Lisa P. Jackson
Administrator
U.S. Environmental Protection Agency
Washington, DC

April 11, 2011

Dear Administrator Jackson:

We are environmental justice advocates, scientists, and other academics who have come together in an effort to find common ground on, and address, issues of critical importance to our environment. One such issue that needs to be thoroughly examined and debated by our society is carbon capture and storage, or CCS. CCS has been proposed as a large-scale solution to the problem of CO2 emissions from all fossil fuels, including oil, natural gas, and coal. (IPCC, 2005; MIT, 2007; Broecker, 2007; Interagency Task Force on Carbon Capture and Storage, 2010) In this letter we discuss CCS related to electric power plants fueled by coal.

CCS has been proposed for new IGCC [integrated gasification combined cycle] coal plants as well as for existing, conventional pulverized coal plants. (Interagency Task Force on Carbon Capture and Storage, 2010) In both instances, a significant fraction of carbon dioxide emissions would be captured, compressed into a liquid state, piped to a suitable location, and pumped roughly a mile below ground or below the ocean floor. (IPCC, 2005; Schrag, 2007; Schrag, 2009) To some, this seems an appealing way to produce electricity while reducing CO2 emissions by anywhere from 67% to 85%, or more (depending on the method of estimation). (IPCC, 2005, p. 4; Viebahn, 2007) However, CCS carries significant costs and risks, and does not address the consequences of mining, processing, and transporting coal, nor does it eliminate local air and water pollution produced by coal-based power plants. There are also questions concerning a philosophy that results in the use of a technology that produces large quantities of waste that must be buried, and concerning the opportunity costs of investments in a waste-producing technology instead of in relatively waste-free alternatives. (Anastas and Warner, 1993; Anastas and Zimmerman, 2003; Tang, 2005) Finally, environmental justice advocates, and others, are concerned that CCS-equipped power plants will be disproportionately sited in communities Of Color and low-income neighborhoods already overburdened by pollution; the proposed coal gasification plant with CCS in Linden, New Jersey, is a case in point. (Upbin, 2009; EJAC, 2009)

Monetary costs associated with CCS would be significant. (MIT, 2007; Bergerson and Lave, 2007) Up-front construction costs of CCS-equipped plants are high, the infrastructure needed is extensive and there is an "energy penalty" associated with this

technology, requiring 1.25 to 1.40 times as much coal to produce energy with CCS as it does without it. (House and others, 2009) Burying one-half of current carbon dioxide emissions produced by coal plants would require an infrastructure equal to that for petroleum in the U.S. today. (USEIA, 2009; USEIA 2010a; USEIA 2010b) Adding CCS to existing power plants could double the cost of coal-based electricity produced by those plants. (Bergerson and Lave, 2007)

Health, safety, environmental and financial risks related to CCS-equipped coal plants are extensive, magnifying risks throughout the life-cycle of coal, which includes extraction, combustion, and waste stream generation. (Schneider and Banks, 2010) Extraction of coal, whether by underground mining or mountain top removal (MTR), inevitably poses hazards to miners and residents of coalfield regions. (Schneider and Banks, 2010) Underground mining can have devastating effects on the land surface above and (Center for Public Integrity, 2009) MTR exposes wide swaths of Appalachia to ecological damage. (GAO, 2010) The waste stream from coal extraction and processing collects in thousands of sludge and slurry ponds, while coal combustion waste contaminates ground water with numerous toxic chemicals (e.g., mercury and selenium). (Gottleib and others 2009) It should not be surprising that coalfield regions show elevated incidence of pulmonary, cardiac, and renal disease. (Lockwood and others, 2009; Hendryx and Ahern, 2009) It has also been estimated that the life cycle impacts of coal and the waste stream generated are costing the public from a third to over one half of a trillion dollars annually. Accounting for the damages conservatively would double to triple the price of electricity from coal per kWh generated. (Epstein and others, 2011)

CCS-equipped coal plants will also result in detrimental health consequences for residents of, and near, the communities in which they are sited due to local air and water pollution from the plants. Because even if CCS-equipped coal plants capture a significant portion of their carbon dioxide emissions, the cleanest modern coal plants will still release significant quantities of conventional pollutants such as particulate matter, sulfur dioxide, and nitrogen oxides into the air and coal combustion waste impoundments. (SCS Energy, 2009, Table 3-2)

Capturing carbon dioxide and then storing it underground in a compressed and liquefied form carries its own risks. They include:

- Saline aquifer acidification, leaching heavy metals (e.g., arsenic and lead) into ground water. (Kharaka and others, 2006)
- Acidification of saline aquifers also increases fluid-rock interactions and can lead to fractures of limestone ($CaCO_3$), with releases of carbon dioxide in high concentrations. (Renard, 2005)
- Increased pressures raise the risk of leaks and releases from previously drilled (often unmapped) pathways, and can destabilize underground faults and lead to earthquakes. (IPCC, 2005 pp. 59, 261)

- Leaks and releases of concentrated carbon dioxide are toxic to plants and animals, including humans (Fogarty and McCally, 2010; IPCC, 2005, pp. 248-249)
- Microbial communities may be altered, with release of other gases. (IPCC, 2005, p. 260)
- Long-term CO2 leakage into the atmosphere. (Shaffer, 2010)

Thus, there are significant environmental and health risks from CCS. By themselves, these risks merit concern but they also raise insurance and investment liabilities. Unexpected or accidental adverse events such as groundwater contamination (Little and Jackson, 2010) or sudden releases of carbon dioxide could significantly affect human health and result in extensive insurance claims with long tails – i.e., damages lasting for years – rendering CCS an unsustainable and essentially uninsurable financial investment.

In addition to the costs, risks, and consequences discussed above, there remains the question of whether CCS technology is feasible and available on the scale needed. (Smil, 2006) There are also technical questions about the longevity of economically accessible coal supplies in the U.S., raising the specter of "peak coal" (the time when half of all economically-recoverable coal has been mined, after which affordable supplies can be expected to dwindle), which has implications for the coal industry in general and investment in infrastructure for CCS-equipped coal plants in particular. The U.S. Geological Survey has estimated that a 200-year supply of coal exists in the U.S. but approximately 25 years of economically recoverable coal may be more realistic. (USEIA, 2008; Glustrom, 2009; Heinberg, 2009; Luppens, 2008; Pierce and Dennan, 2010; Patzek and Croft, 2010) The amount of available coal is important because it affects the planning horizon for moving beyond coal to alternative methods of electric power production.

Given the issues discussed thus far, it is not surprising that some question a philosophy that supports a technology that requires the burial of waste, instead of investments in renewable energy technologies that produce energy without creating a significant waste stream. The second principle of green engineering (Anastas and Zimmerman, 2003), which is also the first principle of green chemistry (Tang and others, 2005; Anastas and Warner, 1993, p. 30, reprinted at http://goo.gl/h6DAj), supports these doubts since it states that, "It is better to prevent waste than to treat or clean up waste after it is formed,"

Another issue, as important as any raised thus far, is where CCS plants will be sited. There is ample evidence that environmental hazards are often sited in communities Of Color or low-income neighborhoods. (Bullard and others, 2007) Linden, New Jersey, is located in Union County, which has a higher than average number of African-American and Hispanic residents. (U.S. Bureau of the Census, 2007) Linden has an unusual

number of environmental hazards located in and near its borders and according to a 2009 report by the American Lung Association, its surrounding county has some of the highest levels of short-term fine particle air pollution in the nation. (Stewart, 2009) These environmental hazards, and high air pollution levels, are accompanied by high cancer rates (Montague, 2009) and an official designation from the State of New Jersey as an environmental justice community. (New Jersey Environmental Justice Task Force, 2005). It is here that a private company has announced plans to build a CCS-equipped 440-megawatt IGCC coal power plant that will pump captured carbon dioxide 70 miles offshore to bury it a mile and a half beneath the floor of the Atlantic Ocean. (Upbin, 2009) In an area currently suffering from excessive air pollution, the coal plant's application for an air permit indicates it will have the potential to emit 1.7 million pounds of particulate matter, sulfur, nitrogen oxides, and volatile organic compounds into the air each year and generate other coal combustion wastes with their own set of risks. (SCS Energy, 2009, Table 3-2).

We want to make clear what the additional pollution from this proposed CCS plant could mean in terms of physical suffering for New Jersey residents and others who live near or downwind of the plant. In a previous public letter from this Initiative we discussed the significant detrimental health effects of airborne particulate matter, sulfur dioxide, and nitrogen oxides. [http://ejandscience.blogspot.com/2010/06/ej-and-science-letter-on-epa-authority.html] These pollutants probably cause tens of thousands of premature deaths in our country every year (California Environmental Protection Agency, Air Resources Board, 2008) and are linked to a variety of health disorders including cardiovascular disease (Jerrett and others, 2005), lung cancer (Pope and others, 2002), asthma (New Jersey Department of Environmental Protection, 2008), and decreased lung function in children (Brunekreef and others, 1997). In a community that already has too many environmental hazards and too much disease, local pollution produced by a CCS plant could mean more suffering, illness, and premature death. Any meaningful commitment to environmental justice would mean not allowing facilities that would increase the total pollution burden of residents to be sited in Linden. Permitting the construction of a CCS plant in this community seems to us to be a blatant environmental injustice and cannot be condoned.

We think that coal-based power plants, whether equipped with CCS or not, should not be located in environmental justice communities already overburdened with pollution, and we believe the proposed CCS-equipped power plant should not be sited in Linden, New Jersey.

We also believe that, given the general issues raised above, CCS itself, apart from issues related to coal, should be thoroughly debated in all corners of our society as part of a full

examination of the health, environmental and financial life cycle risks of this proposed technology. The examination must occur in order to inform public policy and decisions regarding public, and private, financing of CCS and we stand ready to participate in this discussion.

Sincerely yours,

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