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About The Oil DROP

The Oil DROP is an informal journal, produced twice a year by EPA's Oil Program Center. The goal of the Oil DROP is to attract a broad audience such as the general public, including concerned citizens, students and environmental groups, on current developments in news related to oil spills. The Oil DROP covers oil spills in the United States and throughout the world, with an emphasis on the effects these spills have on wildlife and ecosystems. The Oil DROP is available on the Oil Program homepage at www.epa.gov/oilspill.

Giant Oil Rig Sinks

On March 20, 2001, Petrobrás Platform 36 (P-36) sank into 4,455 feet of water, 75 miles off the coast of Brazil, 120 miles northeast of Rio de Janeiro in the Roncador Field, Campos Basin. It all started on March 15, when a feed valve malfunctioned, causing three explosions. The first explosion occurred at 12:20 a.m. in a supporting column. Work was suspended and fire and emergency equipment were brought in. The second explosion occurred at 12:24 a.m. and workers began to be evacuated to Platform 47, 7.5 miles from P-36. The third explosion occurred about 10 to 15 minutes later while the workers were still being evacuated. Of the 175 people on board, 10 were not found and 165 were rescued. An additional person was rescued, but was burned on 98% of his body and died 7 days later.

By 7 a.m., 24 people had boarded the vessel to help investigate the situation; they were soon evacuated due to the instability of the platform. Twelve vessels were deployed to help control the emergency. One of the vessels used was a fire fighter that directed jets of water onto the platform. On March 16, divers were sent to the tilting structure to determine the damage underwater. Three Petrobrás engineers volunteered to go aboard the vessel, accompanied by two

Brazilian divers. The workers had experience in floating systems operations, vessel stability, and shipbuilding. Their mission was to look for missing workers, look for holes that needed to be blocked from incoming water, assess actions to drain the flooded compartments, and help determine how to stabilize the platform. There were barges onsite to help with oil retrieval and storage if a spill occurred. The main objective was to find the missing workers and to stabilize the platform. Another team of 30 technicians, including voluntary engineers, divers from the Marines, U.S. International consultants, and Petrobrás technicians boarded the platform and began sealing gaps. All work occurred above the water line because it was impossible to access the underwater compartments. The team started to inject nitrogen and compressed air to expel accumulating water from the submerged areas. Smit, a Dutch company specializing in water drainage, provided 11 technicians and 50 tons of equipment to the recovery effort. Their equipment, consisting of suction pumps and hoses, was flown into Rio de Janeiro International Airport, and was then transported by a convoy of trucks escorted by eight military

police vehicles to Macaé, the rig's land base. Three hundred men from the Navy's First Naval District were brought in to help also. The Navy also provided a patrol boat, troop carrier, deep-sea tug, and a helicopter. Petrobrás Platform 23 has moved to the site to provide a base for operations.

By day three of the rescue and recovery operations, the platform was listing 2 degrees less than

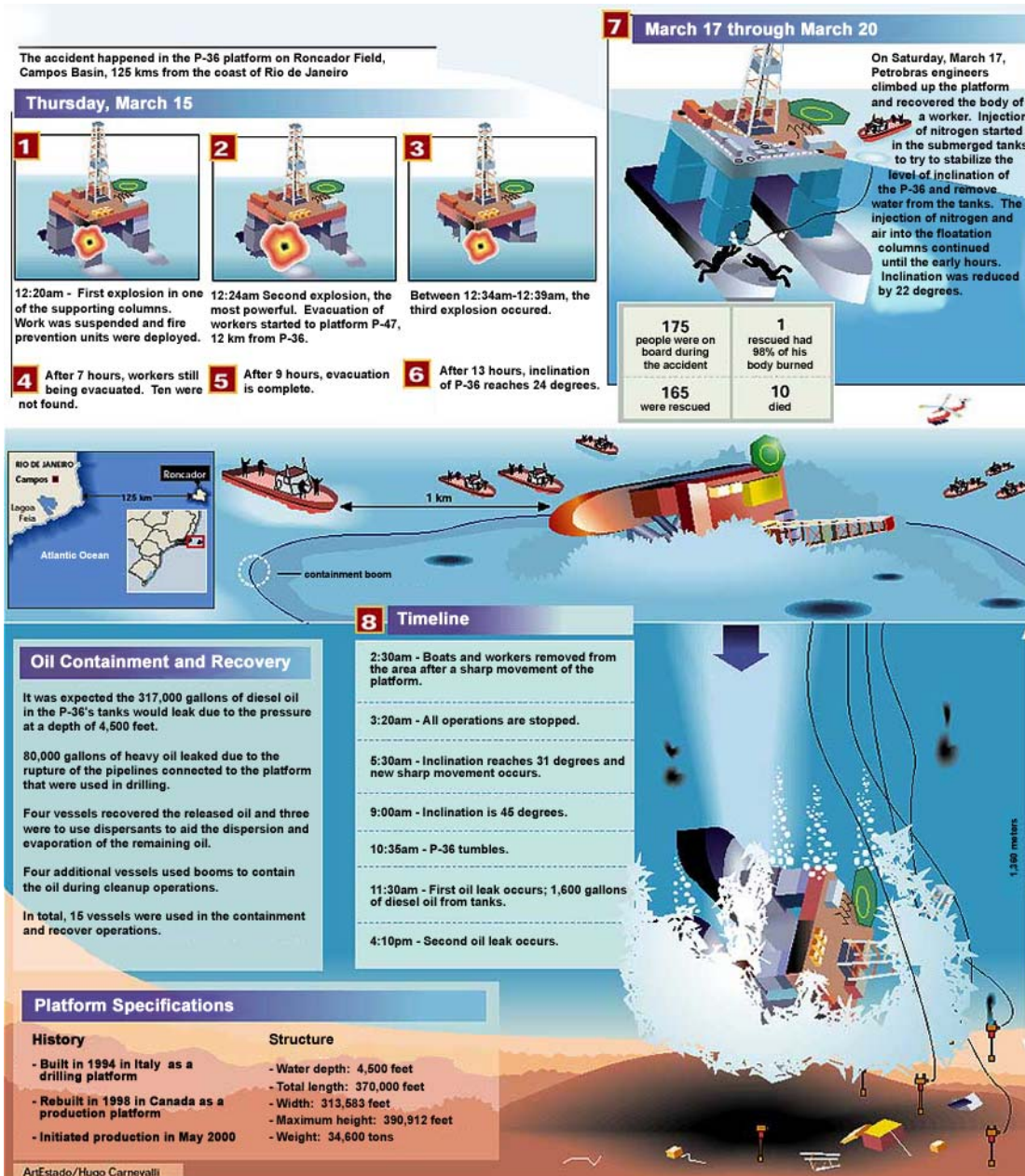
before, due in large part to the holes in the compartments being sealed and the nitrogen pumping. There were efforts being made to make a larger area of the platform accessible and to access the areas where it was believed that the still missing bodies might be found.

On day four, the platform sank 16 inches in 12 hours, because there were still openings feeding water into other compartments. Those

areas continued to be sealed throughout the night.

On day five, March 20, at 2:30 a.m., the platform shifted suddenly and all repair and recovery personnel were removed. By 10:45 a.m., P-36 had sank irreversibly. It wasn't until 11:30 p.m. that the first oil spill was detected, possibly from the 21 pipelines to underwater wells or the crude oil and diesel stored on the rig. The Petrobrás

Courtesy of the Estado de São Paulo.



Environmental Contingency Plan had nine recovery vessels on site from the beginning to recover or disperse any oil that was spilled. These vessels were equipped with 3.6 miles of barriers and recovery and dispersal equipment.

P-36 was the largest production platform in the world that had the capabilities to produce 180,000 barrels of crude oil a day. It was built in Italy in 1994 as a drilling platform, then rebuilt in Canada in 1998 as a production platform. Production on the rig started in May 2000, less than a year before it sank. The platform was equivalent to 40 stories high, weighed 31,400 tons, and was capable of water depths of 4,460 feet.

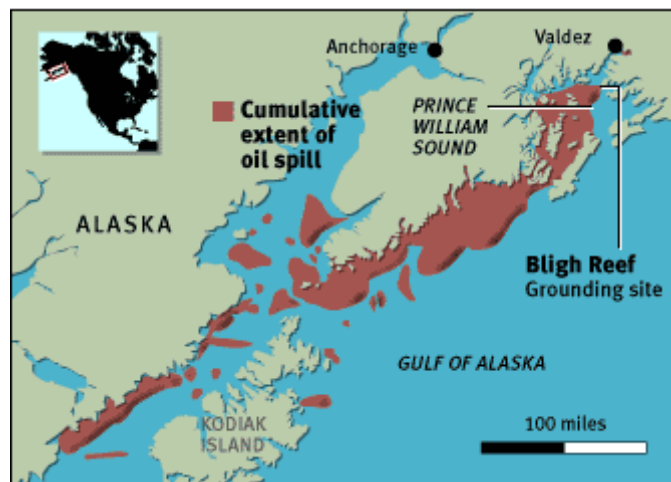
Petrobrás was faced with a \$8.9 million fine by Brazil's environmental agency that covered the P-36 accident, spilling some 312,000 gallons of oil and another accident on April 12 that spilled approximately 6,800 gallons of crude oil into the sea. Petrobrás had to pay another \$890,000 for inappropriately using detergents to break up oil in one of the spills.

Exxon Valdez Oil Still in Alaskan Soil

It has been more than 12 years since the infamous Exxon Valdez oil spill on Bligh Reef, some 25 miles south of Valdez, Alaska. However, the effects are still prominent. There is much debate between interested parties regarding the status of the environment in the region. Exxon claims that the area is fully recovered, yet hard evidence seems to prove otherwise. Only 2 of the 23 species listed as damaged by direct cause of the oil spill are

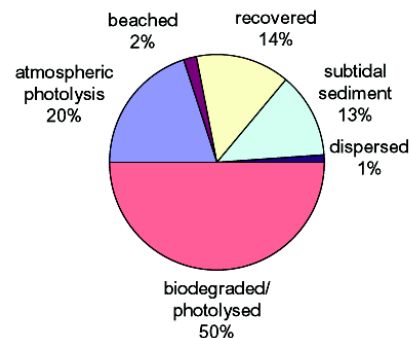
classified as "fully recovered" (the river otter and the bald eagle). Hanging in the balance are a variety of other key players in the food chain: the common loon, three species of cormorants, harbor seals, killer whales, and a variety of fish species ranging from the cutthroat to the Pacific herring.

When the tanker Exxon Valdez ran aground on March 24, 1989, some 10.8 million gallons of crude oil were expelled into Prince William Sound. The impact of the oil was felt up to 1,300 miles southeast of the site. Despite extensive efforts by the citizens of the region and coordinating agencies, the cleanup efforts have not fully rectified the situation. Upon returning to the site during a 1993 survey, crews found hundreds of significant oil deposits along the beach. Cleanup efforts only removed surface oils, removing 14 percent of the oil according to a 1992 NOAA study. Another 13 percent sunk to the ocean floor, and a great majority of the oil either evaporated or dispersed into the water column where it degraded naturally. Two percent, or 216,000 gallons, remained on the beaches just below the surface under rocks and overburden. Winter storms constantly rearrange the coastline, exposing deposits that require subsequent cleanup.



Extent of oiled coastline.

The effect of the cleanup efforts has also impacted the ecosystem. Intense scrubbing and scraping actions, coupled with thermal treatment of the rocks and the introduction of "oil-eating" microbes, destroyed much of the aquatic life whose habitat was in the intertidal zone. These effects, in turn, were reflected up the food chain as adequate supplies of food dwindled. Harbor Seal populations have fallen at an annual rate of five percent from 1989 to 1997. The Sound was also frequented by six pods of killer whales. One particular pod, which numbered at 36 whales prior to the spill, lost 14 in the years since, and has only had a net gain of 3 individuals since the spill.



Fate of the 10.8 million gallons spilled from the Exxon Valdez.

New Oil Cleanup Web Site

A new oil spill web site has been created recently on the World Wide Web, and can be found at www.cleanupoil.com. Known as the International Directory of Oil Spill Cleanup Contractors and Response Organizations, the site provides updated information on oil spill contractors and cleanup equipment at over 1,000 service centers in over 40 countries. The directory was created by Stewart Ellis of Norfolk, Virginia. After working in the oil spill industry for more than 20 years, Ellis realized the need for up-to-date information. The site contains information on oil spill equipment, bulletin boards, links to other sites, and contact information.

The oil spill equipment link provides detailed information on different types of equipment used for various needs including rapid response and long term responses, inexpensive options, and recovery for different oil types. It also includes equipment for uses in many different locations and spill situations such as tidal, fast flowing, and shallow waters, and floating oil or oil that clings to objects. The bulletin board is available to post messages. Recently posted messages included requests for information on contractors, and information on training courses and workshops. There is also a section that provides links to other Web sites for more information of related interest. The site includes links to industry associations, other discussion groups, oil spill news, health and safety issues, and publications of interest. There are many ways to find information on

the site, including a word search, location search, or through an e-mail inquiry.

This site was created because of the need for updated response information gathered at one location for information in a hurry.

The site hopes to reduce cost by putting users in direct contact with the contractors, provide a self-sustaining database of contacts, reduce response times by putting people in contact with equipment closest to their area, and provide contacts for joint ventures. EPA does not endorse contractors, products, or other information provided on this website.

New World Record for the Largest Offshore Oil Containment Boom

New records have been set recently in offshore oil boom containment. Ro-Clean Desmi of Denmark, a producer of oil spill combating devices, released to the market the RO-BOOM 3500. Earmarked as the pinnacle of offshore boom development, the boom has displayed its capabilities in the Norwegian sector of the North Sea during a three-year period. In one test, 95 cubic meters of oil were released, and RO-BOOM contained 95% of the test oil, which was measured at a thickness of 14 cm at the boom wall. During oil sweeping tests, the RO-BOOM 3500 contained oil at speeds of up to 1.3 knots. During conditions of long-term towing, the RO-BOOM 3500 was towed for two weeks in the winter through swells of 23 feet. The



Record-breaking RO-BOOM 3500.

boom survived without significant damage. It has an overall deflated width of 3.5 meters, an operational freeboard of 1.3 meters and a draft of 1.5 meters. It was honored in an entry in the Guinness Book of World Records for largest offshore containment boom.

International Pipeline News

Blast Causes Oil Spill in Yemen

On June 28, 2001, Yemeni tribesmen blasted a hole in a pipeline operated by Hunt Oil Company, of Dallas, Texas, spilling 10,000 barrels of oil. This was the second attack in a month on the pipeline, which has been a target of disgruntled tribesmen trying to force the government to improve local services. The pipeline carries oil from the Safer field in the Marib province 100 miles northeast of San'a, the capital of Yemen, to the port of Ras Isa on the Red Sea. The oil field produces 165,000 barrels of oil a day.

Thieves Break Pakistan Pipeline

The Pak-Arab Refinery Limited oil company (PARCO) found their main pipeline broken in the Sehwantaluka area on July 12, 2001. Thieves broke the pipeline

at a point located six kilometers from the Bajara police check post with the help of heavy machinery.

Fishing Boats Recover One-Third of Sunken Ship's Diesel Fuel

At about 10:50 a.m. on Saturday, August 4, 2001, the Windy Bay tender vessel was heading south about 400 yards east of Olsen Island in the Prince William Sound. Tender vessels normally take the catch from fishermen and deliver it to shore, which is what the 180-foot Windy Bay was attempting to do when it struck a submerged ledge and sank into 1,000 feet of water, disgorging its entire 35,000-gallon fuel supply into surrounding waters. Ralph Hansen, co-owner of the vessel from Sumner, Washington said skipper Doug Elden, who was commanding the boat at the time of the incident, simply misjudged his position, hit a rock, and sank. "It doesn't take a lot of misjudgment to hit something in Prince William Sound," says Hansen.

Since the 1989 Exxon Valdez disaster, this has been the largest spill in Prince William Sound. Recovery of spilled fuel from the Windy Bay was about 30 percent compared to an estimated 3 to 13 percent recovery from the Exxon Valdez. However, the comparison is hardly just, considering 35,000 gallons is only a tiny fraction of the 11 million gallons spilled in 1989. In the Exxon Valdez disaster, there was inadequate spill response equipment and a confused recovery effort. In comparison, a local citizens watchdog group, fishermen, and authorities are all calling this a successful spill recovery.

One reason for the increased recovery percentage in this year's spill is more modern technology such as new spill containment boom and a new skimmer, the Valdez Star, which is working better than expected. But even more important are the fishermen who are now better trained and equipped for cleanups. One such fisherman, Skipper Megan Corazza, pulled in \$2,350 worth of oil the Tuesday after the spill. Her boat is one of the 19 that halted fishing in order to aid in the cleanup effort. In addition to being registered with the spill cleanup group at the oil terminal in Valdez, Corazza and her boat crew are trained in spill response.

Despite the intense cleanup efforts, vibrant sheens can still be seen wrapped around the Sound's rocky heads and curled into its coves. Diesel arrived on shore of at least four islands and one merganser duck covered in oil has been recovered. Sea life such as endangered Steller sea lions and humpback whales were spotted swimming in the diesel sheens. As the spill expanded due to tides and wind, the recovery effort slowed. Cleanup continued, but with fewer boats and less boom. Workers walking the beaches were assessing fuel amounts that reached shore as well as searched for dead or injured wildlife. Containment booms protecting oyster farms and a hatchery north of the spill remained in place.

U.S. EPA Oil Program Center Infoline

The EPA's Oil Program Center (OPC) offers a variety of information about oil spill

prevention and response through its Internet web site (www.epa.gov/oilspill). This information serves as a resource for businesses that are subject to oil spill regulations, emergency personnel that respond to oil spills, students, teachers, and the general public. One of the most popular features of the web site is the e-mail infoline (www.epa.gov/oilspill/comment.htm or oilinfo@epa.gov). This feature allows the public to contact OPC personnel to ask specific questions that may not be answered elsewhere on the web site. People who do not have access to Internet can reach the infoline voice mail system at 1-800-424-9346.

OPC staff respond to approximately 70-90 public inquiries each month. They provide answers to oil facility owners and technical professionals regarding oil spill regulations, offer information to concerned citizens about how to report a suspected spill, provide information on the environmental impacts of oil spills, and respond to requests for data about oil spills. Many of the questions submitted to the OPC through oil spill infoline are from students and teachers seeking information for classroom and science fair projects dealing with oil spills. OPC staff are pleased to have the opportunity to respond to questions from interested individuals.

Typical questions answered through the infoline include items such as:

- What would be an environmentally conscious method of cleaning crude oil from a beach?
- Can you provide or direct me to information on biological oil clean-up agents?

- I am doing a high school science experiment involving oil spills. Can you provide me with examples of how to demonstrate or simulate an oil spill in a classroom laboratory environment?
- How are wildlife oiled during an oil spill incident rehabilitated?
- Is it true that vegetable and cooking oils are also regulated by the EPA?
- What oil regulations apply to transfer facilities? What regulations apply to marinas?
- Does the professional engineer that certifies my facility's Spill Pollution Control and Countermeasures (SPCC) Plan have to be licensed in the state my facility is located in?

Documenting the Revival of Sea Grass in the Patuxent River

Barren muddy bottoms now found in some regions of the Chesapeake Bay make it difficult to imagine the lush aquatic fields of sea grasses that once flourished throughout the clear waters. The delicate ecosystem of the Chesapeake Bay has been hit hard by development within the watershed as chemical and nutrient rich runoff into the water increased drastically over the past century. To combat this change, a new frontier of scientific research is developing, involving the restoration of ecosystems disturbed by human activities.

Some scientists at the Chesapeake Biological Laboratory, headquartered at Solomons Island, part of the University of Maryland's Center for Environmental Science, are working to restore a pristine image of the Chesapeake, begin-

ning with a revival of the sea grass. A wetsuit clad scientist walks down a dock carrying an ordinary cooler. His mission is to plant the grassy foliage in his cooler as part of a \$670,000 restoration project. The goal is to restore 63 acres of degraded aquatic ecosystem at the mouth of the Patuxent River with the contents of the cooler, a plant by the name of eelgrass. If the planted eelgrass survives, it will provide increased habitat for shellfish, in particular, oysters. As oysters filter the water to feed, they gradually help clear the water, boosting the light levels available for eelgrass growth. With purer water and increased vegetation, scientists hope to foster a habitat for fish and birds.

Along with their usual business of science, the lab group has an even larger goal of documenting the restoration process. Although scientists have thoroughly documented the degradation of the environment through human activities, the ability to help heal ecosystems remains difficult to evaluate. Equipped with state-of-the-art underwater cameras to capture the secret lives of the eelgrass habitats, the scientists will post live images on the Internet for public access to the project.

Although government-funded projects like this one are leading the way, private industries are now investing millions per year in restoration ecology. Corporations are researching better technologies to clean up environmental spills and ways to build in sensitive environments. On one project alone, the cleanup of an oil spill at a former plant near the Patuxent River, the Potomac Electric Power Company has spent over \$60 million.

Jet Planes Harbor New Use for Soybean Oil

Soybean oil has been successfully used to power cars, buses, and boats. A new use has emerged as researchers at the federal government's Agricultural Research Service have found a way to blend the bean-based oil with jet fuel.

Inspecting soybean oils that have been winterized.



Photo by Keith Weller/Courtesy USDA.

Supporters of biodiesel technology cite payoffs such as cleaner air, larger profits for U.S. soybean growers, and a decreased national dependency on foreign oil imports.

Biodiesel components can come from renewable sources such as soybeans, sunflowers, canola, and cottonseeds. In addition, waste products like fryer oils and cooking grease, as well as beef tallow and pork lard, can be used. However, drawbacks and limitations to biodiesel use in jet aircraft exist. A spill of these non-petroleum oils could affect local wildlife by coating animals' fur and feathers causing suffocation, starvation, and freezing. Biodiesel fuels can also cause oxygen depletion in water

leading to fish kills, and they can contaminate drinking water supplies.

Biodiesel also has one serious technical problem - the behavior of the bean oil at low temperatures. Using biodiesel fuel blends that have not been "winterized" could limit a jet's ability to fly at high altitudes, where cold temperatures can cause crystal formation, blocking fuel filters and plugging of fuel lines. Research continues and steps have been made to develop an appropriate winterizing process for biodiesel fuel. In fact, in 1999, the Federal Aviation Administration certified a fuel for piston driven aircraft containing biodiesel. This fuel contains 85 percent ethanol, a high-octane petroleum product, and an agriculturally derived biodiesel for lubrication. Look for the certification of more biodiesel fuels in the future.

Environmental Impacts of Ethanol

There's little doubt that the impending necessity for energy solutions is not a trivial issue, nor is it a simple one to understand. As has been the case since energy concerns were brought to the public's attention several decades ago, the different sources of energy each have their positive sides, as well as potentially harmful aspects. Hydroelectric dams, for example, were once touted as being the ultimate in "clean" energy. Now, many dams are being removed as their impact on the waterways and the inhabiting fauna are reevaluated.

A current issue for regulators to handle is whether ethanol should be used as either a fuel or a gasoline

additive. Ethanol is a natural, biodegradable, renewable resource. In the face of a limited supply of oil, and such tragic oil spills as the Jessica tanker leak, the prospect of its use is very appealing.

One of the most pressing application of ethanol is its use as a gasoline additive. Each ethanol molecule contains a high ratio of oxygen by weight, and, for this reason, it is used as an "oxygenate." In the presence of oxygen, most hydrocarbons (the simplest components of gasoline, molecules formed from carbon and hydrogen only) are combusted completely into water and harmless carbon dioxide. However, when oxygen is not as abundant, some incomplete combustion may occur, leading to the dangerous gas carbon monoxide. Many states have regulations concerning allowable levels of carbon monoxide produced in engine exhaust. The oxygenate methyl tertiary butyl ether (MTBE), which was until recently a favorite additive for lowering carbon monoxide, is being banned in many states following several high profile incidents in which the non-biodegradable compound leaked from tanks into nearby water supplies. With MTBE's shortcoming fresh in mind, ethanol seems to be the ideal alternative. Ethanol degrades very quickly and does not pose a groundwater contamination threat.

However, not everyone is pleased with the idea of ethanol additives in gasoline. Like many other sources of energy, ethanol may have several negative impacts along with the desired effect. Opponents of ethanol have noted that, while carbon monoxide emissions drop

when the chemical is used as an additive, emissions of nitrogen oxides increases. These nitrogen oxide molecules are responsible for the reddish-brown haze of smog, acid rain, and the formation of ozone, a dangerous respiratory irritant. Also, opponents are concerned that the ethanol-blended fuel will evaporate more easily, especially on hot summer days. Evaporated gasoline is chemically altered by elements of smog to produce particulates and amplify ozone production.

Just as natural gas contains a foul-smelling additive to help people detect leaks, ethanol intended for fuel has a sulphurous compound added to distinguish it from alcohol intended for consumption. However, as guidelines concerning sulfur in gasoline become more restrictive, this additive may become a problem.

Another concern lies in the transportation of ethanol-enriched fuel. As it passes through the large network of fuel pipelines, ethanol in the blended fuel separates in the presence of moisture. For this reason, it is better to ship the pure ethanol separately by truck and mix it into the gasoline at the point of distribution. However, this results in an increase in transportation costs, which is likely to be passed down to the consumer.

As is the case with most energy sources having both positive and negative aspects, the benefits must be carefully weighed before ethanol becomes a component of all gasoline.

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