California Environmental Policy Council Hearing

PuriNOx Technology Multimedia Evaluation

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Environmental Policy and Regulatory Affairs Manager
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The Lubrizol Corporation

A global, fluid technology company concentrating on high-performance chemicals, systems and services for industry and transportation. Industry--$2 Billion Annual Sales

Core Competencies in:
Technical Problem Solving
Chemical Formulation
Global Chemical Manufacturing

Research Centers:
Wickliffe, Ohio, USA
Hazelwood, England
Kinuura, Japan

Sales and Technical Service Offices:
50 Worldwide

Founded in 1928
World Headquarters: Wickliffe, Ohio, USA
Approximately 5,200 Employees

Manufacturing Plants:
34 Facilities in 15 Countries
PuriNOx™ Technology

PuriNOx™ Additive Package

Purified Water

Diesel Fuel

Blending Unit

PuriNOx™-fuel

PuriNOx™ Technology
What is PuriNOx Emulsified Fuel?

- Water-in-diesel blend
- PuriNOx additive encapsulates water droplets
- Water cools combustion temperature and lowers NOx
- Water slightly delays combustion and lowers PM
- Engines recognizes liquid as fuel—water does not come into contact engine and fuel systems
Uniqueness of PuriNOx™ Fuel

- Tested and Confirmed Energy Savings of 1-3%
- Reduces NOx by up to 30% and Particulates by up to 65%
- Immediate Air Quality Benefits when Fuel is Utilized with only Minor Maintenance to Vehicles/Equipment (Fuel Filter Change)
- Uses Existing Storage, Distribution and Fueling Facilities with Minor Modifications
- Handles Like Diesel Fuel But with defined stability parameters
PuriNOx Technology Manufacturing Sites

Sacramento
PuriNOx Fuel Marketed by
**Ramos Oil Company**
5 Million Gallons Annual Capacity

Fresno
PuriNOx Fuel Marketed by
**R.V. Jensen**
5 Million Gallons Annual Capacity – Q204

Los Angeles
Proformix® Fuel Manufactured by **Chevron**
Marketed and Distributed by **General Petroleum**
25 Million Gallons Annual Capacity
End-Use Applications

Emission Sensitive

Intensive Use Applications

Centrally Fueled Equipment

On-Highway
- Pick Up & Delivery Fleets
- Urban/School Buses
- Waste Management Fleets

Off-Highway
- Mining
- Construction
- Stationary Power
- Port

Others: Agriculture, Locomotive, Marine
California Applications

- Rail
- School Buses
- Municipal Transit
- Port
- Off Road
- Standby Equipment
- Solid Waste
- Off Road
### PuriNOx™ Fuel Regulatory Credentials

<table>
<thead>
<tr>
<th>Credential</th>
<th>Date Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>California Air Resources Board (ARB) Verification (Voluntary Markets)</strong></td>
<td>January 2001</td>
</tr>
<tr>
<td>• Regulated and Unregulated Emissions Testing</td>
<td></td>
</tr>
<tr>
<td>• Verified that PuriNOx fuel reduces NOx by 14% and PM by 63%</td>
<td></td>
</tr>
<tr>
<td><strong>U.S. EPA Fuel Registration</strong></td>
<td>October 2002</td>
</tr>
<tr>
<td>• Tier I – Regulated and Unregulated Emissions Testing and Literature Search</td>
<td></td>
</tr>
<tr>
<td>• Tier 2 – 90 Day Subchronic Inhalation Toxicity Study</td>
<td></td>
</tr>
<tr>
<td>No appreciable differences in effects observed with PuriNOx compared to published studies on petroleum diesel exhaust</td>
<td></td>
</tr>
<tr>
<td><strong>U.S. EPA Emissions Verification</strong></td>
<td>December 2002</td>
</tr>
<tr>
<td>• Regulated and Unregulated Emissions Testing</td>
<td></td>
</tr>
<tr>
<td>• Established on and off-road emission reduction values for PuriNOx fuel including NOx, PM, HC and CO</td>
<td></td>
</tr>
<tr>
<td><strong>California Air Resources Board (ARB) Verification (Regulated Markets)</strong></td>
<td></td>
</tr>
<tr>
<td>• Regulated and Unregulated Emissions Testing</td>
<td></td>
</tr>
<tr>
<td>• U.S. EPA Fuel Registration</td>
<td></td>
</tr>
<tr>
<td>• Multimedia Evaluation</td>
<td></td>
</tr>
<tr>
<td>Potential Impact on Soil Media From Release of PuriNOx Additive/Fuel</td>
<td></td>
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<tr>
<td>Potential Impact to Water Body From Release of PuriNOx Additive/Fuel</td>
<td></td>
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</tbody>
</table>
## Status of ARB Regulatory Verifications Utilizing Lubrizol Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Application</th>
<th>NOx Reduction</th>
<th>PM Reduction</th>
<th>Verification Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PuriNOx Fuel Technology</td>
<td>Voluntary On/Off Road and Stationary</td>
<td>14%</td>
<td>63%</td>
<td>Complete</td>
</tr>
<tr>
<td>AZ Purimuffler Diesel Oxidation Catalyst (DOC)</td>
<td>Regulated On/Off Road</td>
<td>--</td>
<td>i 25% (Level 1)</td>
<td>Pending</td>
</tr>
<tr>
<td>PuriNOx Fuel Technology</td>
<td>Centrally-fueled Regulated On Road</td>
<td>15%</td>
<td>i 50% (Level 2)</td>
<td>Pending</td>
</tr>
<tr>
<td>PuriNOx Fuel Technology + AZ Purimuffler DOC</td>
<td>Centrally-Fueled Off Road</td>
<td>20%</td>
<td>i 50% (Level 2)</td>
<td>Pending</td>
</tr>
<tr>
<td>PuriNOx Fuel Technology + AZ Purimuffler DOC</td>
<td>Centrally Fueled Regulated On Road</td>
<td>20%</td>
<td>i 50% (Level 2)</td>
<td>Pending</td>
</tr>
<tr>
<td>Purifilter Particulate Filter</td>
<td>Regulated medium and heavy duty highway</td>
<td>--</td>
<td>i 85% (Level 3)</td>
<td>Complete</td>
</tr>
<tr>
<td>Cattrap</td>
<td>Regulated Off Road</td>
<td>--</td>
<td>i 85% (Level 3)</td>
<td>Pending</td>
</tr>
<tr>
<td>Combfilter</td>
<td>Regulated mobile and stationary</td>
<td>--</td>
<td>i 85% (Level 3)</td>
<td>Pending</td>
</tr>
</tbody>
</table>
ARB Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines--Requirements

P  EPA Fuel Registration
P  Emissions Test Data
P  Durability
P  Field Demonstration
P  Warranty

□  Multimedia Evaluation
Emission Reduction Synergies-- An Example
(California, Off Road):

**Diesel Engine With Comm’l Diesel Fuel**

**ULSD**

**Lubrizol PuriNOx™**

**Lubrizol/ECS AZ Purimuffler**

**Engine Emissions Reductions**

<table>
<thead>
<tr>
<th></th>
<th>ARB Verified</th>
<th>ARB Confirmed</th>
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<tbody>
<tr>
<td>NOx</td>
<td>14%</td>
<td>20%</td>
</tr>
<tr>
<td>PM</td>
<td>63%</td>
<td>50%</td>
</tr>
</tbody>
</table>

For every 5 million gallons of PuriNOx used in combination with an AZ Purimuffler:

NOx is reduced by 115 Tons and @ current capacity: **805 Tons**

PM is reduced by 13 Tons and @ current capacity: **91 Tons**
Summary

• Lubrizol fully supports the findings of the multimedia working group indicating that use of the PuriNOx technology does not pose a significant adverse impact on public health and the environment compared to California diesel fuel.

• Lubrizol fully supports staff’s revised recommendations related to supplemental comparative studies.

• Lubrizol respectfully requests the Environmental Policy Council accept staff recommendations and advise the Air Resources Board that the multimedia verification procedure requirement has been satisfied.