To hear different groups describe the outlook for air quality in the United States, you’d think they were on different planets. There is just one Earth. But its future could be brighter than pessimists would have us believe.

Today’s Forecast: Partly Cloudy
Coal-fired power plants supply more than half of total U.S. energy demand. But, they operate under a cloud of regulatory uncertainty. So do refineries, manufacturers, and recently, even some local and state governments. Is the cloud lifting? Or are hopes of protecting the environment without jeopardizing power supplies or crippling the economy just ”blue sky”?

Burns & McDonnell is helping clients analyze impacts of evolving regulations, and providing emissions testing, air quality studies, expert testimony, strategic planning, air permitting, engineering design and construction services to position them for success — in any outcome.

Hold the Champagne
Affected industries applauded and environmentalists wailed at the EPA’s announcement of revisions to New Source Review (NSR) rules late in 2002. But Burns & McDonnell regulatory expert Carl Weilert says both celebrations and mourning are premature.

“The situation hasn’t changed that much,” Weilert says. ”The EPA’s decision is not retroactive — the new NSR rules are applied from this point forward. Companies may be liable for violations under former NSR rules. And, while some of the rule changes are final, the new definition of ‘routine maintenance’ is only proposed.”
Political stakes involving environmental regulations are high. The bottom line? Regardless of improvement in NSR rules, industry will continue to be impacted by emission regulations.

"We’re helping clients prepare for changes to the Clean Air Act along the lines of President Bush’s Clear Skies proposal," says Weilert. (For details on the proposal, see our “Clearing The Air” newsletter at www.burnsmcd.com/overview/clearair.html).

"A refined version of the president’s proposal is likely to be introduced early in the 108th Congress, with final legislation passed by the end of 2004," Weilert says. "A cap and trade approach does mean some plants will never have to add additional air pollution control equipment. But the net effect is going to be huge decreases in emissions nationwide."

Legal Battleground
Nine northeastern states are challenging the EPA’s new NSR rules, claiming the revisions will result in impaired air quality for their residents due to emissions from sources far outside their states’ boundaries.

"The EPA has a remarkable record of defending its rulings," Weilert says. "In 2002, it turned away challenges to the fine particulate national ambient air quality standard when many people predicted that it would be overturned. There were numerous legal challenges to the NOx SIP call, but of the 22 states initially covered in 1998, the EPA’s judgment stands fully in 17 states and partially in four. We expect the new rules to be upheld."

The EPA may not vigorously pursue charges of non-compliance under the former NSR rules, although the agency has vowed to do so. But, says Weilert, the possibility of lawsuits filed by individuals who feel they have been harmed by violations to the Clean Air Act, including previous NSR requirements, remains a threat.

The Big Three
Mercury, NOx and SO2 are the “big three” emissions targeted by the EPA and addressed in the Clear Skies proposal. Mercury exposure has been shown to impair motor and cognitive skills, particularly in young children. Even small amounts of mercury build up as contamination progresses through the food chain, and have made some larger game fish in U.S. lakes unsafe for consumption. SO2 and NOx are linked to acid rain, increased ground-level ozone and environmentally damaging nitrogen deposits.

Under current law, further NOx restrictions are scheduled to go into effect in 2004, with mercury reductions required as early as 2007. The proposed legislation may delay implementation of mercury controls, allowing more time for planning and retrofits, but reductions will become necessary no later than 2010.

Ozone Deadline Near
Existing law also requires the EPA to designate non-attainment areas for ozone and particulate. High levels of these pollutants can cause breathing difficulty, especially in young children, asthma sufferers and the elderly. Recent lawsuits by environmental groups attempt to force a timetable for non-attainment designations.

In a November 13, 2002, settlement of litigation brought by environmental groups before the U.S. District Court in Washington, D.C., the EPA agreed to designate communities failing to meet ozone standards by April of 2004.

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Mercury and Water

According to the U.S. Geological Survey, 33 states have issued fish consumption advisories because of mercury contamination. Due to progressive buildup along the food chain, larger game fish are most likely to be unsafe.
"A non-attainment designation requires the state or local government to prepare and implement smog clean-up plans," says Burns & McDonnell Vice President Dan Froelich. "Ozone levels are linked to a multitude of sources, but power plants, petroleum refineries, and other industrial facilities are large, visible targets for reductions. We're conducting studies for clients on the impact these designations could have on their facilities, and helping them identify and evaluate alternatives."

Removing Uncertainty
Weilert points out that clients are not necessarily unwilling to make changes to improve environmental performance, but they can’t afford to do so without an across-the-board mandate.

"The kind of modifications we’re talking about run into millions of dollars," Weilert says. "Producers need to know what caps and trading provisions will be in place. In some cases, they may choose to shutter some facilities. Either way, it takes a lot of planning."

Burns & McDonnell is reducing uncertainty for clients by providing site-specific evaluation of the potential effects of multi-pollutant legislation on their facilities. This includes case-by-case identification of the probable regulatory scenarios for each plant, evaluation of technologies for compliance with the defined range of regulatory requirements, and estimation of compliance costs.

"Our analysis includes not only evaluation of the feasibility and cost of air pollution control equipment retrofits, but assessment of changes to the 'balance of plant' that would be needed to support operation of the control equipment," Weilert says. "Clients can use this information to plan and budget for future compliance costs, to plan and schedule unit outages necessary for tie-in of pollution control equipment, and to determine whether changes in the dispatch order of certain units should be considered."

Going Green Now
Some companies have decided that getting the jump on implementing pollution control measures is their best alternative. Burns & McDonnell is helping clients such as ConocoPhillips, Tri-State Generation and Transmission, and others reduce emissions now.

Burns & McDonnell provided the KCP&L team with permitting, detailed design and resident services to return the unit to service in record time — just 22 months. The boiler was fully replaced along with state-of-the-art pollution control equipment, including selective catalytic reduction for NOx control, a dry flue gas desulfurization system to reduce SO2 emissions, and a baghouse to control particulates and visible emissions. The boiler replacement is only part of the story — every major system was restored, rebuilt or replaced to increase unit output and target high unit reliability.

"KCP&L was determined to get the unit back online before the summer months," says Burns & McDonnell Project Manager Rod Robertson. "Operation during the summer of 2001 and thereafter became reality through the hard work of a lot of ‘believers’.”

Hawthorn was cited in the president’s energy policy as an example of what pollution control technology can achieve. EPA administrator Christie Whitman called it “part of our commitment to provide reliable, affordable energy that protects the environment.” The project received the Missouri Consulting Engineers Council Grand Award; and Power magazine's Year 2001 Marmaduke Award for dramatically reducing emissions while increasing power output.
Burns & McDonnell is working with ConocoPhillips on a $146 million retrofit of its Ponca City, Oklahoma, refinery. A new hydrotreater, isomerization unit, and other additions will allow ConocoPhillips to achieve an average 90 percent reduction in the sulfur content of gasoline produced at the refinery. Sulfur in gasoline limits the ability of vehicles’ emission control systems to convert nitrogen oxides and carbon monoxide to less harmful gases.

ConocoPhillips’ project positions the Ponca City facility to meet future Tier 2 low-sulfur gasoline requirements, and has the potential to improve air quality wherever gasoline produced at the refinery is sold. The project also includes a new flare gas recovery unit to reduce SO2 and NOx emissions from refinery operations.

“Our clients face multiple environmental regulation issues,” says Dave Nispel, Burns & McDonnell refinery marketing manager, process and industrial group. “We’re helping them reduce emissions by modifying facilities that produce fuels, and by developing better systems to burn those fuels. We specialize in implementing these solutions at the lowest possible cost.”

YEP is transforming each of Craig Station’s 428 MW units 1 and 2 according to an October 2000 consent decree settling litigation brought by the Sierra Club. The suit charged that Craig Station emissions violated opacity limits and caused impaired visibility at the Mt. Zirkel wilderness area.

The alleged opacity violations had only occurred during start-ups or other short-term upset conditions. Although Tri-State had reported the incidents to the EPA as required, the company agreed to implement extensive anti-pollution controls to settle the suit. Burns & McDonnell filed an expert witness report and served as technical advisor to the owners’ attorneys during settlement negotiations.

Rising to the Challenge: Yampa Environmental Project
The Yampa Environmental Project (YEP) at Craig Station illustrates the possibility — and the challenge — of retrofitting older coal plants to meet exacting environmental standards.

Owned by a coalition of utility companies led by Tri-State Generation and Transmission Association, Craig Station, a 1264 MW, coal-fired generating station near Steamboat Springs, Colorado, supplies power to multiple states. It runs baseloaded 365 days a year, with a single outage for each unit scheduled every three years for maintenance.

Meeting the stringent standards specified in the court decree requires installation of low-NOx burners and overfire air; conversion to pulse-jet baghouses and a new fly ash handling system; and updates to the units’ flue gas desulfurization (FGD) system.

"Tri-State wanted central coordination of a very complex project," says Fred Campbell, Burns & McDonnell project manager. "We worked with Tri-State to accomplish that by managing contract

CALPUFF

Ever watch dust motes floating in a sunbeam? The bright specks drift, shift direction, rise and fall, carried on air currents too slight to feel on your skin. Imagine trying to predict where the particles in a curl of cigar smoke or a scattering of fireplace ash might end up.

In the case of minute amounts of "contaminants" you can see from your easy chair, where they come from and where they go doesn’t matter much. But in tracking down pollutants that may affect visibility in Class 1 areas, it can matter a lot. Burns & McDonnell’s air quality specialists use a sophisticated computer model known as CALPUFF to analyze the long-range impacts of pollutants that can reduce visibility, where transport is affected by irregular wind flows. The process consists of project setup, meteorological modeling, air pollution dispersion modeling, and post-modeling analysis.

CALPUFF can predict where particles even smaller than dust motes can end up. But don’t try it on your home computer. The extremely complex model takes into account such a large amount of meteorological and geographical data that it can take weeks to run.

Clean Coal Makeover
Craig Station’s Units 1 and 2 began operating in 1979 and 1980, when pollution control technology was less advanced. Tri-State agreed to retrofit the units to significantly reduce emissions of NOx, SO2, and particulate — no small task.

"Tri-State wanted central coordination of a very complex project," says Fred Campbell, Burns & McDonnell project manager. "We worked with Tri-State to accomplish that by managing contract
preparation, evaluation, and administration; monitoring and coordinating schedules, and providing construction management and design support.”

100-Percent Scrub
The consent decree specifies that Craig Station’s modified FGD system treat 100 percent of flue gases and be designed for 93 percent SO2 removal. Previously, the station was bypassing a portion of the flue gas. Engineers had to fit new systems to scrub gas and reduce NOx and particulate into very limited space.

“There are a lot of considerations involved in adding the baghouses and additional scrubber capacity,” Campbell says. “One of the existing FGD thickeners must be removed to make space for the Unit 2 baghouse. The induced draft fans need to be upgraded to handle the added pressure drop. Systems to de-water the FGD slurry have to be upgraded to add capacity. We’re even adding vertical ball mills in series with existing ball mills to increase capacity of the limestone grinding system.”

Critical Schedule
Because Craig Station’s output meets base-load needs, only one outage is scheduled for each unit. The final tie-in for all systems must be made during the same six weeks allowed for standard maintenance. The construction teams — Burns & McDonnell and Tri-State are coordinating seven different contracts for the project — are doing their work on a carefully phased schedule.

“We’re carrying construction as far as we can while the units are in service,” says Campbell. “Work during the unit outages will obviously have to proceed very quickly.” When the project is complete in 2004, additional, new, continuous opacity monitors will verify the effectiveness of the system.

“This project clearly demonstrates that whatever clients come up against, we can help,” says Energy Division Marketing Director Doug Riedel. “We support them with expert testimony, compliance planning, and design and construction to solve the problem.”

Power plants and other facilities are required to report an increasing amount of information on their emissions. Data collection will become even more important as mercury controls, revised emissions trading programs and other new regulations are implemented.

Burns & McDonnell helps clients collect and verify data by offering testing services using mobile Continuous Emissions Monitoring Trailers and standard manual testing methods.

Technicians climb stacks in every kind of weather to insert air-sampling probes — and immediately analyze the sample to provide on-site results for many of the tests. The vans are outfitted with the instrumentation needed to perform most EPA and industry-required testing, including calibration and certification of pollution control and monitoring equipment.

Clients use the service to collect and verify test data mandated by air quality regulations. That data may increasingly be used in defending performance of facilities in litigation regarding regulatory compliance or to demonstrate eligibility for emissions trading credits.