study that estimates nationwide costs for MTBE remediation and drinking water treatment, results of which were published in newspapers nationwide and in testimony against provisions of an energy bill that would limit liability for oil companies.
- Research to support litigation to restore drinking water supplies that have been contaminated by MTBE in California and New York.

- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.

- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

As Executive Director with Orange Coast Watch, Matt led efforts to restore water quality at Orange County beaches from multiple sources of contamination including urban runoff and the discharge of wastewater. In reporting to a Board of Directors that included representatives from leading Orange County universities and businesses, Matt prepared issue papers in the areas of treatment and disinfection of wastewater and control of the discharge of grease to sewer systems. Matt actively participated in the development of countywide water quality permits for the control of urban runoff and permits for the discharge of wastewater. Matt worked with other nonprofits to protect and restore water quality, including Surfrider, Natural Resources Defense Council and Orange County CoastKeeper as well as with business institutions including the Orange County Business Council.

Hydrogeology:

As a Senior Hydrogeologist with the U.S. Environmental Protection Agency, Matt led investigations to characterize and cleanup closing military bases, including Mare Island Naval Shipyard, Hunters Point Naval Shipyard, Treasure Island Naval Station, Alameda Naval Station, Moffett Field, Mather Army Airfield, and Sacramento Army Depot. Specific activities were as follows:

- Led efforts to model groundwater flow and contaminant transport, ensured adequacy of monitoring networks, and assessed cleanup alternatives for contaminated sediment, soil, and groundwater.
- Initiated a regional program for evaluation of groundwater sampling practices and laboratory analysis at military bases.
- Identified emerging issues, wrote technical guidance, and assisted in policy and regulation development through work on four national U.S. EPA workgroups, including the Superfund Groundwater Technical Forum and the Federal Facilities Forum.

At the request of the State of Hawaii, Matt developed a methodology to determine the vulnerability of groundwater to contamination on the islands of Maui and Oahu. He used analytical models and a GIS to show zones of vulnerability, and the results were adopted and published by the State of Hawaii and County of Maui.

As a hydrogeologist with the EPA Groundwater Protection Section, Matt worked with provisions of the Safe Drinking Water Act and NEPA to prevent drinking water contamination. Specific activities included the following:

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted public hearings, and responded to public comments from residents who were very concerned about the impact of designation.

- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

Matt served as a hydrogeologist with the RCRA Hazardous Waste program. Duties were as follows:

- Supervised the hydrogeologic investigation of hazardous waste sites to determine compliance with Subtitle C requirements.
- Reviewed and wrote "part B" permits for the disposal of hazardous waste.
- Conducted RCRA Corrective Action investigations of waste sites and led inspections that formed the basis for significant enforcement actions that were developed in close coordination with U.S. EPA legal counsel.
- Wrote contract specifications and supervised contractor's investigations of waste sites.

With the National Park Service, Matt directed service-wide investigations of contaminant sources to prevent degradation of water quality, including the following tasks:

- Applied pertinent laws and regulations including CERCLA, RCRA, NEPA, NRDA, and the Clean Water Act to control military, mining, and landfill contaminants.
- Conducted watershed-scale investigations of contaminants at parks, including Yellowstone and Olympic National Park.
- Identified high-levels of perchlorate in soil adjacent to a national park in New Mexico and advised park superintendent on appropriate response actions under CERCLA.
- Served as a Park Service representative on the Interagency Perchlorate Steering Committee, a national workgroup.
- Developed a program to conduct environmental compliance audits of all National Parks while serving on a national workgroup.
- Co-authored two papers on the potential for water contamination from the operation of personal watercraft and snowmobiles, these papers serving as the basis for the development of nation-wide policy on the use of these vehicles in National Parks.
- Contributed to the Federal Multi-Agency Source Water Agreement under the Clean Water Action Plan.

Policy:

Served senior management as the Senior Science Policy Advisor with the U.S. Environmental Protection Agency, Region 9. Activities included the following:

- Advised the Regional Administrator and senior management on emerging issues such as the potential for the gasoline additive MTBE and ammonium perchlorate to contaminate drinking water supplies.
- Shaped EPA's national response to these threats by serving on workgroups and by contributing to guidance, including the Office of Research and Development publication, *Oxygenates in Water: Critical Information and Research Needs*.
- Improved the technical training of EPA's scientific and engineering staff.
- Earned an EPA Bronze Medal for representing the region's 300 scientists and engineers in negotiations with the Administrator and senior management to better integrate scientific principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

Geology:

With the U.S. Forest Service, Matt led investigations to determine hillslope stability of areas proposed for timber harvest in the central Oregon Coast Range. Specific activities were as follows:

- Mapped geology in the field, and used aerial photographic interpretation and mathematical models to determine slope stability.
- Coordinated his research with community members who were concerned with natural resource protection.
- Characterized the geology of an aquifer that serves as the sole source of drinking water for the city of Medford, Oregon.

As a consultant with Dames and Moore, Matt led geologic investigations of two contaminated sites (later listed on the Superfund NPL) in the Portland, Oregon, area and a large hazardous waste site in eastern Oregon. Duties included the following:

- Supervised year-long effort for soil and groundwater sampling.
- Conducted aquifer tests.
- Investigated active faults beneath sites proposed for hazardous waste disposal.

Teaching:

From 1990 to 1998, Matt taught at least one course per semester at the community college and university levels:

- At San Francisco State University, held an adjunct faculty position and taught courses in environmental geology, oceanography (lab and lecture), hydrogeology, and groundwater contamination.
- Served as a committee member for graduate and undergraduate students.
- Taught courses in environmental geology and oceanography at the College of Marin.

Matt taught physical geology (lecture and lab and introductory geology at Golden West College in Huntington Beach, California from 2010 to 2014.

Invited Testimony, Reports, Papers and Presentations:

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Presentation to the Public Environmental Law Conference, Eugene, Oregon.

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Invited presentation to U.S. EPA Region 9, San Francisco, California.

Hagemann, M.F., 2005. Use of Electronic Databases in Environmental Regulation, Policy Making and Public Participation. Brownfields 2005, Denver, Colorado.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Nevada and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Las Vegas, NV (served on conference organizing committee).

Hagemann, M.F., 2004. Invited testimony to a California Senate committee hearing on air toxins at schools in Southern California, Los Angeles.

Brown, A., Farrow, J., Gray, A. and **Hagemann, M.**, 2004. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to the Ground Water and Environmental Law Conference, National Groundwater Association.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Arizona and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Phoenix, AZ (served on conference organizing committee).

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in the Southwestern U.S. Invited presentation to a special committee meeting of the National Academy of Sciences, Irvine, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a tribal EPA meeting, Pechanga, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal representatives, Parker, AZ.

Hagemann, M.F., 2003. Impact of Perchlorate on the Colorado River and Associated Drinking Water Supplies. Invited presentation to the Inter-Tribal Meeting, Torres Martinez Tribe.

Hagemann, M.F., 2003. The Emergence of Perchlorate as a Widespread Drinking Water Contaminant. Invited presentation to the U.S. EPA Region 9.

Hagemann, M.F., 2003. A Deductive Approach to the Assessment of Perchlorate Contamination. Invited presentation to the California Assembly Natural Resources Committee.

Hagemann, M.F., 2003. Perchlorate: A Cold War Legacy in Drinking Water. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. From Tank to Tap: A Chronology of MTBE in Groundwater. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. A Chronology of MTBE in Groundwater and an Estimate of Costs to Address Impacts to Groundwater. Presentation to the annual meeting of the Society of Environmental Journalists.

Hagemann, M.F., 2002. An Estimate of the Cost to Address MTBE Contamination in Groundwater (and Who Will Pay). Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to a meeting of the U.S. EPA and State Underground Storage Tank Program managers.

Hagemann, M.F., 2001. From Tank to Tap: A Chronology of MTBE in Groundwater. Unpublished report.

Hagemann, M.F., 2001. Estimated Cleanup Cost for MTBE in Groundwater Used as Drinking Water. Unpublished report.

Hagemann, M.F., 2001. Estimated Costs to Address MTBE Releases from Leaking Underground Storage Tanks. Unpublished report.

Hagemann, M.F., and VanMouwerik, M., 1999. Potential Water Quality Concerns Related to Snowmobile Usage. Water Resources Division, National Park Service, Technical Report.

VanMouwerik, M. and **Hagemann, M.F.** 1999, Water Quality Concerns Related to Personal Watercraft Usage. Water Resources Division, National Park Service, Technical Report.

Hagemann, M.F., 1999, Is Dilution the Solution to Pollution in National Parks? The George Wright Society Biannual Meeting, Asheville, North Carolina.

Hagemann, M.F., 1997, The Potential for MTBE to Contaminate Groundwater. U.S. EPA Superfund Groundwater Technical Forum Annual Meeting, Las Vegas, Nevada.

Hagemann, M.F., and Gill, M., 1996, Impediments to Intrinsic Remediation, Moffett Field Naval Air Station, Conference on Intrinsic Remediation of Chlorinated Hydrocarbons, Salt Lake City.

Hagemann, M.F., Fukunaga, G.L., 1996, The Vulnerability of Groundwater to Anthropogenic Contaminants on the Island of Maui, Hawaii. Hawaii Water Works Association Annual Meeting, Maui, October 1996.

Hagemann, M. F., Fukanaga, G. L., 1996, Ranking Groundwater Vulnerability in Central Oahu, Hawaii. Proceedings, Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association Publication VIP-61.

Hagemann, M.F., 1994. Groundwater Characterization and Cleanup at Closing Military Bases in California. Proceedings, California Groundwater Resources Association Meeting.

Hagemann, M.F. and Sabol, M.A., 1993. Role of the U.S. EPA in the High Plains States Groundwater Recharge Demonstration Program. Proceedings, Sixth Biennial Symposium on the Artificial Recharge of Groundwater.

Hagemann, M.F., 1993. U.S. EPA Policy on the Technical Impracticability of the Cleanup of DNAPL-contaminated Groundwater. California Groundwater Resources Association Meeting.

Hagemann, M.F., 1992. Dense Nonaqueous Phase Liquid Contamination of Groundwater: An Ounce of Prevention... Proceedings, Association of Engineering Geologists Annual Meeting, v. 35.

Other Experience:

Selected as subject matter expert for the California Professional Geologist licensing examination, 2009-2011.



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October 21, 2015

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Re: Freeport-McMoRan Oil & Gas, LLC, Arroyo Grande Oil Field, Application to Extend Phase IV CUP # D010386D

To Whom It May Concern,

The Center for Biological Diversity ("the Center") submits comments in opposition to the request by Freeport-McMoRan ("FMOG") for an extension of its conditional use permit ("CUP") for its Phase IV expansion for another three years in order to allow FMOG to build 31 new wells at the Arroyo Grande Oil Field ("AGOF"). FMOG's CUP expired in August 2015, and FMOG now seeks to extend its terms from the original ten years to thirteen. Since the County of San Luis Obispo ("County") certified the Environmental Impact Report ("EIR") for the Phase IV expansion project in 2004, however, significant new information about the health and environmental harms of oil drilling have become known, and new regulations governing oil and gas drilling have been adopted. In addition, the State has found that at least eight of the injection wells operating at the AGOF are illegally injecting into groundwater that has not been exempted from the federal protections of the Safe Drinking Water Act. The State has also recently found

that many wells across California do not meet current integrity criteria and have not been reviewed or inspected in many years. In light of all of this new and serious information, the County cannot rely on a decade-old EIR to extend FMOG's CUP to drill 31 new wells. Given that as of 2014, the total number of active (non-plugged) and new wells in all of San Luis Obispo County was approximately 400, adding 31 wells to one oil field is significant.¹ Moreover, FMOG plans to add another 450 wells in Phase V of its expansion plan, and any evaluation of impacts of these 31 wells must take into account the foreseeable Phase V expansion.

I. The County Cannot Extend FMOG's CUP, But Rather Must Issue a New CUP for the 31 Wells

The County cannot issue FMOG a CUP extension because the original conditions required that FMOG receive a new CUP for Phase IV work not completed, and because new information about environmental conditions since 2004 negate the County criteria for issuing CUP extensions.

In 2005, the County issued FMOG a CUP for its Phase IV expansion. This Phase IV project included:

- Grading of 4 new well pads (total disturbance of about 2.68 acres);
- Grading on 18 existing well pads (total disturbance of about 4.22 acres);
- Construction of 95 production wells;
- Construction of 30 injection wells;
- Construction of 3 new steam generators (previously approved in the 1994 Phase III Development Plan); and,
- Increasing production of marketable quality crude oil from 1,800 – 1,900 barrels of per day (BOPD) to 5,000 BOPD.

The CUP expired in August 2015, and FMOG has applied for an extension of the permit in order to build 31 (20 production, 8 steam injection, and 3 water disposal) Phase IV wells that have not yet been built.²

¹ Natural Resources Defense Council, *Drilling in California: Who's at Risk?* (October 2014) ("NRDC, 2014"), Appendix II, Table 1.

² Freeport MacMoRan Oil and Gas, *Conditional Use Permit Application to extend 10-year time limit on Arroyo Grande Phase IV* (July 20, 2015), San Luis Obispo Department of Planning and Building ("Phase IV CUP

The County cannot extend the CUP for an additional three years to build 31 new wells. The Conditions of Approval for the Phase IV CUP specifically state that "[a]t the end of the ten years, any wells or steam generators not yet completed shall require review and approval of a new Conditional Use Permit."³ The County staff now proposes to "amend" this condition to state that "[a]t the end of the thirteen years, with a start date of August 9, 2005 and end date of August 9, 2018, any wells or steam generators not yet completed shall require review and approval of a new Conditional Use Permit."⁴ The County cannot simply amend its earlier conditions to explicitly require the opposite of what the condition originally stated; otherwise, the original condition would have no meaning.

CUPs expire for a reason. Conditions, knowledge, and regulations change over time. In San Luis Obispo County, CUPs normally expire 24 months from the issuance date.⁵ In this case, the County gave then PXP (now FMOG) ten years--five times as long as usual--to build its Phase IV expansion. The fact that PXP and FMOG did not finish its project within the decade provided does not now provide a good reason to issue an extension. As described below, a significant amount of new information about the safety and impacts of oil drilling has been ascertained within the last ten years, and it is unreasonable to allow FMOG to defy the original condition of its CUP that it must obtain a new CUP for unfinished portions of the project after ten years.

Indeed, the County Code allows extensions (normally of 2-year, not 10-year, permits) in very limited circumstances, including:

1. There have been no changes to the provisions of the Land Use Element or Land Use Ordinance applicable to the project since the approval of the land use permit; or
2. There have been no changes in the character of the site or its surroundings that affect how the standards of the Land Use Element or Land Use Ordinance apply to the project; or
3. There have been no changes to the capacities of community resources, including but not limited to water supply, sewage treatment or disposal facilities, roads or schools such that there is no longer sufficient remaining capacity to serve the project.⁶

Extension"), available at: http://www.slocounty.ca.gov/Assets/PL/referrals/south+county/DRC2015-00002_FREEPORT-MCMORAN_CUP_MODIFICATION.pdf.

³ Staff Report for Phase IV CUP, Exhibit B, "Conditions of Approval."

⁴ DRC2015-00002 (Freeport-McMoRan), *Proposed Conditions of Approval* (2015), Phase IV CUP, Exhibit B.

⁵ San Luis Obispo Land Use Ordinance, County Code sec. 22.64.060

⁶ *Id.* 22.64.070(A).

Further, it is clearly the intention of the County Code that the three CUP 12-month extensions allowed under §22.64.070 be granted one at a time and annually, not all together as Freeport MacMoRan has requested. If the Commission is inclined to grant the Phase IV CUP Extension, which it should not, it can only grant only the first 12-month extension.

In the last decade, there have been changes--at the very least--to water supplies in the community from a multi-year severe drought that is causing water wells to dry up and people to dig deeper wells into new groundwater sources in order to find water for domestic use. Given that California is currently in the fourth year of a historic drought, and communities are more dependent than ever on underground water resources, it is vital that the County act to ensure our groundwater is protected from the toxic waste generated by oil and gas production processes. As the attached and incorporated comments from the Center for Biological Diversity and others describe,⁷ the most recent data available as of October 2014 shows that groundwater levels have decreased in many basins throughout the state since spring 2013, and more notably since spring 2010; basins with notable decreases in groundwater levels are in the Sacramento River, San Joaquin River, Tulare Lake, San Francisco Bay, **Central Coast**, and South Coast hydrologic regions.⁸ Indeed, there is precedent on the Central Coast for a scenario in which drought causes a major increase in reliance on groundwater supplies: during the last major drought in the late 1980s, the City of San Luis Obispo began pumping groundwater for the first time in history, and by 1990 it received 40% of its water from groundwater.⁹

Even the California Division of Oil, Gas, and Geothermal Resources ("DOGGR") acknowledges that because "some water supply wells are being drilled increasingly deeper, *supporting data must be current and accurate.*"¹⁰ Groundwater in agricultural areas of the State, including the coastal regions, is particularly vulnerable during a drought because it is used to replace unavailable surface water supplies for agriculture. Increased pumping already stresses

⁷ Center for Biological Diversity, *Comments to California Division of Oil, Gas, and Geothermal Resources (DOGGR) re: Arroyo Grande Oil Field Aquifer Exemption Request* (September 21, 2015), and Center for Biological Diversity et al., Comment letter sign-on (September 28, 2015), attached and incorporated herein.

⁸ Cal. Department of Water Resources, *Public Update for Drought Response: Groundwater Basins with Potential Water Shortages, Gaps in Groundwater Monitoring, Monitoring of Land Subsidence, and Agricultural Land Falling* (November 2014) ("DWR, 2014"), pp. 5, 11 (emphasis added), available at: http://water.ca.gov/waterconditions/docs/DWR_PublicUpdateforDroughtResponse_GroundwaterBasins.pdf.

⁹ Halverson, Nathan, *What will happen to a sinking California? Just ask San Luis Obispo*, *Grist* (June 24, 2015) (Halverson), available at:

<http://grist.org/climate-energy/what-will-happen-to-a-sinking-california-just-ask-san-luis-obispo/>.

¹⁰ DOGGR and SWRCB, *Aquifer Exemption Process Guidance Document* (April 10, 2015) ("DOGGR Aquifer Exemption Guidance"), p. 5 (emphasis added).

this “last resort” resource because it decreases groundwater levels below wells (“overdraft”), requires more and deeper wells, reduces groundwater quality (by drawing waters from more sources increasing the likelihood of cross-contamination), increases land subsidence (irreversibly reducing the storage capacity of the aquifer network), and threatens drinking water supplies to the many communities that depend mostly or entirely on groundwater for their potable water supply.¹¹ Newly deepened wells reduce the water pressure in existing shallow wells, forcing nearby users to also drill deeper wells as the existing wells risk running dry. In addition, Californians have been “forced . . . to use water of lesser quality to meet their needs.”¹² This increased pumping and decreased surface water supplies make any existing aquifers that are available for potential use – in agriculture or as a drinking source – that much more valuable during the current drought.

The drought has directly affected the water resources of San Luis Obispo County. On March 11, 2014, the San Luis Obispo County Board of Supervisors adopted a resolution proclaiming a local emergency due to drought conditions in the County.¹³ The County has proposed a Countywide Water Conservation Program (“WCP”) in response to the fact that “[w]ater levels in groundwater basins and surface lakes and reservoirs throughout the County have been in decline for over a decade, and the current ‘exceptional drought’ exacerbated this decline.”¹⁴ As a result, the Board of Supervisors has declared three groundwater basins in the County at Level III severity, which means “groundwater demand has met or exceeded the dependable supply.”¹⁵ Clearly there has been a major change in community resources (available water) since 2004 as a result of the drought, and that change is leading to serious environmental impacts. In addition, the WCP would be an amendment to the General Plan and the County Code. The County has not evaluated the effects of extending the CUP in light of the changes in capacity of water supplies, or consistency with the General Plan or County Code amendments; therefore, the County cannot extend it.

¹¹ See generally, DWR, 2014.

¹² DOGGR, *Aquifer Exemption Guidance*, p. 5; Krieger, Lisa M., *California Drought: San Joaquin Valley Sinking as Farmers Race to Tap Aquifer*, San Jose Mercury News (August 19, 2015), available at: http://www.mercurynews.com/drought/ci_25447586/california-drought-san-joaquin-valley-sinking-farmers-race.

¹³ Resolution No. 2014-64 (March 11, 2014), available at: <http://www.slocounty.ca.gov/Assets/AD/images/Resolution+No.+2014-64.pdf>.

¹⁴ Countywide Water Conservation FEIR, Executive Summary, p. ES-1, available at: <http://www.slocounty.ca.gov/planning/water-amendments/environmental-review.htm>.

¹⁵ *Id.*

What is more, we now know (and did not know ten years ago) that AGOF's injection operations into the aquifer are in violation of the federal Safe Drinking Water Act. In 2011, the U.S. EPA commissioned a report on California's Underground Injection Control Program ("UIC Program") ("Horsley Witten Report"). That report found, *inter alia*, that state regulations did not protect aquifers as required by the SDWA and the State's primacy agreement.¹⁶ As of early February 2015, California had "identified approximately 2,500 wastewater disposal and enhanced oil recovery wells injecting into potentially non-exempt zones, 2,100 of which [were] still active. Of these, there are approximately 140 active wastewater disposal wells injecting into aquifers with Total Dissolved Solids (TDS) less than 3,000 mg/l, a key indicator under the federal Safe Drinking Water Act (SDWA) of higher quality water."¹⁷ These include at least eight injection wells *currently* operating at the AGOF.¹⁸ The extension application contains no information on where these 31 wells--including 11 injection wells--will be, and whether they even comply with the legal requirements of the Safe Drinking Water Act, something not contemplated when the original CUP was issued. The County cannot issue or extend a CUP or otherwise condone illegal activity.

This illegal injection at the AGOF is taking place within a context of a failed effort to regulate oil and gas throughout the state. This month, DOGGR released a self-audit that documented a breakdown in its underground injection control program. It found, among other deficiencies, a failure to require Area of Review evaluations to ensure that the injection site is isolated from other sources of groundwater prior to issuing well permits; failure to conduct required annual reviews of permitted wells; missing or non-existent quality control data; and--based on only a small sample of wells--hundreds of wells that failed to meet current integrity criteria, were potential sources of pollution, or required remediation.¹⁹ As a result, DOGGR

¹⁶ David Albright, Manager, Ground Water Office, US EPA Region IX, Letter to Elena Miller, State Oil and Gas Supervisor, DOGGR (July 18, 2011) ("July 18, 2011 letter").

¹⁷ CalEPA Review of UIC Program, Memorandum from Matthew Rodriguez, Secretary of CalEPA to Cliff Rechtschaffen, Senior Advisor, Office of the Governor, and John Laird, Secretary, California Natural Resources Agency (March 2, 2015) ("March 2, 2015 CalEPA Memorandum"), p. 1, *available at*: <http://www.calepa.ca.gov/Publications/Reports/2015/UICFindings.pdf>.

¹⁸ Steve Bohlen, State Oil & Gas Supervisor, DOGGR and Jonathan Bishop, Chief Deputy Director, State Water Resources Control Board, Letter to Michael Montgomery, US EPA, Region IX (October 15, 2015), Attachment A, *available at*: <ftp://ftp.consrv.ca.gov/pub/oil/UIC%20Files/20151015%20-%20Joint%20Letter%20to%20US%20EPA%20Cat%201%20Well%20Review%20Findings.pdf>.

¹⁹ DOGGR, *Underground Injection Control Program Report on Permitting and Program Assessment, Reporting Period of Calendar Years 2011-2014, Prepared pursuant to Senate Bill 855 (2010) (October 2015) ("SB 855 Report")*, *available at*: <ftp://ftp.consrv.ca.gov/pub/oil/Publications/SB%20855%20Report%2010-08-2015.pdf>.

stated that there was an immediate need for new regulations and procedures regarding well construction, zone of endangerment analyses, inspections, remediation, data management, and other requirements to ensure minimal protection from dangerous well production activities.²⁰ New regulations further include well stimulation regulations that went into effect in July 2015, and a proposal to adopt new regulations for cyclic steam operations (which occur at the AGOF) because of the unique risks it poses to bore integrity and even worker safety.²¹

As a result of new environmental conditions and more limited resources due to the drought, new water management protocols that will be required under the County WCP, new information on lax oil and gas regulatory oversight, and new regulations coming into play that are essential for providing the most basic, minimum protections for health and the environment, the County cannot issue a CUP extension for the new wells. The oil field is subject to state, federal, and county laws that have not been regularly enforced but must be now--such as the Safe Drinking Water Act--and to regulations that are currently being developed and implemented, as described above. At the very least, before summarily finding that the project meets current County Code requirements despite the fact that the application provides no support for this proposition and, indeed, fails to meet the County's own criteria for issuing permit extensions, the County must ensure that it is not permitting illegal wells or condoning harmful activity. The CUP extension, therefore, must be denied.

II. The County Must Require a Subsequent EIR Before Extending or Issuing FMOG a Permit to Drill More Wells

Even if the County believes that the CUP extension is warranted under the County Code (which it is not), as a result of the new regulatory information and new environmental conditions described above, and new scientific information that has become available since the original EIR was certified in 2004, the County must prepare a supplemental or subsequent EIR (SEIR) before extending the CUP (or issuing a new CUP) for the 31 new wells. An SEIR is required when substantial changes occur in circumstances under which the project is being undertaken that will require major revisions in the EIR, or new information of substantial importance to the project

²⁰ *Id.*; DOGGR, *Renewal Plan for Oil and Gas Regulation: Changing Past Practices to Usher in a New Era of Oil and Gas Regulation* (October 2015) ("Renewal Plan"), available at: <ftp://ftp.consrv.ca.gov/pub/oil/Publications/Renewal%20Plan%2010-08-2015.pdf>.

²¹ Renewal Plan, pp. 9-10.

that was not known and could not have been known when the EIR was certified as complete becomes available.²² Both circumstances exist here.

A change in circumstances requires a SEIR when the change is substantial, involves new or more significant impacts that require significant changes to the EIR, and the impacts were not covered in previous EIR.²³ Meanwhile, "[n]ew information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified . . . shows any of the following:"

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.²⁴

Here, the multi-year, serious drought coupled with mandatory water restrictions, new information about the poor integrity of existing wells and nearly non-existent environmental and safety regulatory oversight of oil operations, and new scientific information about the harmful impacts of oil extraction activities have come to light in the last ten years. This new information should result in new requirements and mitigation measures to reduce newly known or more severe significant impacts not previously analyzed. Therefore, a SEIR is required.

First, as described above, there is significant and substantial new information about the breakdown of the regulatory regime under which oil drilling has taken place in California up until now. FMOG's desire to drill the 31 new wells must be re-evaluated within this new context, which will provide new requirements and mitigation measures on wells and oil operations. The

²² Cal. Pub. Res. Code § 21166; CEQA Guidelines § 15162(a). At the very least, the County must prepare a supplemental EIR for the 31 wells, given all of the new information that has come to light in the last decade. CEQA Guidelines § 15163.

²³ CEQA Guidelines § 15162(a)(2).

²⁴ CEQA Guidelines § 15162(a)(3).

recent reports issued by DOGGR (discussed *supra*) demonstrate that its failure to regulate and enforce oil drilling has resulted in thousands of wells with potentially compromised integrity that can pose serious threats to the environment. Improper well construction, maintenance, or plugging can allow oil and gas "fluids and naturally occurring toxic and radioactive materials to migrate into shallower groundwater aquifers."²⁵

Second, also as described above, the drought has created a substantial change in circumstances that will result in more serious adverse impacts than were understood when the 2004 EIR was certified. Eleven of the new wells will be injection wells, and their potentially significant impacts to San Luis Obispo's dwindling and precious water supplies must be evaluated before they can be permitted. Even the original 2004 EIR noted the potential for injection wells at this site to impact other beneficial and potable groundwater: "[w]astewater generated through the petroleum recovery process would be reinjected into wastewater injection wells. This wastewater reinjection could impact shallow groundwater supplies if the wastewater came in contact with groundwater used for domestic purposes. If this occurred, the water quality of down-gradient public and municipal water production wells could be degraded."²⁶ Given the increasingly scarce availability of water over the last few years, these potential impacts will be even more devastating and significant than previously believed.²⁷

Third, we now have an incredible amount of new scientific information and knowledge about the actual impacts of oil operations on the environment, health, and safety that we did not have in 2004. This includes, for instance, new information on groundwater impacts, such as the

²⁵ NRDC, 2015, p. 7, citing Ingraffea, Anthony, et al., *Assessment and Risk Analysis of Casing and Cement Impairment in Oil and Gas Wells in Pennsylvania, 2000–2012, Proceedings of the National Academy of Sciences*, June 2014, doi:10.1073/pnas.1323422111.

²⁶ San Luis Obispo County Department of Planning Building, and Padre Associates, Inc., *Final Plains Exploration and Production Phase IV Development Plan Environmental Impact Report* (September 2004) ("Phase IV EIR"), section 5.7.2.3, available at: <http://www.slocounty.ca.gov/Assets/PL/environmental/plains/Historical+Documents/2004+-+Phase+IV+EIR/phpEIR2004.pdf>.

²⁷ See generally: California Council of Science and Technology, *Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulation* (Jul. 2015) ("CCST Report"), Vol. II, Ch. 2; U.S. EPA. (2015); U.S. Environmental Protection Agency, Washington, DC, *Assessment of the potential impacts of hydraulic fracturing for oil and gas on drinking water resources* (External review draft), EPA/600/R-15/047, 2015, available at: <http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>; Physicians for Social Responsibility, *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)*, 3rd ed. (Oct. 14, 2015) ("PSR Compendium of Findings, 2015"), pp. 26-52. Although these reports evaluate hydraulic fracturing and well stimulation, many of the conclusions also apply to other oil extraction techniques, such as steam flooding, cyclic steam, horizontal drilling, injection, and other techniques that occur at the AGOF.

fact that changes in pressure, earthquakes, and subsidence from injection and dewatering²⁸ can cause potential changes to the water flow paths that contribute to beneficial use reservoirs;²⁹ in other words, they can cause groundwater to shift its flow path such that an aquifer once thought isolated could now contaminate beneficial use groundwater. Further, known and unknown abandoned wells and compromised wells can create pathways to contamination.³⁰ These and other potential vectors for groundwater contamination exist in the AGOF and have not been adequately studied. In addition, drilling itself can create conduits to previously isolated sources of water.³¹ A recent report finds that "because the oil-containing rock layers in California are located closer to the surface than in other states, the state's groundwater is potentially vulnerable to chemical contamination through vertical faults and fissures and via old and abandoned wells."³² Indeed, the initial study for the next phase (Phase V) expansion of the AGOF to add up to 450 wells confirms this: "[a]s this formation is relatively close to the surface, potential impacts increase to nearby potable groundwater tables."³³

We now know, too, that the risk of well blow outs, spills, and other accidents that can contaminate soil and groundwater is much higher than previously believed. A recent analysis estimated that "[o]nshore production sites leaked oil, produced water and other material at least 9,728 times last year, releasing 716,844 barrels of fluid.... In states where comparisons could be made, the number of spills jumped 20 percent between 2013 and 2014."³⁴ Several recent studies have found methane, fracking fluids, brine, and heavy metals, among other oil-related pollution,

²⁸ FMOG is gradually dewatering the reservoir under the AGOF. See FMOG, *Arroyo Grande Oil Field, San Luis Obispo County, California, Dollie Sands, Pismo Formation Aquifer Exemption Application* to DOGGR (2015) ("FMOG aquifer exemption application"), pp. 17, 21, available at: [ftp://ftp.consrv.ca.gov/pub/oil/Aquifer_Exemptions/County/San_Luis_Obispo/Arroyo_Grande_Oilfield/Dollie_Sands_Pismo_Formation/Arroyo%20Grande%20Oilfield%20Edna%20Member%20Dollie%20Sands%20Pismo%20Formation%20Aquifer%20Exemption%20Application.pdf](http://ftp.consrv.ca.gov/pub/oil/Aquifer_Exemptions/County/San_Luis_Obispo/Arroyo_Grande_Oilfield/Dollie_Sands_Pismo_Formation/Arroyo%20Grande%20Oilfield%20Edna%20Member%20Dollie%20Sands%20Pismo%20Formation%20Aquifer%20Exemption%20Application.pdf).

²⁹ CCST Report, Vol. II, Ch. 2, pp. 104-109, 117-121, 124, 125-126, 151, 165.

³⁰ CCST Report, Vol. II, Ch. 2, pp. 104-109, 122-125, 159; United State Government Accountability Office (US GAO), *EPA Program to Protect Underground Sources from Injection of Fluids Associated With Oil and Gas Production Needs Improvement*, Report to Congressional Requesters (GAO-14-555, June 2014) ("GAO Report"), pp. 23-24.

³¹ CCST Report, Vol. II, Ch. 2, pp. 104-109.

³² PSR Compilation, p. 28. See also CCST Report, Summary Report, available at: <http://ccst.us/publications/2015/2015SB4summary.pdf>

³³ San Luis Obispo County Department of Planning and Building, *Initial Study, Phase V Oilfield Expansion Conditional Use Permit* (November 2012) ("Phase V Initial Study"), p. 22, available at: <http://www.slocounty.ca.gov/Assets/PL/environmental/plains/Environmental/initialstudy.pdf>.

³⁴ NRDC, 2014, p. 6; King, Pamela, and Mike Soraghan, "U.S. spill count rose 20% in 2014," *EnergyWire*, September 29, 2015, available at <http://www.eenews.net/energywire/stories/1060025432/search?keyword=spills+up+18+Percent+in+U.S.+in+2013> (accessed October 21, 2015).

in water samples from nearby drinking water wells and surface water bodies near oil and gas sites.³⁵ Moreover, "naturally occurring radioactive materials" brought to the surface with oil and gas produced water also poses risks to oil field workers, neighbors, and the environment because it can "accumulate in pipes and other well equipment, build up in sediments downstream of wastewater treatment facilities [such as the one at the AGOF], and contaminate the air and soil when wastewater is sprayed on roads."³⁶

New information that has come to light since the 2004 EIR not only reveals increased risks of oil extraction to soil and water resources, but also to air, noise, odors, traffic, and geology (including earthquakes and subsidence).³⁷ Air pollution has been extensively and widely linked to all phases of oil and gas development and production.³⁸ Emissions include: toxic chemicals such as benzene, toluene, ethylbenzene, xylene, and hydrogen sulfide; criteria pollutants that contribute to the formation of ground-level ozone (which harms the respiratory system) such as VOCs and NOx; and, greenhouse gases such as methane, NOx, and CO₂.³⁹ Improper plugging or idling of wells may continue to release hydrocarbons, methane, and other VOCs even after a well has become idle.⁴⁰ Health effects from exposure to these pollutants cause a wide

³⁵ See e.g., NRDC, 2014, p. 7; Llewellyn, Garth T., *Evaluating a Groundwater Supply Contamination Incident Attributed to Marcellus Shale Gas Development*, Proceedings of the National Academy of Sciences 112 (20) (2015): 6325–6330, doi: 10.1073/pnas.1420279112; Osborn, Stephen G., et al., *Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing*, Proceedings of the National Academy of Sciences 108 (20) (2011): 8172–76, doi:www.pnas.org/cgi/doi/10.1073/pnas.1100682108; Fontenot, Brian E., et al., *An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation*, Environmental Science & Technology 47 (2013): 10032–40, doi:dx.doi.org/10.1021/es4011724.

³⁶ NRDC, 2014, p. 9; Skalak, Katherine J., et al., *Surface Disposal of Produced Waters in Western and Southwestern Pennsylvania: Potential for Accumulation of Alkali-Earth Elements in Sediments*, International Journal of Coal Geology, 2013, doi:10.1016/j.coal.2013.12.001 (as cited in NRDC 2014).

³⁷ See generally, PSR Compendium of Findings, 2015; CCST Report.

³⁸ See generally, CCST Report, Vol. II, Ch. 3. See also PSR Compendium of Findings, 2015, pp. 14-26, describing the many studies from the previous five years documenting new information about increased risks of and from air pollution from oil operations.

³⁹ Some of the many recent studies oil operations and air pollution include: McKenzie, Lisa M. et al., *Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources*, Science of the Total Environment 424 (2012): 79–87, doi:10.1016/j.scitotenv.2012.02.018 (as cited in NRDC 2014 endnote 35); Eastern Research Group (ERG) and Sage Environmental Consulting LP, *City of Fort Worth Natural Gas Air Quality Study*, 2012, Fort Worth, TX ; Gilman, Jessica, et al., *Source Signature of Volatile Organic Compounds (VOCs) from Oil and Natural Gas Operations in Northeastern Colorado*, Environmental Science & Technology 47 (3) (2013): 1297–1305, doi:10.1021/es304119a.

⁴⁰ David T. Allen, *Atmospheric Emissions and Air Quality Impacts from Natural Gas Production and Use*, Annual Review of Chemical and Biomolecular Engineering, February 2014, doi:10.1146/annurevchembioeng-060713-035938 (as cited in NRDC 2014 endnote 43).

of health effects, including respiratory, cardiovascular, and neurological harm, endocrine disruption, birth defects, cancer, burning eyes and skin irritation, headaches and nausea, and premature mortality.⁴¹ In addition, the greenhouse gases emitted contribute to climate change, which will have severe environmental impacts, but was not studied in the original EIR.

The noise, odors, night-time light, and traffic associated with oil operations all have serious environmental and health effects, and new studies have documented the severity of these impacts.⁴² The impacts of noise (grinding, drilling, blasting, flaring, running generators) and night-time light, for instance, can lead to stress and anxiety, hypertension, and cardiovascular and endocrine problems.⁴³ Truck traffic similarly contributes to noise and air pollution, as well as stress and anxiety.⁴⁴ In addition, a new study has found that oil and gas development lead to increase in traffic accidents in the area,⁴⁵ In addition to noise, air emissions, and congestion from increased traffic, such new information about safety must also be studied in a SEIR.

Additionally, new information is now known about the risks of oil and gas operations to and from earthquakes, as well as in causing adverse impacts from land subsidence. Known and unknown faults can be conduits for fluid migration.⁴⁶ In fact, the Federal Regulations require that all new Class II wells be sited “in such a fashion that they inject into a formation which is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of review.”⁴⁷ What is more, we now know more about how oil and gas activity itself, including from wastewater injection, can activate faults and trigger earthquakes.⁴⁸ As a

⁴¹ NRDC, 2014, pp. 6-7; Finkel, Madelon, et al., *Modern Natural Gas Development and Harm to Health: The Need for Proactive Public Health Policies*, ISRN Public Health, 2013, doi:<http://dx.doi.org/10.1155/2013/408658>

⁴² See generally, PSR Compendium of Findings, 2015, pp. 78-81.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ Texas A&M Transportation Institute, *Oil and Gas Energy Developments and Changes in Crash Trends in Texas*, Final Report, PRC 15-35 F (Oct. 2015).

⁴⁶ CCST Report, Vol. II, Ch. 2, pp. 125-126.

⁴⁷ 40 C.F.R. § 146.22(a). See also CCST Report, Vol. II, Ch. 2, p. 151 (“Site characterization requirements include a confining zone free of known open faults or fractures that separates the injection zone from underground sources of drinking water. . .”).

⁴⁸ See generally, PSR Compendium of Findings, 2015, pp. 81-95, describing the dozens of studies from the last five years documenting induced seismicity from injection and other well stimulation activities. See also, California Council on Science and Technology Lawrence Berkeley National Laboratory Pacific Institute, *Advanced Well Stimulation in California*, “Executive Summary” (August 28, 2014) (“2014 CCST Report”), pp. 41, 269-275, available at: <http://ccst.us/publications/2014/2014wstES.pdf>. Further study is needed as well. “[A]reas of the southern San Joaquin, Ventura, Santa Clarita and Santa Maria basins, where active water disposal wells are concentrated at present (Figure 5-10), have relatively high rates of seismicity in the 2-5 magnitude range. While undoubtedly most of these earthquakes are naturally-occurring, detailed study of the seismicity in relation to fluid injection will be needed to assess the likelihood that a proportion of the events in these areas are induced.” 2014

2014 scientific report noted, if "produced water is disposed of by injection and not handled through an expansion of water treatment and re-use systems, it could increase seismic hazards."⁴⁹ Even a small earthquake can compromise well integrity and other oil infrastructure, leading to water and soil contamination. Subsidence is similarly likely occurring at the AGOF due to the gradual dewatering of the reservoir.⁵⁰ Neither earthquakes nor subsidence was not evaluated in the 2004 EIR, but must be studied now.

In sum, we now have an overwhelming amount of new scientific information documenting impacts from oil and gas activity that were either underestimated or not known in 2004 when the County certified the original Phase IV EIR. We also now have far more information about the failures of the state and local agencies to effectively regulate and monitor oil and gas production, and of the potential for thousands of wells across the state to contaminate air, water, and soil. Local and state agencies are in the process of updating regulations to provide even the most basic protection for oil field neighbors and workers from the harmful effects of oil operations, as well as regulations regarding water scarcity due to the drought. Given all of these changes in circumstances and new information, the County--which represents the neighbors of the AGOF--cannot and must not issue or extend a CUP for the 31 wells without, at a bare minimum, preparing a SEIR.

III. The 31 Wells are Part of a Larger Project with Reasonable Foreseeable Future Phases, and Cannot be Piecemealed to Avoid CEQA Review

CEQA requires that an EIR identify all significant impacts on the environment of the "whole of action."⁵¹ Environmental review thus requires that a proposed project be analyzed along with reasonably foreseeable future phases or other action.⁵² In addition, applicants may not avoid environmental review "by chopping up proposed projects into bite-size pieces which, individually considered, might be found to have no significant effect on the environment or to be

CCST Report, pp. 275-6. *See also* Brodsky, Emily and Lisa J. Lajoie, *Anthropogenic Seismicity Rates and Operational Parameters at the Salton Sea Geothermal Field*, Science, vol. 341 (Aug. 2, 2013); Ellsworth, William, *Injection-Induced Earthquakes*, Science, vol. 341 (6142) (July 12, 2013); Clarke, D., et al., *Induced seismicity potential in energy technologies*, National Academies Press, 2012 (as cited in NRDC 2014, endnote 70).

⁴⁹ 2014 CCST Report, p. 41.

⁵⁰ FMOG aquifer exemption application, pp. 17, 21; CCST Report, Vol. II, Ch. 2, p. 124.

⁵¹ CEQA Guidelines §§ 15126.2(a) § 15378; *RiverWatch v. Olivenhain Mun. Water Dist.* (2009) 170 Cal.App.4th 1186.

⁵² *Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 396.

only ministerial."⁵³ Indeed, CEQA requires that environmental considerations must not be hidden by separately focusing on isolated parts, overlooking the cumulative effect of the whole action, or attempting to avoid responsibility for considering the environmental impact of the project as a whole.⁵⁴

Here, the 31 wells are part of a much larger project that is being illegally piecemealed into bite-sized pieces to avoid an analysis of the impacts of the larger project. First, FMOG has explicitly said that the 31 wells are tied into its Phase V expansion. FMOG requests in its extension application for a three-year extension up to August 2018 "or until such time as a decision regarding FM O&G's pending CUP application for the Phase V Development of AGOF is made by the County."⁵⁵ FMOG further notes in its extension application that the extra three years to drill the 31 wells will "provide a seamless transition into FM O&G's proposed Phase V Development (if approved)."⁵⁶ FMOG is in the process of applying for a conditional use permit for its Phase V expansion project, which would increase oil production at the AGOF from the current approximately 1,350 barrels per day (bpd) of oil to up to 9,000-10,000 bpd--up to a nearly ten-fold increase in oil production.⁵⁷ The project would add 350 new wells and 100 replacement wells on 11 new well pads and 38 modified well pads, and will include both vertical and directional drilling.⁵⁸ In its initial study, the County of San Luis Obispo found that this project has the potential for significant impacts and impacts that require mitigation to, among other environmental resources: wildlife species and vegetation that are endangered or threatened by water degradation,⁵⁹ geology,⁶⁰ groundwater and hydrology.⁶¹ Given that the Phase V

⁵³ *Orinda Assn v. Board of Supervisors* (1986) 182 Cal.App.3d 1145, 1171.

⁵⁴ *Id.*; *Bozung v. LAFCO* (1975) 13 Cal.3d 263, 283.

⁵⁵ Phase IV CUP Extension, *Attachment A: Project Description*, available at: http://www.slocounty.ca.gov/Assets/PL/referrals/south+county/DRC2015-00002_FREEPORT-MCMORAN_CUP_MODIFICATION.pdf.

⁵⁶ *Id.*

⁵⁷ Freeport MacMoRan, *Application for Aquifer Exemption, Arroyo Grande Oilfield* ("FM Application"), p. 3; Phase V Initial Study, p. 2; San Luis Obispo County Department of Planning and Building, *Scoping Meeting Presentation* (Feb. 19, 2014), available at: <http://www.slocounty.ca.gov/Assets/PL/environmental/plains/Environmental/Scoping+Meeting/Presentation+2-19-14.pdf>.

⁵⁸ Phase V Initial Study, p. 2.

⁵⁹ Phase V Initial Study, pp. 13-18. *See also* California Department of Fish and Wildlife, *Letter in Review of the Phase V Environmental Impact Report Notice of Preparation* (January 8, 2013), available at: [http://www.slocounty.ca.gov/Assets/PL/environmental/plains/Environmental/Notice+of+Preparation+\(NOP\)/Responses+Received/CADFW.pdf](http://www.slocounty.ca.gov/Assets/PL/environmental/plains/Environmental/Notice+of+Preparation+(NOP)/Responses+Received/CADFW.pdf).

⁶⁰ Phase V Initial Study, pp. 21-22.

⁶¹ Phase V Initial Study, pp. 41-48.

expansion is currently undergoing environmental review (hence, it is more than a "reasonably foreseeable" future phase), and given that the County cannot extend the CUP without first requiring a SEIR, perhaps the County should instead analyze the 31 wells in the Phase V EIR and (if the County so chooses) approve the CUP for these wells then.

Second, last year, the County approved a massive pipeline to run from the AGOF to Phillips 66 Santa Maria refinery, which would accommodate the Phase V expanded production.⁶² The County approved this pipeline, which travels down residential streets and over several waterways, based only on a negative declaration and with a minor use permit.⁶³ In other words, by separating this project from the larger expansion of production (and sales) at the oil field, Phillips 66 and FMOG improperly skirted the requirements of CEQA.

Third, FMOG is in the process of requesting from DOGGR, the State Water Resources Control Board, and US EPA an aquifer exemption to allow FMOG to inject wastewater into an aquifer that is currently protected under the Safe Drinking Water Act.⁶⁴ As noted above, at present, FMOG has at least eight injection wells operating in the protected aquifer. FMOG has requested that the DEIR for the Phase V expansion be put on hold until the aquifer exemption process is complete.⁶⁵ In order to try to legitimize what is currently illegal and accommodate the planned expansions, FMOG is looking to this exemption process to help facilitate the increased volumes of produced water. Thus, this exemption project, too, is intricately tied to the 31 wells, the pipeline, and the Phase V expansion, and severing it from the rest of the project has allowed FMOG to unlawfully evade the requirements of CEQA. The County must not condone or assist FMOG's actions to evade public review and disclosure of the impacts of its massive planned expansion at the AGOF by extending the CUP to allow FMOG to construct the 31 wells.

III. Conclusion

Although the 31 wells were part of the AGOF Phase IV expansion plan, under the County Code and CEQA, new environmental conditions and scientific knowledge about the impacts of oil and gas activities require that the County reject FMOG's three-year extension request. Rather,

⁶² San Luis Obispo County, *Negative Declaration and Notice of Determination, Phillips 66 5.6 Mile Pipeline; Minor Use Permit; DRC2012-00101* (Sept. 25, 2014).

⁶³ *Id.*

⁶⁴ FMOG aquifer exemption application.

⁶⁵ Phase V Conditional Use Permit (DRC2012-00035) Ongoing Status Report, *available at*: <http://www.slocounty.ca.gov/Assets/PL/environmental/plains/OngoingStatusReport.pdf>.

the County must evaluate the proposed project under CEQA by requiring either a SEIR or review in the Phase V EIR before deciding whether to approve the construction of these wells. Indeed, the 31 wells is really part of a much larger project to expand production and sales at the AGOF, and must be analyzed as part of this activity. The agencies responsible for protecting California's residents from the harmful impacts of oil and gas drilling and extraction activities have fallen asleep at the wheel. It's time for the County step up and protect the public health and beautiful environment of San Luis Obispo County.

Sincerely,

/s/

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Center for Biological Diversity

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