

October 15, 2012

## **Food & Water Watch: Industry Bias Shapes the PXP/Cardno ENTRIX Hydraulic Fracturing Study**

### **Summary**

The PXP/Cardno ENTRIX study does a disservice not only to the communities surrounding the Inglewood Oil Field, but also to communities throughout the Los Angeles Basin that are subjected to current or future drilling and hydraulic fracturing.

The study exemplifies how the oil and gas industry bends science to suit its financial interests:

- First, Plains Exploration & Production Company (PXP) pays Cardno ENTRIX, an environmental consultancy group that advertises its ability to meet the needs of the oil and gas industry, to conduct a study of the “potential impacts ... of the types of fracturing operations PXP may conduct in the Inglewood Oil Field.” Cardno ENTRIX cannot be considered an “independent” consultant due to their strong ties to the oil and gas industry.
- Second, Cardno ENTRIX narrows the scope of the study in a way that minimizes the potential impacts addressed. A single high-volume hydraulic fracturing, or fracking, job is conducted on each of two vertical wells, and no short-term negative impacts are observed. This leads Cardno ENTRIX to suggest, absurdly, that PXP can conduct tens of high-volume fracking jobs on each of potentially hundreds of horizontal wells over the next 20 years without any short- or long-term negative impacts.
- Third, the study is subjected to a peer review by two individuals, one of whom, John P. Martin, serves the oil and gas industry as an environmental consultant and was recently discredited for co-authoring a report that misrepresents the drilling and fracking industry’s environmental safety record in Pennsylvania.
- Finally, the narrow and deeply biased study is misleadingly rolled out as a definitive and rigorous report with the sweeping conclusion that any negative impacts of future drilling and fracking in the Inglewood Oil Field would be minimal.

Not only does this study wrong the communities surrounding the Inglewood Oil Field, it sets a disingenuous and dangerous precedent for those communities across the Los Angeles Basin that just so happen to sit atop oil- and gas-bearing rock formations that the industry would like to frack.

## Introduction

The PXP/Cardno ENTRIX study stems from a settlement agreement, made on July 15, 2011, between a group of petitioners — Community Health Councils, Inc., Natural Resources Defense Council, Mark Salkin (concerned citizen), the City of Culver City, Citizens Coalition for a Safe Community and Concerned Citizens of South Central Los Angeles — and the County of Los Angeles and PXP. The study was paid for by PXP, conducted by Cardno ENTRIX and reviewed by two individuals: John P. Martin, Ph.D., of J.P. Martin Energy Strategy LLC., and Peter Muller, Ph.D.

The explicit objective of the study was to assess “the feasibility and potential impacts (including impacts to groundwater and subsidence) of the types of fracturing operations PXP may conduct in the [Inglewood] Oil Field.”<sup>1</sup> However, Cardno ENTRIX’s ultimate product focuses solely on the impact of a single-stage fracking operation on each of two vertical wells. It then makes unsubstantiated and misleading claims about the potential impacts of PXP conducting, in the future, multiple-stage fracking on horizontal wells, many of which are likely to extend beneath the communities that surround the Inglewood Oil Field.

Moreover, only immediate impacts are considered. Potential long-term risks due to cumulative effects, such as those related to seismic activity, groundwater contamination or simply the inevitability of accidents and spills over time, are either ignored or imprudently dismissed. Overall, the study is riddled with direct evidence of pro-industry bias.

## Oil and Gas Industry Influence at Each Step of the Study Process

### *Cardno ENTRIX*

According to the 2008 press release announcing the merger between Cardno and ENTRIX, Chevron, BP and ConocoPhillips are among the list of “major clients” of ENTRIX.<sup>2</sup> Chevron and ConocoPhillips, in particular, are heavily invested in modern drilling and fracking of shale and other tight rock formations to extract oil and natural gas.

Cardno, the parent company, advertises its ability to help the oil and gas industry meet its needs.<sup>3</sup> In this case, PXP needed a favorable assessment of the potential impacts that drilling and fracking for oil in the Inglewood Oil Field will have on local communities.

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<sup>1</sup> Cardno ENTRIX. [Prepared for Plains Exploration & Production Company]. (PXP/Cardno ENTRIX Study) “Hydraulic Fracturing Study: PXP Inglewood Oil Field.” October 10, 2012 at ES-2.

<sup>2</sup> “Major clients of ENTRIX include: Chevron, BP, ConocoPhillips, Pacific Gas & Electric, Southern California Edison, TransCanada, Placer County Water Agency, Pepco Holdings, Dow Chemical Company Mosaic, CF Industries, Cleveland Cliffs Mining and various federal and state government natural resource management agencies.” See Cardno ENTRIX press release of October 6, 2008, available at [http://www.cardnoentrix.com/documents/100608\\_ENTRIX\\_Cardno\\_Merger\\_Media%20Release.pdf](http://www.cardnoentrix.com/documents/100608_ENTRIX_Cardno_Merger_Media%20Release.pdf), accessed October 12, 2012.

<sup>3</sup> “Cardno professionals know how to best meet your technical needs and understand the context in which you operate – often under intense public scrutiny. We know how to effectively engage stakeholders, meet

Not surprisingly, the PXP/Cardno ENTRIX study delivers such an assessment.

*John P. Martin, Ph.D.*

In the standard process of peer review for ensuring rigorous and accurate research, the authors of the research have no control over the peers who conduct the review. The review of the PXP/Cardno ENTRIX study violates this standard. PXP was directly involved in the selection of the two reviewers.

One of the selected reviewers, John P. Martin, is himself feeding at the oil and gas industry trough, providing “strategic planning, resource evaluation, project management and government/public relations services to the energy industry” through his environmental consultancy.<sup>4</sup> Martin spent 17 years working for the New York State Energy Research and Development Authority, during which time, according to a statement on his consultancy’s website, “he completed the initial research on the natural gas potential of New York’s Utica Shale that helped stimulate significant industry investment in this resource.”<sup>5</sup> He has since leveraged his experience working with state and federal agencies, industry trade groups and private industry to form J.P. Martin Energy Strategy LLC.<sup>6</sup>

Martin is also director of the University of Buffalo’s Shale Resources and Society Institute, where he collects \$60,000 annually for a 25-percent (i.e., 10 hours per week) appointment, plus an additional \$1,000 per month in travel expenses.<sup>7</sup> The SRSI came under fire earlier this year for a pro-industry report, of which Martin was a co-author.<sup>8</sup> According to a Public Accountability Initiative analysis of the SRSI report, the “data in the report shows that the likelihood of major environmental events has actually gone up, contradicting the report’s central claim; entire passages were lifted from an explicitly pro-fracking Manhattan Institute report; and the report’s authors and reviewers have extensive ties to the natural gas industry.”<sup>9</sup>

Food & Water Watch maintains that the evidence of industry bias throughout the study reflects this record of ties and associations. Selecting John P. Martin as a peer reviewer has done the residents of Los Angeles County a disservice.

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rigorous regulations and deliver strategic solutions that meet short- and long-term needs.”

<http://www.cardno.com/en-au/MarketsandServices/Pages/Oil-and-Gas.aspx>.

<sup>4</sup> See J.P. Martin Energy Strategy LLC, available at <http://jpmartinenergy.com/biography.php>, accessed October 12, 2012.

<sup>5</sup> *Ibid.*

<sup>6</sup> See J.P. Martin Energy Strategy LLC, available at <http://jpmartinenergy.com/career.php>, accessed October 12, 2012.

<sup>7</sup> Quigley, Buck. “UB Releases Information on Shale Institute. Available at [http://artvoice.com/issues/v11n37/week\\_in\\_review/ub\\_releases\\_shale\\_info](http://artvoice.com/issues/v11n37/week_in_review/ub_releases_shale_info), accessed October 12, 2012.

<sup>8</sup> See Public Accountability Initiative. Available at <http://public-accountability.org/2012/05/ub-shale-play/>, accessed October 12, 2012.

<sup>9</sup> *Ibid.*

## Oil and Gas Industry Bias Permeates the Resulting Study

### *Narrow scope, sweeping conclusion*

According to the PXP/Cardno ENTRIX study, one high-volume fracking operation was conducted on each of two vertical wells while monitoring for potential negative impacts, and no short-term negative impacts were observed. Cardno ENTRIX reports that in the immediate aftermath of these single-stage fracks of the two vertical wells<sup>10</sup>:

- Microseismic monitoring of fracture formations indicated that fractures did not extend beyond the targeted rock formation;
- Groundwater testing revealed no contamination;
- Well integrity testing verified that metal well casings and surrounding cement did not fail;
- Tests for methane did not show levels of concern;
- No ground subsidence was detected;
- No perceptible earthquakes were induced;
- Noise and ground vibrations were within allowable limits; and
- Emissions were within South Coast Air Quality Management District standards.

But by focusing on just the immediate aftermath of just a single-stage fracking job on each of just two vertical wells, Cardno ENTRIX has enabled PXP to move the goal posts.

The objective of the study was to evaluate the “potential impacts ... of the types of fracturing operations PXP may conduct in the [Inglewood] Oil Field.”<sup>11</sup> Multi-stage fracking of horizontal wells is likely to be used to extract oil from rock formations not just beneath the surface of the Inglewood Oil Field, but also beneath communities within a several-mile radius of the existing wells where PXP maintains mineral rights.<sup>12</sup> Such fracking operations would be an order of magnitude more intense. Importantly, they could introduce fundamentally new dynamics between induced, manmade fractures and the existing faults that crisscross the strata beneath the Inglewood Oil Field.

Cardno ENTRIX dismisses this distinction by stating that the “monitored effects would be the same in each stage [of a multistage fracking job done on horizontally drilled wells] as those measured during this study. The intent of the two high-volume hydraulic fracture jobs was to *bound the potential effects* [emphasis added] of this process on the field.”<sup>13</sup> This statement implies that the potential effects of any fracking done at Inglewood Oil Field would not be greater. However, the single-stage frack jobs on vertical wells establish a lower bound on the potential effects — they do not represent the maximum potential effects.

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<sup>10</sup> PXP/Cardno ENTRIX Study at ES-3.

<sup>11</sup> *Ibid.* at ES-2.

<sup>12</sup> Baldwin Hills Community Standards District Final Environmental Impact Review at ES-7.

<sup>13</sup> PXP/Cardno ENTRIX Study at ES-12. See also page 3-12.

After drilling several miles down to a targeted rock formation, the oil and gas industry can now drill up to two miles or more horizontally, and proceed to frack in as many as 40 stages along the horizontal “leg” of a well. This means that for such a horizontal fracked well, some of the near-term environmental impacts — namely, air pollution — would be about 40 times worse, on a per-well basis.

More generally, while the PXP/Cardno ENTRIX study may identify the ideal precautions and conditions for drilling and single-stage fracking a vertical well, it does not consider any worst-case scenarios. It assumes that every aspect of every drilling and fracking operation is perfect. But with already over 1,000 aging wells drilled into the Inglewood Oil Field, and plans to drill and frack hundreds of new wells, there will be well cementing failures, accidents and spills as a simple consequence of human error and the risks inherent to modern drilling and fracking.

*No earthquakes induced immediately, so orders-of-magnitude-more fracking is safe?*

It is particularly disingenuous to examine the immediate aftermath of single-stage fracking on two different vertical wells and conclude that there is no meaningful risk of seismic activity. Drilling hundreds of horizontal wells, and fracking each in tens of different stages, will alter local stresses among the underlying strata of the Inglewood Oil Field, and these alterations could conceivably accumulate to induce a significant earthquake. Moreover, disposing of drilling and fracking wastes by injecting them underground, as PXP does at the Inglewood Oil Field, is, in fact, linked to seismic activity.

*No immediate groundwater contamination, so orders-of-magnitude-more fracking is safe?*

The PXP/Cardno ENTRIX study wrongly dismisses the long-term potential for drilling and fracking activities to contaminate groundwater in the vicinity of the surface of the field.

A recent peer-reviewed research article — in the legitimate sense — demonstrates through mathematical modeling that drilling and fracking, combined with natural faults, creates a network of pathways through which natural or injected contaminants might flow long distances, over decades. To counter such research, the PXP/Cardno ENTRIX study emphasizes that this contamination is just “theoretical in nature” and cites clearly biased criticism from Energy in Depth, an Independent Petroleum Association of America front group.<sup>14</sup>

The PXP/Cardno ENTRIX study also repeatedly emphasizes that, while there is groundwater beneath the oil field surface, it is insufficient to serve as a local supply of drinking water. The study does note that this local groundwater is still protected by law from contamination, but it still cites the low quantity of groundwater as reason to dismiss the potential relevance of the U.S. Environmental Protection Agency’s (EPA’s) ongoing study of the potential impacts of hydraulic fracturing on drinking water supplies.<sup>15</sup> But part

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<sup>14</sup> PXP/Cardno ENTRIX Study at 4-23.

<sup>15</sup> *Ibid.* at 5-9.

of this study is to refine the abovementioned mathematical modeling to better understand the long-term risk of contamination to underground sources of drinking water.

It is telling that this aspect of the EPA study is ignored and that instead the counterpoint to such risk is an industry-front-group analysis. As an aside, the ongoing EPA study has a much larger scope than just this risk alone. The EPA study will address how water use for fracking impacts local communities, which is clearly relevant to Southern California.

#### *Short shrift given to air quality impacts*

The PXP/Cardno ENTRIX study estimates emissions of air pollutants only from “off-road equipment [e.g., generators] and on-road vehicles” associated with drilling and fracking operations.<sup>16</sup> For emissions of other air pollutants associated with the drilling and fracking process, such as hydrogen sulfide and methane, benzene and other hydrocarbon gases, the PXP/Cardno ENTRIX study defers to “an Air Monitoring Plan” currently in draft form.<sup>17</sup> The PXP/Cardno ENTRIX study claims that such emissions are captured using a closed-loop system in which liquid flow-back wastes are re-injected below ground while vapors are collected in carbon-canister vapor control systems.<sup>18</sup>

While this sounds reassuring, it is no substitute for actual data on emissions of hydrocarbon gases and other air pollutants during operations. Most alarmingly, the PXP/Cardno ENTRIX study concludes that “emissions associated with high-volume hydraulic fracturing were within standards set by the regional air quality regulations of the South Coast Air Quality Management District” *before* the proposed Air Monitoring Plan has been implemented.<sup>19</sup>

As for the draft Air Monitoring Plan, it repeatedly cites budget constraints as forcing shortcuts in the evaluation of future community exposure risks to toxic air emissions from the Inglewood Oil Field.<sup>20</sup> The budget-enforced shortcuts lead to the decision to use just four continuous monitoring stations over one year to detect particulate matter pollution, to detect metals at just two sites for about two months, and to monitor for volatile organic compounds (such as benzene, toluene and other hydrocarbon gases) and carbonyls only “during a two-week period at one or two sites.”<sup>21</sup> Deploying these stations over two weeks and equipping the stations with the capacity to test only for a truncated list of toxic air pollutants<sup>22</sup> is cold comfort to residents of the surrounding communities who have been forcibly evacuated from their homes due to large-scale hydrogen sulfide releases.

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<sup>16</sup> PXP/Cardno ENTRIX Study at 4-44;

<sup>17</sup> *Ibid.* at 4-44.

<sup>18</sup> *Ibid.* at 4-44.

<sup>19</sup> *Ibid.* at ES-3.

<sup>20</sup> Vaughn, David L. et al. Sonoma Technology, Inc. “Draft Baldwin Hills air quality study plan and quality control plan.” August 16, 2012 at 5, 7, 10, 11 and 14.

<sup>21</sup> *Ibid.* at 5.

<sup>22</sup> *Ibid.* at 5, 7, 10, 11 and 14.

The settlement agreement that called for this study states, “The County commits to spending up to \$250,000 of its own funds toward implementing the plan and shall use reasonable efforts to seek additional funding sources, if necessary, to implement the plan.” The draft Air Monitoring Plan makes it abundantly clear that more funding sources are necessary to avoid shortcuts,<sup>23</sup> but minimal effort has been made to secure additional funding sources.

This all raises an important question: Why is there no reporting of actual emissions as measured using monitors throughout the actual field? Such data, combined with dispersion and transport models, would provide a check on the sparse deployment of air quality monitoring stations proposed in the Air Monitoring Plan.

*“Conservation and environmental protection” is the mission of those behind FracFocus?*

Perhaps the most revealing instance of industry bias shines through in the discussion of FracFocus, the online venue for voluntary reporting of non-proprietary chemical ingredients in fracking fluids. FracFocus is a fig leaf for the industry, providing a venue for the illusion of transparency, not genuine transparency.

The PXP/Cardno ENTRIX study blatantly misleads the public when, in reference to the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission (IOGCC), it claims, “The mission of these organizations is conservation and environmental protection.” Readers may be surprised to learn that the IOGCC defines “conservation” as “maximiz[ing] recovery and promot[ing] energy efficient production of oil and natural gas.”<sup>24</sup> In essence, to the oil and gas industry, conservation means not wasting oil and natural gas resources by not leaving them in the ground!

*Horizontal drilling is good for the environment?*

The PXP/Cardno ENTRIX study repeats the standard industry line that “horizontal wells minimize the surface footprint of the oil production operation,”<sup>25</sup> as a way of saying that if it weren’t for horizontal drilling, many more vertical wells would have to be drilled to achieve the same access to the targeted rock formations. But horizontal wells are drilled because they improve the economics of fracking, not as a means of minimizing the number of well sites.

Horizontal wells also enable the industry to drill beneath locations that might otherwise be off limits, as is the case in the neighborhoods surrounding the Inglewood Oil Field. The cross-sectional views of the Inglewood Field suggest that the only targeted rock formations are those that lie directly beneath the surface area of the field, as indicated in Figure ES-1 of the study.<sup>26</sup> But close examination of Figure ES-2 reveals that the Inglewood Oil Field — the

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<sup>23</sup> *Ibid.* at 5, 7, 10, 11 and 14.

<sup>24</sup> See Interstate Oil & Gas Compact Commission. “About us: strategic plan.” Available at <http://iogcc.state.ok.us/strategic-plan>, accessed October 12, 2012.

<sup>25</sup> PXP/Cardno ENTRIX Study at ES-12.

<sup>26</sup> *Ibid.* at ES-1 and 2-14 to 2-21.

actual oil-bearing underground rock formations — is much larger than the surface area indicated in Figure ES-1.<sup>27</sup> Indeed, PXP owns mineral rights to oil that is potentially held in strata directly beneath some of the communities that surround the surface of the field.<sup>28</sup> Yet despite the clear objective to study “potential impacts ... of the types of fracturing operations PXP may conduct in the Inglewood Oil Field,” PXP’s clear intent to extract that oil is ignored in the study.

### *There is a local oil market?*

Further evidence of industry bias shines through when the PXP/Cardno ENTRIX study states, “Oil and natural gas produced from the field is sold and used entirely in California.”<sup>29</sup> Later on, the study emphasizes “local source of energy” as a counterweight to community concerns.<sup>30</sup>

This emphasis mirrors PXP’s Inglewood Oil Field website, which advertises that “PXP’s California business is to search for and produce oil and natural gas which is then used entirely in California. We are a local, real world example of reducing our dependence on imported oil and associated greenhouse gas and toxic emissions,”<sup>31</sup> evidently referring to air pollution associated with oil tankers.

The implication is that Californians benefit from consuming oil that is extracted locally, when in fact the price of oil is set on a global market. Drilling and fracking for oil in California will have no bearing on the global price of oil, and as a consequence it will have little bearing on the prices that Californians are paying at the pump.

### *Shale gas is reducing greenhouse gas emissions?*

A final industry talking point is rolled out by the PXP/Cardno ENTRIX study when, in its general praise of shale gas development enabled by modern drilling and fracking, the study confuses declines in carbon dioxide emissions with declines in greenhouse gas emissions.<sup>32</sup>

It is true that cheap natural gas — which is notably far below the break-even price needed to justify drilling and fracking for shale gas — has begun to displace coal, and that this has contributed to the recent declines in U.S. carbon dioxide emissions. But first of all, the bulk of these declines are due to lower demand for electricity and transportation fuels during a sputtering economy. Second, it is misleading to equate carbon dioxide emissions with greenhouse gas emissions. Methane is a potent greenhouse gas that is emitted in large quantities during shale gas development, and during the transport and processing of natural gas. As a consequence, reduced carbon dioxide emissions from burning natural gas

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<sup>27</sup> *Ibid.* at ES-1 and 2-14 to 2-21.

<sup>28</sup> Baldwin Hills Community Standards District Final Environmental Impact Review at ES-7.

<sup>29</sup> PXP/Cardno ENTRIX Study at ES-6.

<sup>30</sup> *Ibid.* at 5-1.

<sup>31</sup> See PXP Inglewood Oil Field. Available at <http://www.inglewoodoilfield.com/economic-benefits>, accessed October 12, 2012.

<sup>32</sup> PXP/Cardno ENTRIX Study at ES-12.



instead of coal does not tell the whole story of greenhouse gas emissions and climate impacts.

The PXP/Cardno ENTRIX study states that, “methane has 21 times the averaged relative radiative forcing effect of CO<sub>2</sub>,”<sup>33</sup> but fails to clarify that this is when measured over a 100-year time frame. Shindell et al. have estimated that, over a 20-year time frame, methane is over 100 times as powerful as carbon dioxide at trapping heat in the atmosphere.<sup>34</sup> Much to the oil and gas industry’s consternation, this understanding has led to a growing scientific consensus that natural gas is a false solution for global climate change.

## **Conclusion**

The PXP/Cardno ENTRIX study serves the financial interests of PXP and the oil and gas industry writ large. The deeply flawed study exemplifies how environmental consultancy groups can be used by the oil and gas industry to provide scientific cover.

Sweeping conclusions are drawn from an exceptionally narrow study that is riddled with evidence of industry bias. The study leads readers to believe that there is no risk of negative impacts, when in fact the long-term, cumulative impacts that stem from combining high-volume hydraulic fracturing with horizontal drilling are completely ignored. Not only does this wrong the communities surrounding the Inglewood Oil Field, it sets a disingenuous and dangerous precedent for those communities across the Los Angeles Basin that just so happen to sit atop oil- and gas-bearing rock formations that the industry would like to frack.

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<sup>33</sup> *Ibid.* at 4-43.

<sup>34</sup> Shindell, Drew T. et al. “Improved Attribution of Climate Forcing to Emissions.” *Science*, vol. 326, no. 5953. October 30, 2009 at 716 to 718.