

**An Overview of environmental and other impacts of the Potential DKRW LNG plant/pipeline and Arizona Clean Fuels refinery in Tacna, Arizona with oil port and pipeline. (English)**

**Report for *Proyecto Fronterizo de Educacion Ambiental*, Playas de Tijuana, Baja California August 19, 2005**

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BlueWhale Swimming in Gulf near Puerto Libertad ,Sonora (Diane Gendron 2003)

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## I. Introduction

**A. Why This Report?** In 2004, two major industrial developments—a liquid natural gas (LNG) regasification facility by Houston-based DKRW Energy and a “clean fuels” refinery by Arizona Clean Fuels of Phoenix, Arizona-- were announced by their promoters as planned for Puerto Libertad, Sonora and Tacna, Arizona, respectively. The two facilities, along with their accompanying Mexican ports and new pipelines, could have environmental impacts on both the Gulf of California and protected lands in Sonora and Arizona.

A number of individuals and groups, as well as PFEA, contacted this author and E-Tech International concerning the possibility of putting together an overview of the status of these proposed projects, their possible environmental and/or social impacts, and where and how the public could provide input into the regulatory process. Fears were expressed about oil spills, air pollution, and intrusions on native lands and ecological reserves.

During summer 2005, the author and his co-investigators, Ruben Lopez and Sandy Lanham, spoke with the projects’ owners, government agencies, and various stakeholders concerned with these new developments, as well as other developmental projects currently underway in the Gulf.

We hope that the information contained herein is of use to all stakeholders and we appreciate the cooperation of Mr. David Ramm of DKRW Energy and of Mr. Glenn McGinnis of American Clean Fuels.



The diversity and abundance of marine life, associated with spectacular underwater forms and a high level of water transparency, make it a paradise that has been called “the aquarium of the world,” by Jacques Cousteau. This incredible biodiversity attracts fishing fleets, which commercially harvest around 70 species in the zone, pushing some of these and other populations to a critical point, directly or through bycatch. The vaquita marina, is often trapped in shrimp and shark fishing gear and is at risk of extinction with only around 500 remaining. The same is true with sea turtles. Several of the area’s species are ecologically extinct, making this declaration one small step towards recovery.”

[http://news.nationalgeographic.com/news/2005/07/0715\\_050715\\_worldheritage\\_2.html](http://news.nationalgeographic.com/news/2005/07/0715_050715_worldheritage_2.html)

World Heritage Sites are considered extremely high priority regions to preserve because they are in danger of losing their unique features. There is no question that sustainable economic developments are needed in the Gulf, a priority of all World Heritage Sites. Commercial fishing dramatically impacts the region, while small scale or artisanal fisheries, carried out for self-sufficient purposes as well as small profits, are an increasing social-environmental struggle. The impoverished and indigenous Seri communities located near the proposed Puerto Libertad development are of concern, as well.

**II. Proposed DKRW Liquefied Natural Gas (LNG) Plant at Puerto Libertad, Sonora:**  
(Photo below shows appearance of site today)



PHOTO: Courtesy of Edward Glenn, Arizona-Sonora Desert Museum, and Pamela Nagler, University of Arizona from “*Photographic Atlas of Esteros and other Coastal Wetlands of Conservation Interest in the Northern Gulf of California*”

**Puerto Libertad, Sonora (pop. 2500):** Proposed site of the LNG Plant, owned by DKRW Energy, and one of two sites under consideration by Arizona Clean Fuels (ACF) for use as an oil port. If selected, ACF would build a pipeline to transport fuel north to its new refinery in Tacna, AZ, starting here. Adjacent to the town of Puerto Libertad is a 569-632 MW major-polluting power plant utilizing as fuel, combustoleo, the tar distillates of the PEMEX refining process (containing up to 5% sulfur and conservatively estimated by the North American Commission for Environmental Cooperation to emit annually 67,300 [short-U.S] tons of sulfur dioxide (SO<sub>2</sub>) as well as high levels of nitrogen oxides and particulates. (*North American Power Plant Air Emissions, Commission for Environmental Cooperation 2004*).

The power plant is located on land that has been drained and scraped of all natural vegetation and wetlands. The surrounding Gulf waters are a diverse breeding ground for both fish and endangered marine mammals.

## **LNG liquefaction, tanker and receiving operations**



Photos of different LNG ships and regasification facilities from various sources courtesy of Powers Engineering

We start with a discussion of the proposed DKRW Energy LNG facility that would be built in Puerto Libertad. Information on the LNG plant and natural gas pipeline is based on interviews with DKRW Energy partner David Ramm, July 22 and August 12, 2005.

**For more information on the LNG Plant please contact: Mr. David Ram  
DKRW Energy, 2 Riverway Suite 1780, Houston , TX 77056 (713) 425 6520**

Mr. Ramm stated that their LNG project is being promoted as environmentally and economically beneficial by the Governor of Sonora and the state Secretary of Infrastructure and Ecology. According to Mr. Ramm, DKRW Energy considers itself to be a proponent of “renewable energy-clean fuel”. Other current company projects range from wind-energy investments in West Texas to coal-diesel extraction in Wyoming. One beneficial byproduct of the proposed LNG regasification facility in Puerto Libertad, if the facility is built, would be the conversion of the existing thermoelectric plant in Puerto Libertad from its current fuel of tar pitch with naphthalene—combustoleo (COPE)—to cleaner burning natural gas.

**A. LNG: What is it?** Liquefied natural gas (LNG) is natural gas that has been cooled to minus 261 degrees Fahrenheit, reducing its volume 600-fold. Specially designed tankers with large, insulated storage compartments can carry more than 2.5 billion cubic feet (BCF) of gas per shipment. In 2003, the United States imported about 2.3 percent (507 BCF) of its natural gas usage as LNG. That figure rose to nearly 3 percent (652 BCF) in 2004, according to the U.S. Dept. of Energy’s Energy Information Administration (EIA) ([www.eia.doe.gov/neic/a-z/gasa-z.htm](http://www.eia.doe.gov/neic/a-z/gasa-z.htm)). In 2004, LNG imports constituted about 15% of total natural gas imports from all sources, the vast majority being gas piped from Canada. Five facilities currently operate in the U.S., in Massachusetts, Maryland, Georgia, off the Louisiana shore, (the new Excelerate floating terminal in the Gulf of Mexico), and a smaller facility in Puerto Rico used primarily to supply a power plant. Total import capacity is increasing to close to 1 T (Trillion) CF annually. LNG regasification facilities can be either offshore or onshore and can use one of several technologies to regasify the liquid gas.

Proposals have surfaced for at least 40 more import facilities to serve the U.S. market, with 58 terminals proposed in North America overall. Far fewer will actually be built—perhaps only 3 or 4 in the near future – although the EIA is predicting close to a nine-fold increase in U.S. LNG importation by 2025.

**B. LNG: Where does it come from?** Currently, the only long-term imports of LNG into the US are from Trinidad, accounting for 27% of the total in the first eight months of 2004. A further 40% were from Trinidad under shorter-term arrangements, in most cases redirection of cargoes originally contracted for the Spanish market. The remaining 30% of US imports were short-term supplies from Africa (Algeria and Nigeria) and east of Suez (Oman, Qatar, Australia and Malaysia). Mexico has no LNG currently imported.

**C. LNG: General Environmental and Social concerns:** In some areas where natural gas is extracted and liquefied, substantial environmental issues have surfaced in recent years and they are frequently related to both the exploration and extraction of gas as well

as the impacts of laying the gasline—also from a process that DKRW **DOES NOT** intend to use—ocean regasification. These include the Peruvian Camisea natural gas project that will provide LNG for the U.S. and Mexican markets (indigenous land and health impacts, poor quality revegetation and monitoring of environment and pipeline, and rupture of a newly-laid pipeline) the Sakhalin gas line north of Japan (threatened mortality of gray whales from platforms and pipeline construction) and the British Petroleum, Tangguh, Indonesia projects (mangrove ecosystem destruction) A more generalized concern of LNG is the global warming effects of the methane produced by gas lost in production and delivery—estimated to be 2-2.5% by some industry sources. The loss has produced a debate about whether natural gas overall is better or worse than petroleum sources.

All factors aside, it is indisputable that natural gas is cleaner to burn than petroleum distillates—particularly *combustoleo*, the fuel used by the thermoelectric plant in Puerto Libertad.

**D. Financing and Economics:** DKRW Energy purchased 1500 acres of land in Puerto Libertad from the State of Sonora in 2004, according to Mr.Ramm. The tract was originally intended in the 1980's for the Comision Federal de Electricidad (CFE) thermoelectric power plant currently operating. Of this land, “approximately 20%” was donated to the local municipio of Pitiquito to allow for urban growth in Puerto Libertad from its current population of around 2500. The land for the LNG plant has been zoned by the municipio as industrial for LNG usage. Concurrently, the nearby Liberty Cove planned development is advertising a planned (if virtual at this time) community of 100 000 with a NASCAR race track. Enormous environmental impacts of such a development aside, it seems odd that a huge population would emigrate to live in an isolated desert by a power plant and LNG facility—although the Liberty Cove website seems to intimate that DKRW will provide them with natural gas to make the good life better.

DKRW Energy would own and operate the LNG facility as well as the pipelines necessary to carry the natural gas to markets. DKRW would purchase LNG from a supplier (often a major petrochemical corporation) and the regasified product would be marketed in both Arizona and Sonora. At this time, DKRW either does not have, or would prefer not to name, their marketing contractor.

The process of financing the LNG plant is something of a chicken-and-egg process. Long-term contracts are needed, signed by DKRW Energy, before financing can be obtained. Mr. Ramm says that DKRW has successfully obtained financing in the past for projects of equivalent scales of infrastructure and is convinced that they have enough sources of debt equity to do it again. He is “confident and as a developer I have to be” that they will not have a problem once they decide to sign a contract.

The plant has been downsized from 1.3 to 1.0 Billion Cubic Feet per Day (BCFD) in size although the plant can exceed that capacity for short periods and they hope to begin construction in 2006, completing it in 2009. Pipelines would be laid between 2007-2009.

Ramm estimates that approximately .5 BCFD will be utilized by Sonora and .5 BCFD will be utilized by Arizona. The basis for his estimates—and also the basis for obtaining rights of way for pipelines and laying the pipe—is as follows. The Puerto Libertad plant, which could vary in consumption depending on how energy efficient a natural gas facility would be (rebuilt combined cycle turbines or refurbishing the present boilers)—would probably utilize 10%. If the Empalme plant were to be converted, add another 10%. Other potential industry in Guaymas includes sardine factories and the Ford plant in Hermosillo that could expand natural gas usage as well as “other power plants and potential investors who would welcome the availability of natural gas”

The economic realities of LNG, however, are not easy—at this time for either the seller(s) or the consumers and in Sonora they are fairly conjectural outside of power plants (presuming CFE will proactively work on converting the Empalme and Puerto Libertad power plants to natural gas which could account for, at most, 20 percent of Sonoran consumption). The plants could also utilize diesel and pollution controls to reduce air pollution; although less effectively than with natural gas.

Generally, at least a 5 year contract needs to be signed between an LNG regas plant and the consumer because NG, unlike a liquid fuel like oil, diesel, or gasoline, has nowhere to be stored. It has to be delivered and burnt off somehow or ships must stop delivering it from its “upstream” source where natural gas is liquefied. Whether DKRW will be capable of selling half its gas in Sonora is unknown; and whether it will be able to sell enough gas in Arizona is also uncertain if it cannot sell 500 million cubic feet daily in Sonora. Heating needs are substantial in Nogales, Sonora but other towns with moderately cold winters are small and/or isolated; the “domestic usage” pipeline might or might not provide user access to that region since the defined lines go south to Guaymas and Hermosillo for domestic usage and north for export.

Since the Iraq war and the rise of costs of imported oil, the costs of natural gas from all sources have risen to record levels and Mexico has no plans to pipe gas from gas fields in Taumalipas and south all the way to the west coast. The natural gas options for Sonora--where the will is present to pay the price---are to utilize LPG bottled gas (that is currently sold in Sonora but is impractical for most high fuel consuming industrial consumers), to pipe more gas in from the U.S. through current or new pipelines, or to invest in LNG terminals.

Past experience has shown that the presence of a pipeline in northern Mexico, such as the PEMEX natural gas line that originates with El Paso Natural Gas in the U.S., crosses the border at Naco, Sonora, and travels to Hermosillo and the Ford Motor plant, does not equate to fuel availability for municipal users. However, since municipios in Mexico have the legal authority to determine how their land is utilized, contracts could be drawn up to ensure that LNG gas can be utilized by towns that are in municipios where the pipeline must pass. Very limited arrangements were made by the city of Ensenada, for example, regarding the Sempra-Shell pipeline in Baja California. That pipeline is being laid; however no LNG plant has begun construction yet to provide the gas.



Of obvious concern would be whether the costs of the gas can be negotiated low enough to make it competitive to municipal users currently utilizing LPG gas that is trucked around the state. Certainly, domestic and industrial use of affordable natural gas could reduce the amount of wood and other fuels that create local air pollution. Whether contracts can be negotiated between municipalities and DKRW that are mutually acceptable remains to be seen. Costs of LNG production and regasification have been estimated by EIA to be between \$3.50 and possibly as high as \$4 million metric BTUs, a high production cost, and the sales price has hovered around 7\$ in the U.S---a price that may not be competitive with LPG in the near future.

**E. Natural Gas Pipelines:** According to Mr. Ramm, at least two pipelines would be constructed: one pipeline for export to the U.S. that would run northeast, skirting around the towns of Pitiquito and Caborca, presumably to Nogales but the actual route is not one that Mr. Ramm would comment on. He would also not comment on how the second pipeline would travel from Puerto Libertad south to the Guaymas region, from where it could follow the existing highway from Guaymas to potential Hermosillo consumers. However, the current plan of the state of Sonora is to build a 4-lane 375 mile-long paved highway from El Golfo to San Carlos; a plan that has generated controversy among the Seri Indians and some environmentalists. Such a coastal route would be the most direct trajectory between the LNG facility and Guaymas. Angry Seri's shot and wounded a helicopter pilot—and allegedly were involved in gunfire with Sonoran state police earlier this year after expressing their outrage with the highway potentially passing through their coastal land south of Libertad and north of Bahia Kino. Whether the highway will indeed be completed is not entirely certain but construction has begun at the northern terminus of El Golfo, north of Puerto Penasco.

Most pipelines of this capacity will range between 24 and 30 inches in diameter, and a “right of way” (ROW) that creates a corridor for laying and maintaining pipe could easily be 80 feet in width, as it is along the Sempra-Shell Baja pipeline. Bill Powers of Powers Engineering in San Diego describes the actual process: “Pipe is laid on the ground parallel to the trench. The pipe laying vehicle is wide. The pipe laying vehicle picks up the pipe and puts it in place. A second passing lane is maintained outboard of the pipe and pipe laying vehicle lanes so miscellaneous project vehicles, or other pipe laying vehicles, can get by with enough additional space to ensure those vehicles don't accidentally whack the pipe laying vehicle. This technique requires a wide ROW.” (The current PEMEX importation pipeline running south from Naco to Hermosillo is only 16 inches—the right of way appears to be much smaller)

Pipelines, to be protected from corrosion and leaks under international monitoring and oversight requirements such as ASME b31.8 and API 1104 (equivalent to U.S. Office of Pipeline Safety regulatory criteria), require cathodic (electrolytic) protection as well as regular computerized monitoring and the line should be hydrostatically tested in long segments after assembly. This means that the entire line (or miles long segments) is filled up with water to 120% of normal gas pressure. Adequately monitored in an arid climate, no corrosion problems are likely to be encountered for 30 years or longer, although sabotage—or in other cases, potential consumers looking for free gas in

ignorance of the repercussions)--is not unheard of in politically unstable areas. The danger is often greatest to the saboteur who can be killed by a high pressure jet of gas; an adequate computer pressure monitoring should result in a rapid shut down in case of a pipeline rupture.

**F. LNG Plant Technology and Environmental issues:** An LNG terminal can be onshore, anchored offshore, floating on what is basically a converted ship, or in cases where the LNG regasification facility and the shipping units are both owned by the same company, a regasification facility can be the LNG ship and be entirely mobile. Off shore terminals that are floating are generally less environmentally intrusive to marine life than those that are anchored.

Ramm says that he is personally committed to building an on-shore LNG terminal on land DKRW has purchased from the state of Sonora, and not an offshore LNG plant, citing problems with costs of square footage needed for offshore floating barges to provide adequate space to warm up and “regasify” LNG in an environmentally acceptable fashion—without utilizing seawater. DKRW is seeking to utilize ambient air regasification at Libertad, generally considered the state of the art, environmentally. During evaluation of potential alternatives under a SEMARNAT Manifesto de Impacto Ambiental (MIA) the question of the most appropriate siting—offshore or onshore—of an installation should be evaluated, objectively, whatever the preference of the applicant..

Ambient air regasification is generally regarded as being environmentally benign in its impacts on surrounding marine life with no accompanying air emissions. The first North American unit to use air warming is under construction in Texas (Freeport LNG). Use of air to vaporize LNG is particularly cost-effective in warm climates.

The other common means of regasification include seawater utilized to warm the gas (ORV) which has very serious impacts on fish and other marine life since it sucks millions of gallons per day of seawater into its ducts and utilizes a biocide. A second means of regasification is to use natural gas itself to regasify, in a process called submerged combustion vaporization (SCV). This utilizes about 1.5 to 2 percent of the LNG; the proposed Mitsubishi Long Beach, California, plant combines this technology with power generation. It has no negative environmental effects on seawater but does produce some NOx air emissions that can be cut by catalytic controls.

Mustang Energy in Houston is the largest manufacturer of the warm air regasification process and Milos Soudek of Mustang Energy stated in response to space and cost considerations, “ To answer your specific question, space is not an issue. We have provided layouts for off-shore platforms for clients and, for example, a 1bscfd send out facility (same size as DKRW) would fit on a 260ft x 120ft platform. The space requirement is no different than for SCVs.

The LNG Smart Air Vaporization is economically viable onshore or offshore, it is dependent on the ambient temperatures. Obviously the warmer the climate the more economical the system is. The CAPEX (capacity) is in the same order of magnitude as

ORVs. SCVs are typically not used in the off-shore applications. Environmental considerations are important, emissions for LNG Smart are up to 99.9% less than compared to SCVs and there are no water pollutants compared to ORVs.”

Ramm points out that there will be no breakwater to impact natural sea movement—a concern with some LNG plants—and; the plant will utilize a jetty for a loading area that will parallel the existing jetty utilized by the power plant that receives oil from PEMEX for its tank farm. The port, says Ramm, is deep enough for the estimated 2 tankers per week that will download their cargo to the LNG regasification facility.

The overall impact of the tankers—and how their size and frequency compare to current PEMEX combustoleo imports that would be replaced by the LNG barges—on marine life would be a subject for a SEMARNAT MIA.

As DKRW is quick to point out, if—and this remains an if—the Comision Federal de Electricidad (CFE) formally approves and promotes the LNG project and actually carries out the power plant fuel conversion: the natural gas from the proposed LNG facility will dramatically reduce a soup of air pollutants from the Libertad and Guaymas power plants. The North American Commission for Environmental Cooperation (CEC) estimates that the total SO<sub>2</sub> emissions from Libertad are 61, 159 metric tons per year; the author would guess that this is low and that actual emissions are closer to 110,000 metric tons per year based on PEMEX fuel consumption estimates of 20,000 barrels per day 20,000 barrels indicates that somewhere over 3000 metric tons a day of COPE are consumed at Libertad (see more math in the Oil Shipping ACF section). At 5% sulfur this would indicate over 300 MTPD of SO<sub>2</sub> emitted—far more than estimated by CEC.

CEC also calculates that the Guaymas I and II power plants emit another 47,078 metric tons per year (the author did not do a fuel sulfur estimate for them) plus, like Libertad, substantial Nitrogen oxides, particulates metals and cancerous hydrocarbons among many HAPS (hazardous air pollutants). There are no pollution controls on these power plants.

## **G. Safety Issues**

Opposition to LNG terminals has largely been based on fear of the flammability of a possible escaped cloud of gas. Sandia National Labs in Albuquerque released “*LNG Tanker Spill Analysis*” in December, 2004. The Sandia report is considered the industry state of the art and establishes for most plants two radii of hazardous response concern – one for high flammability that is one mile in diameter, and a second for possible flammability that extends generally two miles from most plants in the event of a rupture. Increasingly, this puts pressures on terminals to be floating offshore barges miles from shore rather than land-based facilities. The Sandia study is also leading to pressure on the Coast Guard to require a safety zone—an area away from shore that LNG tankers would have to limit themselves to between one and two miles away from habitation.

From a safety perspective, long-term contingency concerns will tend to favor some type of offshore terminals; something that DKRW does not want to consider at the moment. At least within the United States, fears of terrorist attacks on LNG terminals have been very vocal in Congressional testimony on proposed terminals in the northeast. Whether such a motivation for attack is relevant to Mexico is clearly a subject of debate; however concerns over management of natural gas in the country are great following past PEMEX and propane accidents in Mexico City, Guadalajara and Oaxaca.

It is important to stress that the question of whether there would be any environmental---as opposed to hazardous material emergency response---advantage to an off-shore versus an onshore terminal is not being addressed in this brief overview. The author has no answer, however it is an important issue to address in an environmental impact assessment—the MIA-- and for those who are experts on the biotica of the Gulf to consider.

**H. Environmental, emergency response and occupational safety and health permitting and regulatory procedures:** DKRW will proceed with environmental permitting whether or not they have obtained financing and LNG contracts. Mr. Ramm stated they have “a definitive schedule and we have consultants working on preparing the environmental background for permits”, but he “prefers not” to say what the schedule is. On land, they have already conducted seismic and topographic studies.

Environmental permitting would include a preliminary application to SEMARNAT and principally a Manifesto de Impacto Ambiental (MIA). In the MIA, DKRW Energy (Arizona Clean Fuels will also file a MIA regarding impacts of their Sonora or Baja oil port and pipeline to the Tacna, Arizona, refinery), will describe environmental and social impacts, all alternatives to their project, from no action taken to various other means to construct and operate an LNG plant, construction and maintenance of pipelines, ship maritime and terrestrial impacts, and details of how to prevent, control and monitor the impacts of their investment under SEMARNAT regulations.

In the case of either the DKRW investment or the ACF oil port and pipeline, there will be public comments and hearings on this process and documents will be accessible in Hermosillo (or possibly Baja in the case of the ACF port) from the Delegado Estatal of SEMARNAT, and in Mexico City, from SEMARNAT (check SEMARNAT website at [www.Semarnat.gob.mx](http://www.Semarnat.gob.mx) for data on phone contact numbers as well as lists of current MIAs). You can arrange to be contacted through the Delegacion Estatal for hearings; local Comites Ecologico Municipales should also be both notified of potential hearings and be a source of information on these projects. Pitiquito is the Municipio for Puerto Libertad.

Emergency response plans and procedures will fall under the domain of Secretaria de Gobernacion’s Proteccion Civil that will be represented at the Municipio level. Historically, in many areas, Proteccion Civil has been a civil project that has taken a high interest in environmental impacts. DKRW will need an approved plan with them—as well as with the Bomberos, the local fire department. It is important that worst case

scenarios of LNG gas releases, following the Sandia model, be overtly discussed with emergency responders since this is of great concern because of the one and two mile radii of high and low-medium flammability that can occur in the event of a rupture at the facility.

Finally, occupational safety and health plans will need to be submitted to the Secretaria del Trabajo y Proteccion de Seguridad (STPS) for all facets of construction and operation of the LNG plant and pipeline.

Another route to follow, if one encounters problems obtaining documentation, is to utilize Mexico's new freedom of information process that applies to all agencies. Please go to the Conclusions and Recommendations section of this report (IV) for advice from Laura Silvan, Director of Proyecto Fronteriza de Educacion Ambiental, on how to utilize this regulatory process to get information on these or any investments.



**The Midriff Islands or Islas Grandes** Ships carrying combustoleo for the Puerto Libertad power plant currently pass nearby; LNG tankers for the DKRW facility or PEMEX tankers for the ACF Refinery soon could also pass by this coast.

Photo: Luis Bourillon

**III. Arizona Clean Fuels (ACF) Refinery in Tacna, Arizona:** (site photo below from



Arizonacleanfuels.com website)

**Information on the ACF refinery is drawn principally from interviews with Glenn McGinnis, CEO of ACF on July 21 and August 10, 2005. Phone: (480) 753 5400  
4500 East Chandler Blvd, # 145 Phoenix, Az 85048**

**A. Background:** Arizona Clean Fuels received an air quality permit April 14, 2005 (approved by US EPA Region 9) from the Arizona Department of Environmental Quality (ADEQ) to build a 140,000-150,000 barrel per day (BD) “low sulfur/low particulate fuel” refinery near Tacna, Arizona at 45<sup>th</sup> Avenue and old Highway 80. The facility is designed to receive low grade refining distillates or cheap heavy crude oil and to produce environmentally cleaner fuels.

However: the facility does not have financing, proposed Mexican ports of either Puerto Libertad, Sonora or Punta Colonet, Baja that would receive PEMEX refinery inflow products are indefinite, pipeline financing is conjectural, and the approved refinery air quality permit requires that the refinery must be under construction by Dec 15, 2006 and the air quality permit expires April 15, 2010 in the event that either milestone is not reached. While financing remains uncertain, ACF will not—unlike DKRW—proceed with any Mexican permitting for the facility.

We will examine air quality permitting of the refinery, some economics, shipping and pipeline issues in this section. ADEQ provides quick links to detailed permit information—and to their credit the ACF website ([www.arizonacleanfuels.com](http://www.arizonacleanfuels.com)) has links to ADEQ and some other legal documents—as well as to supportive letters, of course. The same links—to ADEQ documents also provide links to a number of environmental justice issues that were raised with ADEQ and some local comments concerning the refinery. It is the opinion of this author that under normal circumstances, the air pollution from the plant will not be a cross-border issue but could be a concern of neighbors.

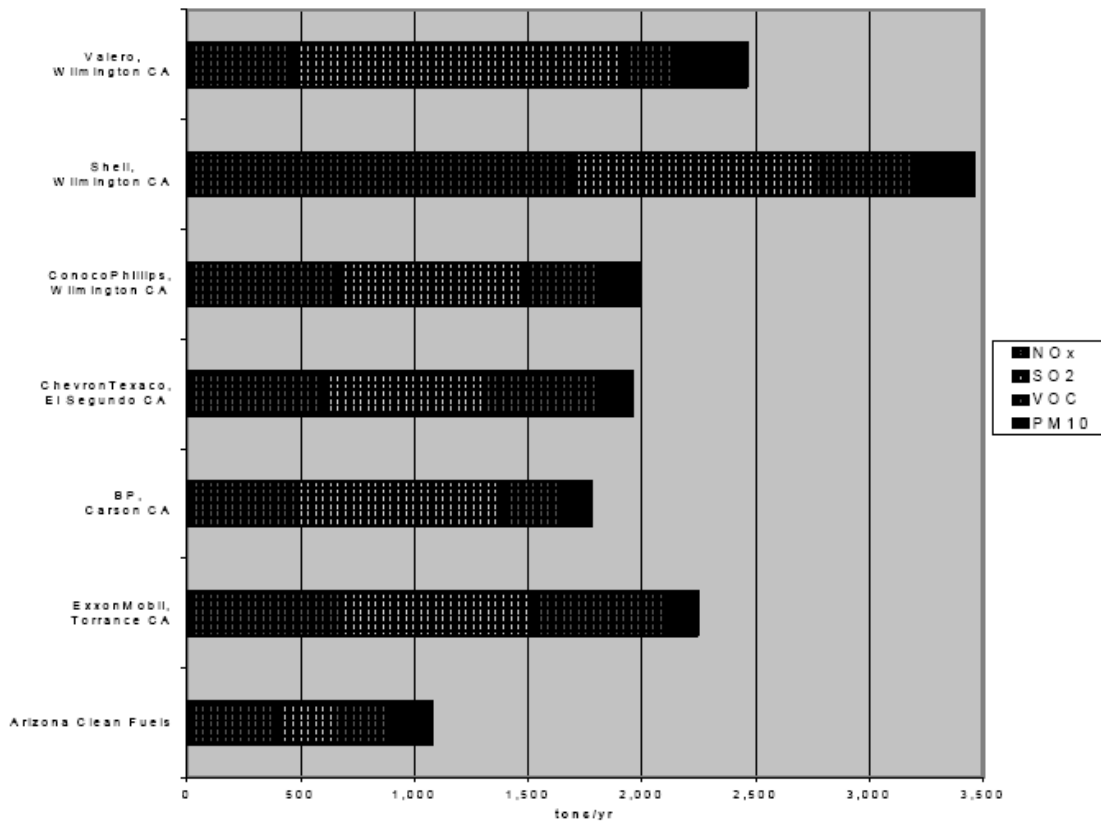
**B. Refinery and Products:** The refinery site is on land surrounded by agricultural land and lower and lower-middle income retiree winter refuges such as mobile home parks. It is just west of the townsite of Tacna (perhaps a mile), just north of the Colfred airport strip, and perhaps a mile and a half northwest of the Cabeza Prieta National Wildlife Refuge boundary and less than a mile from the Goldwater Bombing Range/proposed Sonoran Desert National Park northern boundary. ACF expects to receive about 140,000 barrels per day (bpd) of either high sulfur refinery distillates or heavy crude oil to produce up to 150,000 bpd of “clean” fuels (lower than sulfur and particulates) as 85,000 bpd gasoline, 35,000 bpd diesel, and 30,000 bpd jet fuel. It would be the first refinery constructed in the U.S. since the early 70s and the first to produce fuel to more stringent EPA, California and Arizona clean fuel standards. ADEQ states (4/14/05 “*Responsiveness statement*”) “These specifications govern several different properties in gasoline, including volatility, sulfur content, and benzene content. The effects of these specifications are many, including a reduction in evaporative VOC (volatile organic/solvents) and benzene emissions; a reduction in sulfur oxides emissions due to reduced fuel sulfur content; and reductions in emissions of several pollutants due to enhanced performance of emission control systems in the presence of lower-sulfur fuels”.

ACF anticipates that their products would go to Arizona, California, and to Sonora.

**C. Refinery Air emissions:** Permitting to date has certified that the refinery meets state and federal standards developed for “ambient air quality standards” (mouth level air pollution) as well as standards for continuous emission of pollutants from the facility. at the state level through ADEQ and approved by US Region 9 EPA, that it met the standards for Hazardous Air Pollutants or HAPS that have grown out of the 1990 Clean Air Act, and “prevention of significant deterioration” (PSD) at the federal level and to prevent Class One Federal Parks from visible haze. ACF will not flare except during emergencies and startups, nor be allowed to utilize any other fuel other than their refined clean fuels or natural gas for their processes. A long list of what ADEQ and ACF consider to be stringent measures for controlling air pollution during operation and startups and emergency upsets are listed in the April 14, 2005 ADEQ “Responsiveness Summary to Public Comment”. The author is not qualified to comment on the technology, however a bar graph by ADEQ below presents ACF emissions in comparison with other refineries.

**This does not mean that for sensitive individuals there is no possible health impact;** the refinery does emit hazardous air pollutants including several known carcinogens. It does so at levels that are probably lower than other refineries in the U.S, which is not totally reassuring. These facts are most relevant to individuals living close to the refinery where-- during startups or during equipment failure, certain emissions can increase a thousand fold for a short period that hopefully would be no more than 15 minutes under permit conditions. The author would stress that these are human health issues for local inhabitants and call for community monitoring of health and any emissions problems that they believe could be a problem; he does not know of studies of these levels of emissions’ ecological impact on surrounding areas such as Cabeza Prieta National Wildlife Refuge.

Figure 3. Refinery Emissions (Arizona Clean Fuels and Los Angeles County Refineries)  
 Arizona Clean Fuels allowable; others 2002 actual emissions normalized to 150,000 BPD



Graphic: ADEQ Jan 31 2005 Environmental Justice Assessment Arizona Clean Fuels (links available either [www.arizonacleanfuels.com](http://www.arizonacleanfuels.com) or [www.adeq.gov](http://www.adeq.gov))

At this time, the author cannot comment on impacts on local fauna from either air emissions nor from light or noise pollution. The ADEQ permit will not address tailpipe emissions from tanker trucks hauling fuel from the refinery.

ADEQ must still issue both solid waste and water quality permits; and the use of water and impacts on the aquifer fall under the purview of the Arizona Department of Water Resources. There will be further opportunity to comment on these issues at hearings on the refinery impact on BLM's Cabeza Prieta National Refuge. The author is not certain of what other Federal hearings beyond pipeline hearings from Department of Energy are likely to be held should the process continue.

“The community is divided on whether the economic benefits are worth the environmental tradeoffs. Theresa Ulmer, spokeswoman for Yuma County Citizens for Clean Air (928-783-2968), said: ‘We’re going to fight this air permit.’ Ulmer said the citizens group will petition the EPA and ask them to take over the responsibility for enforcement and compliance. Ulmer said environmental regulators have not adequately addressed concerns raised about pollution or potential health effects. An environmental impact statement on the proposed refinery by the Bureau of Land Management is due to be finished later this year.” *Yuma Sun*, April 15, 2005



**D. Financial and economic issues:** *Yuma Sun, April 15, 2005:* “Glenn McGinnis, Arizona Clean Fuels chief executive officer, said he believes the company can raise the necessary capital and start construction in time. McGinnis said a total of 50 individuals have invested money in the project thus far, though most of the capital has come from three investors. McGinnis said all are U.S. investors and wish to remain anonymous. McGinnis said the company now will seek additional investors and work to get the additional permits the company needs to move forward with their plans. The refinery itself will cost about \$2 billion, and a proposed underground crude oil pipeline from Mexico about \$500 million. McGinnis said the company will ask ADEQ for an (air quality permit) extension if it can't meet the 18-month deadline.”

ACF owns the land by Tacna for their refinery and one would think that at current fuel prices that a refinery would be more economic now than ever before, however various articles over the refining capacity of the U.S. versus costs of the petroleum products to be refined make the economics less clear. However, Mr. McGinnis' goal of getting paid to dispose of the high sulfur byproducts (COPE) from PEMEX may make the question of the costs of process moot---presuming he can bankroll and install pipelines and get at least a 5 year contract to supply COPE or to purchase part heavy low grade crude (sometimes as low as 8 dollars a barrel) and to dispose of COPE. A refinery can, in times of poor supply, cut back production or even shut down temporarily more easily than can a LNG regasification plant.

Presumably if ACF paid the costs of constructing a receiving facility in either Punta Colonet or in Puerto Libertad to receive PEMEX products, and if they utilized the offshore process to receive the ships, land investments would be minimal. However tank farms will be needed unless, in the case of Libertad, ACF upgraded the existing tank farms of PEMEX to receive the PEMEX products. No decisions have been made on Mexican land purchases.

In the event that ACF chose to receive fuel at a Southern California port between Long Beach and San Diego, they would need to purchase both access to right of way through land that McGinnis believes is prohibitively costly as well as go through environmental hearings that he believes will effectively stop such a line. He does not expect this opposition from either Baja or Sonora. He is, however, still considering the purchase of an existing oil line that was designed to transport oil to the west rather than the east but prefers the Mexican option for cost and environmental reasons.

For ACF to construct a pipeline in Sonora or Baja,, as in the case of DKRW, will require negotiations over land with municipios and individual owners to gain approval for a right of way. Unlike DKRW, ACF will not be offering a product for local or regional utilization. We will discuss the pipeline right of way (ROW) and their ecological context in the pipeline section.

It is relevant to point out that representatives of Mexican federal agencies who were at the high management level of CFE and PEMEX—refused to state that their agencies had a stake of any kind in either the ACF refinery or in the DKRW LNG plant. As far as ACF's role as a disposer of combustoleo, transporter of COPE (combustoleo-aceite

pesado),and/or potential provider of cleaner fuels—the agencies recognized the potential feasibility of the relationship and felt that both projects were ones being promoted by the governor of Sonora. The political strength of the PRI governor’s relationship with the (currently PAN) federal agencies will be an unpredictable factor in the future of the investments. Both Mr. McGinnis and Mr. Ramm, not surprisingly, have had meetings at the secretariat levels in Mexico which in both cases have evinced great interest but no formal commitment.

#### **E. Port and shipping issues impacting Libertad or Punta Colonet:**

ACF also seeks to utilize either Puerto Libertad as their COPE receiving port, alongside the proposed LNG plant, or locate the facility on Pacific coast south of Ensenada, Baja, at a proposed containerized port at Punta Colonet, currently a fishing village. They would then seek the most efficient means to bring a very low grade petroleum distillate called Combustoleo Aceite-Pesado (or COPE). McGinnis refers to COPE as a “rotgut” high sulfur tar-pitch distillate that ACF would get paid to dispose of and convert to clean diesel, gasoline and aviation fuel. If the LNG plant were not built, McGinnis believes that he could sell clean diesel to CFE for the Libertad plant, improving local air quality, and provide northwest Mexico with reasonably priced clean fuel along with the state of Arizona.

Giant oil tankers can carry as much as 2 million barrels of oil, however those belonging to PEMEX carry about 250 000 to 264 000 barrels per day of COPE. This estimate is based on PEMEX statements to Ing. Ruben Lopez that COPE weighs about .9-.95 kilos per liter. We then assume that a barrel would weigh about 151 to 160 kg/ba and that a metric ton would be 6.25-6.6 barrels. PEMEX ships tend to be in the 40,000-45,000 metric ton capacity range---giving the total barrel figure above.

The Puerto Libertad power plant consumes about 20,000 barrels per day and this figure is consistent with observer estimates that about 2 ships a month currently travel through the Midriff Islands (Islas Grandes) to Puerto Libertad. Therefore, if PEMEX paid ACF to dispose of their COPE, the 40,000 barrels per day that was discussed, would call for a ship every 6-7 days---presumably coming largely from the Salina Cruz, Oaxaca refinery that has discussed selling combustoleo to Mr. McGinnis. If ACF was able to obtain 140,000 barrels of COPE from PEMEX—the refinery maximum capacity, we are probably discussing a ship more than every other day. A tanker emits substantial nitrogen & sulfur oxides & particulates.

The author does not know if double hulled ships would be utilized; older ships belonging to PEMEX are not double hulled and newer ones that have been ordered according to Marcon,Inc—that logs tanker sales—are ,or will be, double hulled and some will be larger. A photograph of one PEMEX vessel built during the 80s is below; the increasing practice of PEMEX is to contract out to tanker owners more than to purchase ships. In 1998 PEMEX owned 27 tankers.



Pemex tanker loading oil products photo: Chris Sharp  
The 1984/7-built, 45,894-dwt, 26,660-grt, oil tanker **Nuevo Pemex II** is seen in this photograph while she was moored possibly at Veracruz, Mexico during 1997.  
<http://www.wellandcanal.ca/salties/n/nuevopemexII/II.htm>

Whether the shipping port would be located at Libertad or at Punta Colonet, PEMEX tankers would moor to an "SBM" system---a mooring buoy that is located off shore (1 mile or farther) in deep water connected to a pipeline feeding directly to a tank farm. SBM would avoid shallow water shipping catastrophes, stated Mr. McGinnis. McGinnis is leaning toward Punta Colonet (PC) rather than Puerto Libertad due to environmental concerns and "considerable political support" for their building in PC by the state of Baja. Additionally, PC would be part of the development of a new containerized port with a lot of investment by other firms and the Puerto Libertad tank farm is fairly decrepit and would require a lot of rebuilding.

The author apologizes for not having enough information on the Punta Colonet site to discuss environmental concerns over the containerized port proposed for the region however there have been land disputes, and land values have risen 100 fold in the past 5 years based on the massive speculation going on. (See *San Diego Union Tribune*, August 14, 2005. Article "*New Port on Horizon*" by Diane Lindquist.. Should the PC development proceed on its ambitious schedule, it is likely to be 2012 before it is an active port. Whether this overlaps with ACF port plans and needs remains to be seen.

Propeninsula, Wildcoast and other California-Baja border organizations that were previously concerned with the tourist-driven Escalera Nautica program are concerned with the impacts of the development of Punta Colonet.



**Punta Colonet, Baja California: Looking North Photo: Kama Dean**

#### **F. Pipeline issues:**

**1. In Mexico:** Mr. McGinnis intends for the pipeline to use “established” ROWs in Mexico; and defines one of two routes from Puerto Libertad to the refinery..

The first would follow the existing dirt road to Caborca (potentially paved when the LNG plant and Liberty Cove come to Libertad) ; then it would follow Mexico Highway 2 northwest to the border (the highway will probably be widened to 4-lanes within the next 5 years). In this case, the pipeline would travel to west of the boundary of the Cabeza Prieta National Wildlife Refuge on the US side before crossing the border from Sonora to either the east or west side of the Gila Range, and then cut across to the Ave 45 and Old Hwy 80 location of the refinery. McGinnis says that it would cross west of the Goldwater Bombing Range; others have expressed doubt.

The second alternative route from Libertad would follow the ROW of the new highway if it is to be constructed following the coast north (as opposed to following it south for the natural gas line) to northwest of El Golfo, avoiding the Reserva Pinacate and staying on the east side of the current paved El Golfo road, It would cut across the Gran Desierto and cross east of San Luis Rio Colorado (and west of the Bombing Range) and then northeast to the refinery site. (See Map P.4)

The other alternative routes from Punta Colonet are less defined by Mr. McGinnis. One would be to cross through a pass to the east of the proposed port and then north to Mexicali. The second is to run a pipeline north of Punta Colonet to Ensenada along the coast and then utilize existing SENUR secretary of energy-PEMEX ROWs from Ensenada to Rosarito and cross to the east using existing ROWs to Mexicali From there the author was unclear on how it would travel to cross east of San Luis.

It is probably fair to say that what McGinnis believes is that by following existing roads and the impacts that they cause, he can avoid controversy and serious impact on

ecological reserves and on fauna that are protected in Sonora. Whether this could require avoiding any above ground pipeline, the author does not know.

McGinnis does not see that the viscosity of the COPE (naphthalene-pitch as he describes it) requires the heating of the fuel; a question that the PEMEX director of pipelines raised. The pipeline director was not aware of the potential project, nor did he believe that there was any concrete contractual relationship between PEMEX and ACF that would allow for guarantee of stock, either heavy crude or COPE. However Mr. McGinnis has been meeting personally with the Secretary of Energy (SENER) as has Mr. Ramm of DKRW.

**2. Pipeline issues in the U.S.:** As mentioned in the economics section, U.S. pipeline alternatives include buying existing pipeline rights that currently are designed to push fuel east to west and bring fuel stock in from S. California coastal ports. Purchasing new ROW through California, says McGinnis, is not an option due to potential environmental opposition and economic costs of purchasing property easements.

To Arizona conservationists, there are environmental pipeline issues of ecological impact as important as questions of refinery pollution. The principal questions center around an area of Federal and State lands that together form the proposed Sonoran Desert National Park (SDNP)

According to the SDNP website: “All of the land already is federally owned, entrusted to the Department of Interior, and managed as Organ Pipe Cactus National Monument (NPS), Cabeza Prieta National Wildlife Refuge (USFWS), and the Barry M. Goldwater Military Range. The military has acquired the state trust land in the Goldwater. About 1,116,016 acres are congressionally designated wilderness areas. A recent Rocky Mountain Poll showed that 84% of all Arizonans support creation of this park. More than 80% of the public-comment letters on the Goldwater renewal process supported Department of Interior re-designation of the Goldwater and supported having one managing agency” (<http://www.sonorandesertnp.org/facts.html>)

SDNP advisory board member Bill Broyles, a well-known Arizona naturalist and writer, discussed some specific concerns for the area where a pipeline could cross over the Mexican border—whether originating at Punta Colonet, Baja or at Libertad and crossing over from Mexican Highway 2 east of Yuma and west of Tacna. Glenn McGinnis has said that he believes that the line will cross, “either east or west of the Gila-- and west of the bombing range.” Broyles points out that to avoid the bombing range would require the pipeline to cross over quite close to Yuma. Additionally, he says, Marine Corps’ representatives to an informal group that meets regularly to discuss land management issues in the Goldwater Bombing Range (the Goldwater Participants Meeting) believe that the pipeline has been proposed to cross on the western edge of the range—although ACF has never contacted them-- which would require compliance with “a number of steps”. The Goldwater Range is managed under the 1999 Sikes Act by the Marine Corps. Although the vast majority of the Goldwater—including the Cabeza Prieta National Monument ---is not directly bombed-, it is militarily restricted for usage. Most of the

intensive bombing within the range is close to Yuma--- to the southeast of the city--- helicopters and F-18 laser tracing and bombing at 50 feet above the ground.

The areas of greatest concern to Broyles would be the Cieneguilla Valley and the Copper Mountains due south of Tacna as well as the important archaeological sites in the Tinajas Altas. Both the areas east or west of the Copper Mountains would be of great concern.

Broyles said, "It is populated by flat-tailed horned lizards, an endangered species. Desert Bighorn Sheep also are quite common in the Tinajas Altas—where there are pools---and in the Copper Mountains. The disruption surrounding the right of way and laying the pipeline safely and subsequently monitoring it would impact fauna directly; and perhaps, even worse, it would open a smugglers highway---an area where they would cut the border fence and race as fast as they can to I-8." Broyles points out that if the pipeline was close to Yuma and doubled back perhaps 35 miles or more, these problems could probably be avoided. In theory, he believes, one should be able to lay a pipeline, if properly monitored and tested, along the existing highway and road right of ways minimizing ecological damage.

**G. Will there be a refinery and pipeline?** The question of whether there is either a signed contract to build a pipeline or an actual contract to provide feedstock will provide the basis of financing to construct both the refinery and the pipeline. There is not a signed agreement to provide 40 000 barrels per day or more of COPE, nor to provide heavy crude up to 140,000 barrels per day. The Director General of PEMEX has suggested to Mr. McGinnis that there would be at least a 5 year contract for the COPE when the time came to make a commitment. However the ACF refinery, like the DKRW project remains a chicken and egg project—financial security difficult to guarantee until more financial security exists. Until the COPE stock is guaranteed and both the pipeline and the refinery are also guaranteed financing, the ACF project will remain on hold.



The protected Reserva Sierra Pinacate---north of Puerto Penasaco---west of Caborca looking north to the Gulf. A new tourist highway is under construction and planned for the shore to the west; the shoreline highway is one potential right of way for an ACF refinery pipeline. Photo Courtesy of Jack Dykinga

### III. Conclusions and recommendations for stakeholders.

A. These are both projects with pluses and minuses; they are not black and white. Should either or both of these two developments proceed, the authors and investigators urge the project promoters to be open to compromises on locations of pipelines, off-shore vs. on-shore facilities, and to consider that double-hulled ships to transport COPE should be a requirement for the refinery to dispose of COPE or to purchase heavy crude. ACF would not want to be seen as an indirect cause of an oil spill **On the subject of environmental impacts, this overview is cursory and does not address most ecological or social concerns that could affect an evaluation of non-developmental alternatives for either project.** For example we know little of the impacts of the development of Punta Colonet on surrounding marine life or fishing cultures. The author and investigators are attempting to raise questions that we cannot necessarily answer.

B. Both of these project developers, are to some degree, watching to see how other infrastructural and development projects proceed. Highway improvements along Mexico 2 may make it easier for both drivers and pipeline right of way, but a planned coastal highway along the Gulf will have massive impacts on currently isolated villages and on Seris, particularly combined with the 3 or 4 housing development schemes for U.S. residents that are being promoted (the largest being Liberty Cove in Libertad). Putting a right of way for natural gas south to Guaymas or north to El Golfo from Libertad may be seen as an intrusion along with the highway by local residents. Project developers should approach such an alternative with great sensitivity

C. As permitting in Mexico develops, documentation should be available to all. Manifestos de Impactos Ambientales (MIAs) and LNG emergency response plans should be closely scrutinized and commented on. There are many in Sonora and the border region that are experts on the areas of concern here, both environmentally and culturally, and they should provide input into this process as soon as it becomes a reality.

We strongly urge SEMARNAT to create a list of stakeholders with an interest in these projects early and comprehensively—and suggest that ACF and DKRW do the same. We consider it positive that ACF provides links to documents on their website and has maintained good communication with public ; they should do so in Spanish, also.

#### D. Government Contacts

##### 1. Sonora and Mexico:

**SEMARNAT: List of contacts in Sonora.**

**August 21 2005 from:** <http://portal.semarnat.gob.mx/semarnat/portal/>

**(has federal contacts also) DELEGACIÓN EN SONORA**

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If one encounters problems in getting any documents from SEMARNAT (or other agencies), Mexico now has a freedom of information process available for all agencies: according to Laura Silvan, Director of Proyecto Fronterizo de Educacion Ambiental ([laurie@proyectorfronterizo.org.mx](mailto:laurie@proyectorfronterizo.org.mx)) (011 52 from U.S).-- 664 630 0590 in Playas de Tijuana: "you would just go on the web site for [www.ifai.org.mx](http://www.ifai.org.mx) and fill out the request forms. It should take no more than 20 (working) days to get a response, with the possibility that they advise you of a 15 day extension.

If they don't answer or if they answer saying they can't or won't give it to you, or the response is not satisfactory to you, you can find a form to request a "Recurso de Revision" within 15 days of the unsatisfactory response. The form is at <http://www.informacionpublica.gob.mx>,

- 1) choose 'Solicitudes de Informacion',
- 2) punch in your name and password,
- 3) then enter, then click on "solicitudes terminadas",
- 4) then click on "tipo de respuesta"
- 5) again on an icon "Recurso ante el IFAI"
- 6) then verify that the data on that coincides with the info. you requested (and didn't get),
- 7) click 'send'.
- 8) You need to then print a receipt.

If you need assistance, you can write an email to [atencion@ifai.org.mx](mailto:atencion@ifai.org.mx)

I think this whole procedure and implications thereof are described in the web page under 'recurso de revision'”

2. U.S.-- Arizona: Arizona Dept of Environmental Quality---ADEQ--- has a website----- <http://www.azdeq.gov/function/about/contact.html> that has an easy to use directory. The Air Quality division has an easy to find link to Arizona Clean Fuels...and as other permitting arises, those documents will be available. Federal: [www.blm.gov](http://www.blm.gov) will lead you to phone numbers and permits and the agency maintains a list of interested “stakeholders” for the ACF Refinery federal lands impacts.