Response to the Toxics Action Center Report "Toxic Sludge in Our Communities"

March 3, 2003

EXECUTIVE SUMMARY

In October, 2001, the Toxics Action Center (TAC) of Portland, Maine, published a report entitled "Toxic Sludge In Our Communities: Threatening Public Health and Our Farmlands." The report misrepresents agronomic use of biosolids in Maine. It ignores decades of research documenting the safety of the practice and the numerous regulatory safeguards that protect biosolids quality and practice in Maine. Furthermore, it does not mention the substantial benefits derived from biosolids recycling, nor offer any viable alternatives. The Maine Waste Water Control Association (MWWCA) and the New England Biosolids & Residuals Association (NEBRA) have prepared this response to clarify the record regarding biosolids use in Maine.

Biosolids Recycling

Merriam-Webster's Collegiate Dictionary, Tenth Edition, defines "biosolids" as '"solid organic matter recovered from a sewage treatment process and used especially as fertilizer." "Biosolids" is a term used to describe sewage sludge that has been treated and tested and meets federal and state standards for use as a soil amendment and/or fertilizer. The term "sludge," which TAC uses, is non-specific and can apply to untreated or hazardous waste sludges which should not—and cannot legally—be recycled to soils.

Recycling biosolids is an integral component of sustainable agriculture in Maine. Biosolids benefit soils in the same way that adding animal manures helps improve water infiltration, the slow release of nutrients, tilth,, and other soil qualities. Crops grown with biosolids most often are healthier and have equal or higher yields than crops grown only with commercial fertilizers. Using biosolids puts to use a local recycled resource and reduces the need for imported commercial fertilizer, little of which is made in Maine. Overall, it is widely held that biosolids recycling is beneficial for society and the environment. The late Donella Meadows (1996), Professor of Environmental Studies at Dartmouth College and co-author of *Limits to Growth* and *Beyond the Limits* stated:

> "The No. 1 rule of the debate is: Sludge Happens. It has to go somewhere. You don't get to say "not here" without saying where, or personally agreeing to stop producing it.... As long as there is not too much of it, plants love sludge [biosolids]. Land-spreading is by far the best solution. It recycles nutrients back into life. It improves soils. It replaces manufactured fertilizers, reducing fossil fuel use and water and air pollution...."

Lead federal agencies and all state environmental agencies support biosolids recycling. Ultimately, biosolids recycling must be practiced as a part of a sustainable society.

The Safety of Biosolids Recycling

More than a thousand studies have been conducted regarding biosolids recycling, and the large majority of scientists knowledgeable on the topic conclude that biosolids recycling, done in accordance with regulations and best management practices, involves "negligible risk" to public health and the environment. Indeed, this was the finding of the National Academy of Sciences 1996 review of the U.S. Environmental Protection Agency (EPA) biosolids program (National Research Council, 1996).

In writing their report, it is clear that TAC did not perform a thorough review of the published scientific literature. Rather, the TAC report references some news stories and several position papers, most of which have not been peer-reviewed and contain inaccuracies that the TAC report perpetuates. (The most credible critique of biosolids recycling was developed by the Cornell Waste Management Institute and much of it was refuted by the New York State Department of Environmental Conservation—both these documents can be accessed at http://www.nebiosolids.org/scienceof.html.)

In general, the TAC report paints the picture of biosolids being a contaminated media, chock full of toxic compounds and harmful pathogens. In actuality, over 99% of biosolids is composed of water, organic matter (such as proteins and cellulose from foods and other organic waste) and sand, silt, and clay minerals consisting primarily of silica, aluminum, iron, and calcium—common natural elements. As with other environmental media, including leaf and yard waste, soils, and animal manures, biosolids contain trace amounts of natural trace elements, some of which are commonly called "heavy metals," and organic chemical compounds, some natural and some not natural, most of which are found throughout our contemporary environment. TAC makes the faulty assumption that the mere trace presence of such contaminants means biosolids present unacceptably high risks to public health and the environment.

The question that the TAC report focuses on is an important one: are current biosolids "clean" enough—of sufficient quality—to be recycled? In other words, how safe is current biosolids recycling in Maine? Is it safe enough?

This response to the TAC report details why water quality professionals and biosolids managers managing sewage sludges in Maine believe that biosolids recycling is currently safe enough (even as we continue to work to make it even better). Biosolids recycling in Maine currently presents negligible risk to public health or the environment. How "negligible?" In the U.S., there is more than 10 times as much animal manure produced than biosolids (Moss et. al., 2002). Animal manures have always been recycled on farm fields and other soils, either in raw form or after treatment such as composting. Maine citizens widely accept manure recycling. Unfortunately, manure recycling has resulted in documented harm to the environment and public health (e.g. Walkerton, Ontario). The same is not true for biosolids. Still, people are right to feel that applying manures to farm fields and other soils is generally a safe and beneficial practice. It is. Despite an occasional problem, the risks presented by manure management are low. And the evidence from more than 30 years of intensive experience and research indicates that biosolids recycling, done right, is as safe.

Biosolids Recycling in Maine

For as long as wastewater treatment plants have been cleaning water in Maine, municipalities and farmers have been using the sewage sludges—or biosolids—from these treatment plants to improve

soil fertility. Currently, approximately 3/4 of the municipal wastewater treatment sludges generated in Maine are treated, tested, and recycled as biosolids. Virtually every Mainer, from those in dense residential areas serviced by municipal wastewater treatment plants to residents using septic systems, depend on Maine's wastewater treatment plants to make clean water from wastewater and manage the resulting sewage sludge.

The record of biosolids application in Maine parallels that of other states. Here, too, this recycling program has improved crop yields, reduced the need to fill up landfills, and has not had an adverse impact on human health and the environment—even after more than 25 years of Maine experience. Maine's standards for the quality of biosolids with regard to trace contaminants are some of the strictest in the country, and trends over the past two decades indicate that the chemical quality of Maine biosolids has improved with time due to strong industrial pretreatment and pollution prevention programs. Due to the state regulations regarding biosolids recycling, including regular testing, pathogen reduction requirements, and nutrient management, biosolids recycling in Maine is as well controlled as anywhere in the country.

Addressing TAC's Major Concerns

The TAC report focuses its critique of biosolids recycling on several key issues: biosolids quality and the presence of trace chemicals and "heavy metals," the presence of pathogens in some biosolids, testing and quality control of biosolids, and oversight and enforcement at the state and municipal levels. Brief discussions of these issues appear below, as part of this Executive Summary. More detailed discussions may be found in the detailed comments in Part Two of this response.

- *Biosolids quality and the presence of trace chemicals and "heavy metals*: Maine biosolids are of as high quality—or better—than those recycled elsewhere in the United States and Canada. There is plenty of data from Maine biosolids that show that most chemicals tested for do not show up and those that do are at very low levels. Trace elements (including "heavy metals") are found to be well below the risk-based standards set by the U.S. Environmental Protection Agency (EPA) and the Maine Department of Environmental Protection (New England Biosolids and Residuals Association, 2001).

- *The presence of pathogens in some biosolids*: Class A biosolids, including biosolids composts, must, by law, contain no more pathogens than background soils. On the other hand, Class B biosolids contain some viable pathogens and, therefore, must be managed by controlled programs at farm or reclamation sites that are permitted by DEP. Both classes of biosolids, when managed according to state and federal regulations, typically contain less pathogens than animal manures that are applied to agricultural land and present no significant increased risk to public health and the environment. Maine biosolids are treated for pathogens, just as all biosolids across the nation are treated. Indeed, more than 60% or the biosolids recycled in Maine are composted, producing fine Class A soil amendment products.

- *Testing and quality control of biosolids*: Biosolids have been documented as the most analyzed and tested soil amendment ever (WERF, 2002). Maine biosolids are tested on a routine basis, and have been for decades. In recent years, this testing has become more thorough. In Maine, biosolids quality testing is set for each wastewater treatment plant by DEP and involves strict protocols and evaluation of more than a hundred potential contaminants. Maine's regulations are among the

most stringent in the nation and underwent major revision in 1999 after more than seven years of extensive review and risk assessment. Maine's rules are far stricter than the federal regulations. While one or two random tests of the biosolids from a particular treatment plant does not provide much confidence about the quality of the material, when scores of test data from many years are evaluated, the good quality of Maine biosolids becomes clear (New England Biosolids and Residuals Association, 2001).

- *Oversight and enforcement at the state and municipal levels*: The TAC report calls for the state to stop land application of biosolids and/or for municipalities to implement unilateral controls to effectively ban biosolids recycling within their jurisdictions. This is misguided and contrary to longstanding public policy and laws that encourage beneficial use for a variety of reasons - reasons that are in the best, long-term interests of the public as a whole. TAC's recommendation ignores the fundamental fact that all people and businesses of the state, not just the ones directly connected to a wastewater treatment plant, contribute to biosolids generation and should be responsible for the development of sustainable, cost-effective disposal or recycling options for the material. There are over 75 wastewater treatment plants in Maine that recycle their biosolids, representing over 90 municipalities directly connected to wastewater treatment plants. In addition, there are innumerable rural communities that dispose of their septage at these wastewater treatment plants, have residents that commute to urban municipalities, and send goods and services in both directions. Clearly, we are all connected, and the debate about biosolids management should not become a conflict between municipalities and/or the state. The economic and social impacts of TAC's recommendations would be harmful. Currently Maine towns can have ordinances regulating certain biosolids recycling activities, as long as the ordinances are no stricter than state regulations and allow the activity to occur. This encourages public education about the activity, as well as local cooperation in oversight and enforcement and in assuming responsibility for the long-term management of biosolids. In September, 2002 the DEP published a Guidance Document for Municipalities which details the basis of state law and policy and exactly what towns can regulate with respect to biosolids and septage utilization. MWWCA and NEBRA support utilization of the DEP Guidance document and welcome local oversight and enforcement of biosolids and septage management programs.

Conclusion

Given the lengthy positive experience of biosolids use in both Maine and throughout the nation, as well as numerous regulatory and technical safeguards that protect the quality of biosolids and their use, we find the TAC recommendations to be impractical and unwarranted. Protecting public health and the environment is a core tenet of biosolids recycling regulations and practice. There is no credible evidence or peer-reviewed research to suggest that biosolids recycling, as practiced in Maine for over 25 years, is anything other than safe and in the long-term public interest. We strongly encourage readers of the TAC report to review other credible sources of information available on this subject (e.g. visitwww.nebiosolids.org or www.biosolids.org for links to other sources).

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Response to the Toxics Action Center Report "Toxic Sludge in Our Communities"

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PART TWO – DETAILED COMMENTS

Introduction

This response to the Maine Toxics Action Center (TAC) report has been prepared by the Residuals Management Committee of the Maine Waste Water Control Association (MWWCA) and the New England Biosolids and Residuals Association (NEBRA). MWWCA is an association of wastewater officials, facility operators, environmental engineers, and other water quality experts dedicated to the protection of water quality in the State of Maine. NEBRA is a non-profit 501(c)(3) membership association of wastewater treatment facilities and operators, biosolids/residuals management companies, biosolids managers, environmental engineers, users of biosolids products, and others interested in fostering the environmentally sound recycling of biosolids and other residuals in the greater New England region.

Point-by-point discussion

Note: The following discussion follows, more or less, the same order of topics as in the TAC report. Page references in parentheses refer to pages of the TAC report where the particular topic is discussed. This makes it possible for the reader to read a section of the TAC report and then read the response to that section below).

Are biosolids toxic? (See Title and statements throughout the TAC report.)
"Toxic Sludge in Our Communities" is a creative title that effectively engenders concern and fear, yet it is inaccurate with regard to biosolids recycling. The title would more accurately apply to a report on hazardous waste sludges, which exist in many places (e.g. metal plating sludges and hazardous waste sites). No regulatory agency considers biosolids—municipal sewage sludge that has been treated and tested and meets strict regulations—to be a hazardous material. In short, biosolids recycling does not involve "toxic sludge."

Biosolids are not "toxic;" in fact, they are brought into rural communities because they help grow healthier soils, plants, and animals by providing recycled organic matter and nutrients. Many plants and other organisms respond with increased growth and vitality. For example, in 30 years of research, Sopper (1996) found improved forage and perfectly healthy wild animals eating the forage grown on mined lands in Pennsylvania that had been reclaimed using only large volumes of biosolids. Research

by the U.S. Department of Agriculture and the University of Minnesota at the Rosemount watershed showed that for more than 20 years, excellent quality hay and corn feed were grown on soils that receive annual applications of biosolids, and the goats eating the feed all their lives were perfectly healthy as well (Dowdy et. al., 1993). A recently completed major study by the Water Environment Research Foundation entitled "Evaluating Risks and Benefits of Soil Amendments Used in Agriculture" reviewed 230 research studies and reports, many of which were peer-reviewed and conducted by leading research institutions, on inorganic fertilizers, manure, and biosolids. One overarching conclusion of this extensive review was that "Research indicates that risks associated with the use of biosolids may be no greater than – and, in some cases , less than – risks associated with manure use" (Moss, et. al., 2002).

The country's most prestigious peer review scientific body, the National Academy of Sciences, has concluded in the summary of their 1996 report *The Use of Reclaimed Water and Sludge [Biosolids] in Food Crop Production*: "While no disposal or use option can guarantee complete safety, the use of these materials in the production of crops for human consumption, when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production, and to the environment" (National Academy of Sciences, 1996, p. 13).

Is there widespread concern regarding biosolids recycling? (See Page 6, 1st paragraph; page 12, paragraph 3.)
For decades there have been recurrent concerns about the recycling of treated sewage sludge. The concept of putting on farm soils society's organic wastes is a hard concept for some people to immediately accept. There has always been some level of concern.

Today, the same concerns are being discovered by different people. Many concerns that TAC staff considers new are actually quite old and have been the focus of intensive worldwide research for more than 30 years. TAC raises many legitimate "potential" concerns. However, they appear to ignore the extensive research and strict regulations that ensure that these potential dangers do not present actual dangers.

The approach of TAC's report on potential risks of biosolids could just as appropriately apply to something like gasoline use in our communities—in fact, gasoline is far more prevalent and dangerous than biosolids (it has actually killed many people through poisoning and fire), and yet we accept it because we know that its use has been researched and that there are regulations that ensure that the *potential* dangers of gasoline do not easily become real dangers.

Likewise, the statement (page 12) "Citizens across the United States, Maine included, have been fighting to keep sludge from being spread on fields and farmland in their communities" is exaggerated. Biosolids recycling has created some concern and controversy in some places, but for the most part, it is a common practice that goes on routinely, often with little public attention. Major environmental groups have mostly ignored it. State and national agricultural groups support it. All applicable state and federal agencies have policies supporting it. Maine's leading environmental groups have not signed on to TAC's position. Almost 60% of the 6 million dry tons of sewage sludge produced in the U.S. each year are recycled as biosolids. And almost all is recycled with little trouble or concern on the part of involved communities and citizens.

In recent years, several smaller local groups have organized more concerted efforts to opposed biosolids recycling, including critiques of EPA's biosolids program that have led to EPA Office of Inspector General, National Academy of Sciences (2002), and Congressional reviews of the program. These have not found the federal regulations governing biosolids recycling (the so-called "Part 503" rule) to be failing in protecting the environment and public health, but they did find that EPA has failed in recent years to update the science behind the 503 regulations and to monitor and enforce biosolids management across the country. EPA has responded to these criticisms by noting, accurately, that states have strong biosolids monitoring programs (this is especially true in Maine) and that EPA has continued to advance the science of the Part 503 with its proposed dioxin standard. In addition, states and independent research institutions have continued to advance biosolids research and science.

What are the different types of biosolids? (See page 6, 3rd paragraph)
In Maine between 130-160,000 cubic yards (cys) of municipal sludge are generated each year. In 2000, 73% were recycled either through direct land application as Class B biosolids (27%), or as a soil amendment after composting, commonly referred to as Class A biosolids (46%). Less than 22% was landfilled. The volume recycled was generated by 75 treatment plants representing over 90 Maine towns. According to Maine DEP records, the total volume generated and percentage recycled has been relatively consistent for over a decade.

Class B biosolids are used primarily as an agricultural fertilizer in place of chemical fertilizers. Class B biosolids are typically treated with lime to reduce most pathogens. In Maine, Class B biosolids need individual site permits and various restrictions apply (setbacks, crop limitations, limited public access). Class B biosolids are provided free of charge to farmers by wastewater treatment facilities. The use of Class B biosolids saves Maine farmers an estimated $100 per acre in fertilizer expense.

Class A composted biosolids are used as a soil amendment to provide beneficial organic matter and nutrients. Class A material must be treated and certified to be essentially free of pathogens, and can be generally distributed without site permits. Class A compost is a commodity sold for $2-$15 per cubic yard, dependent on agronomic quality. In Maine, over 600,000 cubic yards of composted biosolids have been used in the last ten years to grow grass for public works projects, to build golf courses and sports fields, and to make topsoil for general use at hundreds of residential and commercial projects.

Why do water quality professionals use the term "biosolids?" (See page 6 side box.)
The term 'biosolids' was created in the early 1990s to differentiate sewage sludges that have low concentrations of contaminants and have been specifically treated to make them suitable for beneficial uses from those sludges that have higher concentrations of contaminants that make them unsuitable for agronomic use. Biosolids are those municipal sewage sludges that meet strict state and federal standards and can be legally applied to the land. "Biosolids" is widely used within the field of wastewater treatment and agriculture; it is found in at least two major general usage dictionaries (Webster's, Oxford). Biosolids is a more precise term than sludge. Only biosolids—not other forms of sludge, can be land applied (recycled). There are many wastewater treatment sludges that are not biosolids and cannot and should not be applied to land.

What about the trace metals, chemicals, and pathogens in biosolids? (See page 7, 1st paragraph and pages 12 – 13.)
Biosolids do contain measurable traces of heavy metals, chemicals (including dioxins), and pathogens. "Heavy metals" are naturally-occurring elements and are found naturally in soils, humans, animal manures, etc. Traces of many different kinds of chemicals—natural and human-made--occur in wastewater and some remain through the wastewater treatment process and are found in sewage sludge. Pathogens, microorganisms that can cause diseases, are also found in wastewater and in much-reduced amounts, in some biosolids (Class B) and many pathogens are also found in most soils (in low concentrations). Federal and state regulations governing biosolids recycling were created to ensure that these trace contaminants in biosolids constitute no significant risk to public health or the environment.

The TAC report authors suggest that there is danger due to the *mere presence* of something that can be harmful (toxic) in larger quantities or higher concentrations. The measurable levels of trace metals, chemicals, and pathogens in biosolids that are recycled are very low—measured, for instance, in parts per million, parts per billion, or parts per trillion. What is important is whether these trace amounts have any impact on public health or the environment. Research and assessing the risks through careful conservative analysis (risk assessment) have created a high level of confidence that recycling biosolids in accordance with regulations—which include numerical limits on some of the contaminants of greatest concern (e.g. mercury, lead, cadmium, arsenic, and dioxins)--is as safe as any other agricultural practice (National Research Council, 1996; Chaney et. al, 1999).

There are also decades of experience of wastewater and biosolids workers who are around sewage sludge and biosolids day in and day out, year after year, and have been found to be about as healthy as the general population (see Kuchenrither, 2002).

Are biosolids adequately tested? (See page 13, paragraph 1.)
The notion that biosolids are untested or inadequately characterized is blatantly false. Biosolids must be tested on an on-going, routine basis, in accordance with state and federal regulations. Maine's regulations are among the most stringent in the nation, and underwent major revision in 1999 after more than seven years of extensive review. Maine's regulations are far stricter than the federal regulations, and the typical monitoring program requires testing for more than a hundred trace compounds and elements that represent many groups of potential contaminants that could be present in biosolids.

Maine requires that every biosolids proposed for beneficial use first have a Sampling and Analysis Plan (SAP) specific to the facility generating the biosolids. The SAP must be approved by the Maine Department of Environmental Protection (DEP) prior to allowing any use of the material. Based on a review of the facility, data submitted, and a variety of other factors, the DEP dictates the biosolids SAP to the generator. As part of this review, the DEP can require screening for over 575 compounds and elements to ensure proper characterization of the material. The final SAP stipulates a monitoring program that the waste water treatment plant must follow, including analytes tested, sample frequency, and test methods used on the samples. The SAP is structured to provide a statistically valid sampling of the biosolids product as part of its overall beneficial use program.

Finally, it must be recognized that biosolids producers must file regular reports (typically quarterly) to the DEP which must include, among other items, detailed testing records in accordance with the SAP. This data is reviewed by the DEP to ensure compliance with the overall Program Approval.

What about biosolids odors? (See page 7, 1st paragraph)
Most wastewater sludge, in its raw form, does smell. However, once it has been treated and made into biosolids, it usually smells less, often hardly at all. Still, some biosolids products do smell bad. But even bad smelling biosolids products (usually Class B biosolids) smell no worse, or no more intensely, than fresh chicken or pig manure—to most people (perception of odor is, however, highly variable and personal). The typical Class A biosolids product is not offensively odorous, but tends to smell more like soil or mulch.

Managing odors is a difficult challenge for any manager of any bulk organic-rich material (e.g. fish waste, food waste compost) Biosolids managers are sensitive to concerns about odors and work hard with communities where biosolids are being applied to avoid undue nuisances. Research is going on in Pennsylvania and Washington, DC and elsewhere to find ways to further control odors associated with compost facilities and the land application of biosolids and animal manures. Any community impacted by odors should talk with the farmer and the biosolids or manure manager and work with them to reduce malodor impacts.

Are there public health and animal impacts from biosolids? (See page 7, 1st paragraph; Page 12, Side Box; Page 13, paragraph 5; and pages 17, 18, & 19)
TAC's page 7 statement about links between biosolids and serious health problems are not supported by any documented evidence: while there have been several allegations of this sort, there is no evidence top support any such allegations. These are now "urban myths" that continue to be repeated over and over again, despite their inaccuracy. The facts are these:

- The death of Tony Behun in Pennsylvania involving a boy riding his bike through biosolids was investigated by the Pennsylvania Department of Environmental Services (PA DEP); no link between the boy's death and biosolids could be found (http://www.dep.state.pa.us/dep/biosolids/Testimony/BiosolidsReport0500.htm).
- Likewise, in the death of Shayne Conner, there was no reasonable scientific evidence linking the death to biosolids. In this latter case, those alleging harm had two years to create a theory and develop the science to prove their allegations, and they failed to do so (http://www.nebiosolids.org/shownews.html?section=news&number=70).
- The death of cows at the Ruane farm in Vermont, was brought to public attention in part by two 1992 articles authored by Ed Haag in the farming publications *Farm Journal* and *Inside Dairy Today*. They were strongly biased against the use of biosolids and included misrepresentations of findings and of the statements of the officials quoted therein. The Vermont State Department of Agriculture, Food, & Markets, with the help of the Agency of Natural Resources, the City of Rutland, and the veterinarian and animal nutritionist involved with this particular herd of cows, investigated the problems at the request of Mr. Ruane. Treated sewage sludge from Rutland had been spread on Mr. Ruane's fields from 1984 to the time of the complaint in 1991. They concluded that Mr. Ruane's reported loss of cows (the "cull rate") was not abnormal "given the way he manages his herd." Sewage sludge data indicated that trace metals levels were acceptable, except for 5 of 16 samples that showed elevated levels of copper. A few limited tests of the forage crops grown with biosolids found that the few trace metals tested for were in concentrations

acceptable for cattle feed. The investigation concluded that it was likely certain marginal dairy herd management practices that led to the animal deaths. Biosolids use had little or no impact (Vermont, 1991). There are other allegations of harm to farm animals resulting from biosolids use. But those closely researched by independent investigators have found no scientific evidence of harm from biosolids that have been properly managed and applied according to state and federal laws.

On page 17, the TAC report mentions reports of harm from biosolids "irritant gases" that travel 1600 feet from a land application site, including amines. These allegations cite a paper by Dr. David Lewis, an EPA scientist (not a "former sludge regulator") who has long criticized EPA policy as a "whistleblower." The theories he presents in the cited paper are far outside the realm of accepted science and have been rebutted by leading researchers around the country. An analysis of Dr. Lewis's science is available at the NEBRA website: see www.nebiosolids.org/scienceof.html.

The statement "Symptoms associated with organic amine poisoning frequently occur among waste treatment plant workers and drivers who haul sludge" is another invention with no basis in fact. As noted previously, the health of those working closely with wastewater, raw sludges, and biosolids is generally the same as the overall population. A study in Ohio in the mid-1980s comparing the health of farm families who used biosolids with the health of those that did not found no significant health differences (Dorn et al. 1985).

NEBRA has records of investigations of all significant allegations in New England; more information can be obtained by contacting the NEBRA office.

In summary, TAC has failed to produce any documentation of its claims regarding health impacts from biosolids recycling and has only perpetuated some urban mythology. The National Research Council found in its July 2002 report, "There is no documented scientific evidence that the Part 503 rule has failed to protect public health." The NRC report did note, however, that "additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids." As seen in the TAC report, there continue to be concerns voiced and research should continue. Still, the finding of no documented evidence of any failure to protect public health is very significant, especially in light of the fact that biosolids recycling has been going on for decades and currently involves the application of over 6 million tons per year in the United States, as well as millions of tons in other countries around the world.

Are "thousands of Maine residents affected" by biosolids recycling? (See page 7, Paragraph 2.) Certainly those wastewater, biosolids workers, farmers, contractors and landscapers and other landowners who manage sewage sludge processing, biosolids recycling activities, and handle biosolids products are affected, in the sense that they deal with sewage sludge and biosolids—and that includes up to several thousand people every year. Are they harmed by their relatively close contact with biosolids? Apparently not. There have been few reported cases of illness or health impacts from these people who manage these materials every day.

In contrast, Maine's general population is not widely affected—in fact, the vast majority have never seen or heard of biosolids. Biosolids are applied to farms or landscape projects only once, rarely twice, each year. The process might take several days, and is sometimes noticeable to neighbors because of

machinery noise, truck traffic, and/or malodors in the case of Class B land application. Biosolids managers recognize that biosolids recycling programs may have these impacts on neighbors of land application sites. Similar impacts can occur with the application of animal manures, as well as other common farm or landscaping practices. Nonetheless, biosolids managers typically work to minimize any impacts on neighbors.

Doesn't "land application distribute pollutants from large cities to small towns?" (See page 7, paragraph 4.)
Biosolids are not a significant source of trace contaminants of concern; rather, they are significant sources of organic matter and nutrients, which is why they help soils and plants. More than 99% of biosolids is organic matter (proteins, carbohydrates, cellulose from foods, etc.), silt, clay, sand, etc. Less than 1% are chemicals or elements that may be of concern—if they were present in significant amounts.

Cities are huge consumers of plant and animal nutrients (food) that come from rural areas. Rural soils have limited supplies of nutrients and organic matter. Conservation organizations across the country decry the reduced quality of farm soils due to the one-way extraction of organic matter and nutrients that are consumed, mostly in urban areas, and are disposed of in city landfills. Biosolids recycling helps close this critical loop, bringing organic matter and nutrients back to farm soils where they belong. If TAC's recommendations were followed, this cycling back to the soil would be halted, farmers would have to import from distant mines and chemical manufacturers additional fertilizer, and their soils would be further depleted of organic matter. These environmental impacts are likely much more significant than the minimal impacts posed by biosolids recycling.

Some trace contaminants in biosolids do come from society via wastewater. However, the mere presence of these traces of contaminants of concern should not preclude the use of biosolids in agriculture or reclamation. These same trace persistent contaminants are found in many soil amendments, including animal manures and mineral supplements. Research demonstrates that these contaminants, when added in association with organic matter, such as biosolids and animal manures, remain bound in the soil (Dowdy et. al., National Academy of Sciences, 1996; Chaney et. al., 1999). The use of biosolids mixed with other residuals to create a new sustainable topsoil on a barren site results in similar levels of trace metals as the native soil around it.

The TAC report calls for a prohibition on the land application of "sludge that contains industrial discharges." In fact, the entire report is predicated on a stereotype that most industrial discharges are filled with toxic compounds. This stereotype is still perpetuated in certain television shows and some media coverage. This stereotype is an extremely unfair characterization of the progress that industry has made in reducing discharges of toxic compounds over the past 20 years under industrial pretreatment and pollution prevention programs.

First, this stereotype was never particularly accurate for the majority of industrial discharges, including most industries in Maine. Also, most of the industries that utilize larger quantities of toxic compounds are required to have their own industrial wastewater treatment plant and manage their solids separately from municipal wastewater treatment plants. Publicly Owned Treatment Works (POTWs) exist to treat the discharges from residences, businesses, and industries within a defined district, but no

industry is allowed to connect if it would adversely affect the wastewater treatment process or the solids produced.

Secondly, every wastewater treatment plant must, by its federal and state license, have a pre-treatment program to license any significant industrial flow; must set "local limits" for what those industrial flows can discharge to the sewer; and must have a program to monitor those flows to ensure compliance. Industrial pretreatment is a fundamental first line of defense to protect biosolids quality. The reduction in the quantity of toxic compounds discharged to treatment plants under Industrial Pretreatment and Pollution Prevention programs has been clearly documented and is considered a success nationwide.

Also, the TAC report implies that what comes into a wastewater treatment plant is unaltered through the treatment process and ends up in the resultant biosolids. A wastewater treatment plant provides a combination of physical and biological processes (typically known as "primary" and "secondary" treatment). The typical wastewater treatment plant treats millions of gallons of wastewater per day, and, through natural processes (e.g. microbial degradation), can degrade many compounds. If something were truly toxic, and did not readily degrade in the treatment processes, it would severely disrupt the process. Plant operators would know that biosolids quality may be comprised and would take appropriate action.

Are federal and state regulations adequate and are they enforced? (See page 7, paragraphs 5 & 6.) TAC claims that the federal and state regulations governing biosolids recycling are inadequate to protect public health and the environment. The National Research Council report (1996) quoted above does not support TAC's opinion, nor does the recent July 2002 report of a second National Research Council review, which found "there is no documented scientific evidence that the Part 503 rule has failed to protect public health. However, additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids" (National Research Council, 2002).

While there has been criticism of the U.S. EPA oversight and enforcement of biosolids programs on a national level (National Research Council, 2002; EPA Office of Inspector General, 2002), this is a moot point in Maine due to the Maine DEP's oversight of the biosolids program. The State of Maine has a strong regulatory and oversight biosolids program that includes stringent testing requirements that go far beyond federal requirements and include screening for more than 575 priority pollutant chemicals as part of its very strict standards. Maine DEP has staff in each region, obtains data on quality and quantities of biosolids produced and where they go, and maintains an active database of this information. In addition, bulk biosolids can only be applied with a nutrient management plan overseen by another agency, the Department of Agriculture (DOA). Both Maine DEP and DOA staff and information are as available to any citizen as much as they are available to those working in the field of biosolids management. By contrast, the U.S. EPA has only one staff person dedicated to biosolids oversight for the entire northeastern portion of the U.S. and less stringent chemical quality standards than the State of Maine.

Doesn't it make sense to reduce any trace toxic contaminants at their source, keeping them out of wastewater? (See page 8, paragraph 1)
Yes. The TAC report notes "because sludge contains toxic chemicals and other pollutants, the best solution to our sludge problem is reducing these contaminants at their source." Wastewater treatment and biosolids managers agree whole-heartedly with this principle, which is the foundation of industrial pretreatment and pollution prevention programs. However, it is important to understand that even pure human waste and native soils contain many of the contaminants of concern found in biosolids (e.g. aresenic, lead, copper, zinc, dioxin). Under the Federal Clean Water Act of 1982, publicly-owned treatment facilities with industrial inputs are required to create and enforce industrial pretreatment programs. The purpose of the programs is to eliminate the discharge of toxic compounds in quantities that would adversely affect the wastewater treatment process, effluent quality, or the qualtiy solids produced from the treatment process (sludge). Industrial pretreatment and pollution prevention programs have been hugely successful in reducing discharges of heavy metals and toxic organic compounds. During this same time, industry has reduced the quantities of toxic compounds in commercial products. The net result is much lower levels of these compounds in sewage sludge today than 20 years ago (Stehouwer et al. 2000, Logan 1997).

It is important to note that industries that traditionally discharge larger quantities of toxic compounds were generally required to install industrial wastewater treatment plants and were not allowed to connect to municipal wastewater treatment facilities. Many of these industries have been highly successful in modifying their production processes to reduce or eliminate discharge of toxic compounds. In Maine, one of the big success stories is the paper industry, where emissions of dioxins and other chlorinated organic compounds have decreased due to substitutions for chlorine in the bleaching process.

What is the history of biosolids recycling? (See pages 10 & 11.)
The simplified history of wastewater treatment and biosolids recycling presented in the TAC report is grossly inaccurate. While there were certainly numerous cases of excessive toxic discharges to municipal wastewater treatment facilities, the TAC inaccurately characterizes the levels of harmful chemicals found in the average wastewater in the 1970s and ignores the extensive progress made under industrial pretreatment and pollution prevention in the 1980s and 1990s. Even in the mid-1900s when immodest dumping of chemical wastes was more common, sewage sludges did not generally contain chemicals at levels which would be harmful if utilized according to current regulations.
EPA did not restrict the land application of biosolids during the 1970s and 1980s, as TAC claims. On the contrary, many long-standing biosolids recycling programs began in the late 1970s and have continued to the present day (the City of Milwaukee has been almost continuously producing Milorganite fertilizer since 1927!). Maine was composting and land applying biosolids since the early 1960s, and continues to do so widely, recycling over 70% of the annual generation, or 85,000 tons per year. In fact, the material is used so broadly that in 2001, Maine Governor Angus King was involved in the use of biosolids compost to improve the grass on the back lawn of the Blaine House (the Governor's mansion) in Augusta.

Ocean dumping of sewage sludge did result in reduced biological activity and die offs in the immediate vicinity of discharges (e.g. near the end of discharge pipes). Wastewater treatment facilities are created and operated in order to avoid this scenario. The same nutrients and organic matter that cause problems in natural water bodies are exactly the materials in treated sewage sludges that make them

valuable as fertilizers and soil amendments. Farm fields and soils are the right places for these nutrients and organic matter, which is why the EPA chose, in the 1980s to encourage the beneficial use of biosolids on land and why today there continue to be interagency agreements between EPA, USDA, and the Food and Drug Administration that support the recycling of biosolids.

The TAC report's history of biosolids ends with sweeping statements intended to suggest a conspiracy to allow something "hazardous" to be foisted on the public. Municipal wastewater treatment facilities are operated and managed by dedicated public employees and private contractors working to protect public health and the environment. It is unfortunate for the TAC to imply that the same people that have overseen the clean-up of our nation's waters would be motivated to dupe the public about the quality of biosolids. As noted previously, no federal or state agency considers biosolids a hazardous material. The creation of the federal biosolids regulatory program has been a steady advancement over 30 years of understanding based on scientific research regarding the risks and benefits of applying these organic materials to soils.

Aren't sludges pollutants?
Sludge is a pollutant only insofar as the components that make up sludge (primarily nutrients and organic matter) can adversely impact the health of aquatic environments, if they get into the water Wastewater treatment plants are designed to remove such "pollutants" (sugars, starches, proteins, nutrients and organic matter derived from human wastes, as well as sand, soil, and other solids in wastewater, and trace chemicals) in order to discharge a clean water suitable for fish, wildlife, and recreational uses. The by-product of this water reclamation process is sewage sludge. Sludge is a pollutant in wastewater in the same way that cow manure is a pollutant when discharged to a surface water.

The nutrients and organic matter in the sludge, that, if not removed from the wastewater, would negatively impact water quality, are an ideal soil amendment for farmers trying to improve long-term soil fertility. Properly regulated and applied, the nutrients and organic matter in sludge should be returned to the land, not thrown away. This philosophy is the basis for extensive public policy which encourages beneficial use. In fact, even the Organic Materials Review Institute supports the use of land application of biosolids in conventional agriculture (OMRI, 1998).

How are biosolids managed and marketed? (See pages 11 & 12.)
The TAC report claims "municipal water treatment facilities depend upon corporate sludge brokers to dispose of their sludge." It is true in some parts of the country, and to some extent in Maine, that municipalities contract with private firms to manage their biosolids recycling programs. At the same time, in Maine there are many municipalities that manage composting or land application programs in-house, and do so using the same kinds of practices. No matter who manages biosolids, they must be managed in accordance with the same strict state and federal regulations, and the potential risks and many benefits are the same, either way. Management in-house has the benefit of involving the municipality more directly in discussions with farmers and their communities and can be more efficient by removing a "middleman." On the other hand, having biosolids managed by a private firm that manages many biosolids products takes advantage of specialized expertise, especially where biosolids are used in the agricultural sector. Thus, biosolids management companies often have agronomists and soil scientists on staff—experts that most municipalities do not employ. Finally, biosolids management is no different from any other service that a municipality must complete either

through in-house programs or out-sourcing, such as snow plowing or construction of new town buildings or book-keeping.

"To dispose of it [biosolids], these private corporations convince farmers and landowner across the country to spread sludge on their fields as a nutrient supplement for their crops." This statement implies that farmers who choose to use biosolids are being hoodwinked. TAC has no documentation to back up this ridiculous claim and exposes a negative bias with regards to the agricultural community. Research and experience have clearly shown that biosolids improve soils, much as manures and composts do, by increasing organic matter content, improving water holding capacity, reducing erodability, and providing slow-release nutrients (National Research Council, 1996; Dowdy et. al., Estes and Buob, 2001; Northwest Biosolids Management Association; Water Environment Research Foundation, 1993; Moss, et al, 2002). Biosolids provide these benefits at low cost and with a recycled material. Simply stated, our farmers are excellent stewards of the land and are not foolish about how their land is fertilized and taken care of.

Can "everybody win" in a biosolids recycling program? (See page 11, bottom.)
The claim that everyone can win in a biosolids recycling program is correct. Biosolids recycling close to a wastewater treatment plant is an efficient operation, which makes it cost less than other options (e.g. disposal at a distant location, which requires consumption of fuel for trucking). Recycling is, and should be, a win-win situation. TAC is wrong to suggest that the low costs that farmers incur by using biosolids indicate something bad for the environment; low costs reflect efficiencies, including reduced consumption of fossil fuels, reduced consumption of expensive landfill space, and true financial benefits to farmers—sometimes over $100 per acre in reduced fertilizer costs—from the nutrients in biosolids.

Are farmers paid to receive biosolids? (See pages 11 and 12.)
In Maine, no end users are paid to receive biosolids.

Class B biosolids are typically used by farmers as a low cost source of nutrients and organic matter. The material is usually provided at no charge, but the farmer has to commit to receiving it and managing it in accordance with availability and regulations and best management practices; in other words, using biosolids requires work on the part of the farmer, just like any other fertilizer or soil amendment.

Class A compost and related products are sometimes used in farming applications, but the vast majority is typically sold to landscapers, contractors, nurseries, and distributors. Due to the refinement of the product and its wide array of applications, it typically sells for $3 to $20 per cubic yard, with the price reflective of the final end product quality (maturity, screening, etc.).

Who pays whom for biosolids? (See page 12.)
The TAC report claims "the sludge brokers walk away with the disposal fees from the treatment facility." This statement vaguely refers to the fact that in many places, including Maine, public wastewater agencies select, through open public bidding processes, private contractors to manage their biosolids. Because biosolids management is highly regulated and requires permits and other entitlements, it costs money. Wastewater treatment agencies that manage their own biosolids (e.g. Ogunquit, Old Orchard Beach, or, in part, Lewiston-Auburn) incur these costs in-house. Wastewater

treatment agencies that contract out these biosolids management requirements pay for them to be completed. The contracting process is competitive and the marketplace usually ensures the best value to all parties involved. The management of biosolids costs public agencies money, sometimes paid to contractors, because the inherent value of biosolids—e.g. the nutrients and organic matter—is not high enough to cover all of the costs of managing them. Currently, recycling is often, but not always, less expensive than disposal because recycling takes advantage of the valuable components in biosolids.

In Maine, costs to land apply Class B biosolids range from $40 to $60 per ton, including the fees paid for site management and other contracted services. As the TAC report notes, landfill tipping fees (the fee paid to the landfill operator, which does not include trucking costs) are $70 or more per ton.

A second way sludge is marketed is by composting or pelletizing it. Then it can be sold as compost or fertilizer. Many wastewater treatment agencies choose to treat their biosolids in this way, to Class A standards, reducing pathogens to trace background levels. In Maine, this is done mostly by composting. The Hawk Ridge composting facility in Unity, operated by New England Organics, a division of Casella Waste Management, is New England's largest private composting facility. It processes sewage sludges from more than 20 Maine communities. Lewiston-Auburn and several smaller Maine towns compost their biosolids in-house at local facilities. Depending on the final quality of the compost (particle size, nutrient and organic matter content, pH, color, stability, etc.), these Maine compost products are sold, mostly in bulk, at prices ranging from $3 to $20 per cubic yard (with trucking added to the cost).

Pelletizing, which is done in heat dryers, is a process used in other states, including at the Massachusetts Water Resources Authority in Boston and in Milwaukee, where the fertilizer Milorganite is produced. In Maine, such pelletized biosolids are mostly sold in bags in hardware and garden stores.

What about liability? (See page 12.)
Federal and Maine state regulations are clear in placing the burden of responsibility on the biosolids generator or treatment plant for full compliance during and after biosolids land application. The regulations state that "Any person who prepares sewage sludge (biosolids) shall ensure that the applicable requirements in this part [Part 503] are met when biosolids are applied to the land…" For every load of biosolids that is recycled, wastewater treatment plant personnel certify to U.S. EPA, with signed statements, that they meet the regulatory and quality control standards for land application. At the land application site, the biosolids applier monitors operations and certifies that the application meets all regulatory standards. Enforcement of these certifications is backed up by the power of the Clean Water Act that assigns criminal and civil penalties for not meeting these standards.

Using biosolids on farmland in accordance with the federal Part 503 of the Clean Water Act regulations is widely understood by federal and state environmental and agricultural agencies, as well as lenders and insurers, as similar to the application of fertilizers and animal manures. Thus, farmers, landowners, leaseholders, lenders, and biosolids generators are excluded and protected from liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA imposes liability for cleanup on persons who own or operate facilities at which hazardous substances are released. Biosolids are not considered hazardous by any state or federal agency.

Liability is a major concern of financial institutions that lend money to farms. Farm credit banks in New England accept biosolids applications on farms they lend to, so long as all regulations and best management practices are followed and farmers are indemnified in any case where biosolids or a sub-standard sewage sludge are not properly applied. Most states, including Maine, require written and signed landowner permission for the use of biosolids and lending institutions require written and signed agreements between the parties involved in the biosolids land application program.

Protecting against potential liability from any farming practice is an important aspect of a farmer's risk management program. Farmers and food processors face potential liability for compensatory and punitive damages under common law for a broad range of problems that might occur throughout the life cycle of their farm and products—including through the use of biosolids. Farmers and their farm credit lending institutions are most capable of assessing all such general liability concerns, including biosolids use.

What are the groups that support biosolids recycling? (See page 12, paragraph 5.)
The TAC report mentions several wastewater and biosolids groups. These non-profit professional membership associations all provide technical support and information exchange to members and others interested. They are similar to trade associations that exist in every profession. All of them respond to issues and concerns when they arise, providing accurate information. NEBRA is described at the beginning of this document; more information about it can be obtained at www.nebiosolids.org.

The Water Environment Federation (WEF) is the world's largest organization dedicated to water quality and includes many of the world's leading environmental engineering and water quality experts, including scientists, engineers, researchers, and other professionals. WEF publishes wastewater treatment technical information that is relied on around the world and produces critical technical conferences on current wastewater management concerns, including the nation's leading annual biosolids management conference. For more information, see www.wef.org.

The National Biosolids Partnership (NBP) was formed and funded by the U. S. Congress (see www.biosolids.org for more information). It is composed of three partners, WEF, U. S. EPA, and the Association of Metropolitan Sewerage Agencies (AMSA). Its main purpose is to develop a national Environmental Management System (EMS) program for biosolids. EMSs are used in private industry, and increasingly in the public sector, as management tools that ensure continual improvement and higher quality processes with respect to environmental values. The NBP EMS program has been created and is currently being pilot tested in more than 48 communities across the nation. Lewiston-Auburn is a Maine community already committed to creating an EMS as part of the NBP program. The voluntary NBP EMS program involves going beyond mere compliance with state and federal regulations; it ensures that there is constant improvement in a biosolids management program and requires public participation and independent audits of biosolids production and management, thus helping ensure ever-higher-quality processes and reduced environmental and nuisance impacts.

What about pathogens in sewage sludge? (See page 14.)
Pathogens are microorganisms that, in humans, can cause diseases. There are pathogens everywhere in us and in our environment, but higher levels are found in human wastes and manures. Land application of human wastes and manures is a time-tested, natural process for returning nutrient-rich

organic matter to the soil, but in order to safely complete this recycling loop, the possibility of pathogen transmission to humans and animals from land application must be addressed.

Maine and federal regulations require pathogen reduction in any biosolids that are to be recycled. The strictest pathogen treatments, those that meet "Class A" standards, eliminate pathogens to levels comparable with soil background levels (this is most commonly achieved by composting). "Class B" biosolids have been treated to reduce pathogens, but some remain; these biosolids can only be used at individually permitted sites at which public access is limited. Eventually, all pathogenic organisms die in the environment through exposure to sunlight, competition, etc. EPA determined that the use of Class B biosolids at sites with limited public contact involves no greater risk from pathogens than the use of Class A biosolids.

The TAC report calls for all biosolids "to undergo the strictest pathogen reduction method available." The authors are apparently unaware that over 60% of the biosolids recycled in Maine do undergo treatment and certification to Class A standards and do not exceed soil background levels for pathogens. The balance of material recycled in Maine is treated to Class B standards and can only be utilized on sites individually permitted for such use and considered low public contact sites (e.g.farms and gravel pit reclamation sites).

The TAC report, like similar reports, chooses to emphasize all the potentially scary pathogens that have been found in biosolids. The fact is, these same organisms are found in many parts of our daily environments and, while biosolids should be managed to prevent the risk of spreading pathogens to potential receptors, it is inaccurate to suggest that the mere presence of any pathogens in biosolids should preclude the material from being recycled. If this same logic were followed for all soil amendments, no animal manures would be allowed to be used to fertilize agricultural land. The consequence of such a policy would be a diversion of all manures to landfills and a shift towards using more chemical fertilizers for food and feed production. This would be completely counter to the tenets of sustainable agriculture.

Another bit of context: animal manures contain many of the same pathogens as biosolids and often in much higher concentrations than are found in biosolids. For example, although ubiquitous in the environment, fecal coliform is an indicator pathogen which is regulated in biosolids. Class A biosolids must have less than 1000 colonies/gram for distribution. In practice, most Class A biosolids products test non-detect for this and similar pathogens. However, uncomposted cow manure typically has over 5,000,000 colonies/gram (WERF, 2002)! While animal manures have been responsible for well-documented disease outbreaks and even deaths (e.g. Walkerton, Ontario in 2000; and in the mid-1990s, a child in Maine died from bacteria ingested on manure-contaminated lettuce), with regards to the U.S. biosolids recycling program, the National Research Council found in its July 2002 report, "There is no documented scientific evidence that the Part 503 rule has failed to protect public health." The NRC report did note, however, that "additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids." There continue to be concerns voiced and research should continue. Still, the finding of no documented evidence of any failure to protect public health is very significant, especially in light of the fact that biosolids recycling has been going on for decades and currently involves the application of over 6 million tons per year in the United States.

What about dioxins in biosolids? (See page 15.)
Biosolids contain dioxins. So do soils, other soil amendments such as manures and composts, and food This group of persistent toxic chemicals is found in tiny amounts throughout the environment. In Maine, the major source of dioxin is aerial deposition from burning activities both in and out of state. EPA has determined that back-yard trash burning is a significant source of dioxin. So are municipal waste incinerators and medical waste incinerators. Dioxin goes up in the air and falls across the landscape. When applied to soils, dioxins in biosolids remain strongly bound to the biosolids and soil particles, just as most trace metals do.

Because of concerns about dioxins in soils, Maine became one of the first states in the nation to adopt a regulatory standard for dioxins in biosolids. Maine's standard is effectively 27 parts per trillion (ppt) TEQ. EPA had proposed a limit on a somewhat larger group of dioxins and related compounds of 300 ppt TEQ, but the agency is now considering whether or not dioxins pose enough risk to even bother regulating. The trace levels of dioxins in biosolids are considered far less common and likely to impact human dietary intake in comparison to common background levels and other sources in foods.

Levels of dioxins in Maine biosolids are generally below 10 ppt TEQ (Maine DEP, 2001). By comparison, North American soils uncontaminated by known sources of dioxin (i.e. background soils) have been found to have an average dioxin concentration of 8 ppt (USEPA, 1994). Leaf and yard waste composts, not containing biosolids, have been demonstrated to have a range of 5-91 (Malloy et. al., 1993). Therefore, since biosolids, once they have been applied, comprise only a small portion of the total soil mix; any change in the level of dioxin is small, if it is measurable at all. As with pathogens, the TAC report seems to suggest that the mere presence of dioxin should preclude the land application of biosolids. Were this logic applied across the board, almost all organic-matter based soil amendments would be precluded from land application. This policy is neither justified, nor sensible relative to long-term soil quality.

Can what we don't know about biosolids hurt us? (See page 15.)
Because biosolids are generated from wastewater, which is inherently an impure and somewhat variable source, there will always be at least a small level of uncertainty about biosolids quality. However, biosolids around the world have been tested for a wide variety of trace chemicals and analyses have been made about the potential fate and impact of hundreds of trace contaminants. Is there still more research that could be done? Yes. But research and understanding to date have addressed the most significant potential problems of chemicals in biosolids and have established regulations and understanding that assure us that these contaminants present negligible, if any, risk to public health or the environment.

It is easy for TAC to echo other critics of biosolids recycling and hypothesize numerous "what ifs," but they present no scientific evidence to support their sweeping statements, whereas a considerable volume of research and experience suggests that it is highly unlikely that any significant negative surprises will be discovered in the future. These same "what ifs" could be applied to manures (pathogens, metals, excessive nutrients, trace organic compounds such as dioxin, pharmaceuticals, endocrine disrupters), but, as a society, we continue to recycle these wastes, because we know the benefits to soil fertility outweigh the minimal potential risks--and because of necessity.

It is important to note that the collection of sludge from wastewater treatment plants, and manure from livestock operations, is a consequence of keeping water clean. The management of the resulting by-products for any of these materials can present us with several "what ifs". What is known, is that if we choose disposal, the "what ifs" related to the concentration of these wastes in a landfill are many, and the benefits to soil fertility from these materials are lost.

"Where do these toxics come from?" (See pages 15-16.)
TAC's report grossly oversimplifies the picture of wastewater creation and treatment. First, wastewater is almost entirely water. Secondly, the greatest percentage of pollutants in wastewater is organic matter, sediment, and dissolved sugars and starches from human waste and food.

Third, TAC quotes a New Hampshire Sierra Club source regarding allowable monthly discharges of 33 pounds of "hazardous wastes" to sewers by anyone. This reference is apparently from the limit for reporting to the Toxics Reporting Inventory (TRI), an EPA system that requires industries to report discharges of all listed hazardous wastes. TRI information is routinely made available to the public through the EPA website. This threshold does not release an industry from reporting the discharge of any compound that has the potential to adversely affect the wastewater treatment process or the quality of the resulting solids. The 33 pound threshold for the TRI is based on the expected impact of such a discharge.

Although 33 pounds may sound like a lot, consider the impacts of this on the quality of a typical biosolids. As an example, assume an industry discharges 33 pounds of pure lead per month and that all of the lead ends up in sludge at the wastewater treatment facility (an unlikely and probably illegal situation). A small city might produce about 1,000 wet tons of biosolids each month; in dry weight, that would be about 200 dry tons or 400,000 dry pounds. The 33 pounds of lead added to the wastewater ends up being 33 parts in 400,000 parts or 82.5 parts per million lead. Risk analysis and research has helped set the U.S. EPA exceptional quality and the Maine limit of lead in biosolids at 300 parts per million. Recent data (Maine DEP, 2002) show that Maine biosolids average about 61.5 parts per million.

Finally, TAC's mention of the Toxics Release Inventory raises another important issue—that TRI data clearly shows that significant amounts of potentially harmful chemicals are reported as released to wastewater treatment plants. TAC and others assume that many of these "toxics" end up in biosolids. But TRI requires reporting of many chemicals that have little or no impact whatsoever on biosolids quality. For example, a randomly chosen TRI report for 1998 in New Hampshire shows nitrate compounds alone total 248,000 out of 358,000 total pounds discharged to wastewater treatment plants and reported. Another 10,000 pounds is ammonia, another nitrogen compound. So more than 70% of the TRI report results in an improvement in biosolids quality—nitrogen compounds that help grow plants. Another 56,000 pounds—16%--are ethylene glycol (antifreeze) and glycol ethers that readily biodegrade in water and soil environments (this means these chemicals are food for microorganisms).

Thus, despite the claims of TAC and others, trace chemicals in wastewater and biosolids are not horribly out of control. Industrial pretreatment and pollution prevention programs are working and wastewater treatment facilities can manage relatively small amounts of potentially harmful chemicals—it all depends on what it is. The state and federal regulatory limits focus on those potential toxics that can make a difference in the safety of recycling biosolids. Several studies investigating the

chemical quality of biosolids over time have demonstrated that the level of potentially toxic materials, such as cadmium and lead, have decreased significantly since the advent of industrial pretreatment programs. A national survey indicated that the concentrations of cadmium and lead in biosolids decreased by 60% and 34% respectively from 1988 through 1996 (Logan, 1997). A more intensive study of Pennsylvania biosolids found similar decreases in trace metal concentrations (including cadmium, lead, chromium, nickel, copper and zinc) in biosolids from 1978 through 1996 (Stehouwer et. al., 2000).

TAC's argument about biosolids recycling is summed up in the sentence: "Any of these chemicals dumped down the drain could end up being spread on a farm field or in a forest." It's just not that simple—the sewer pipe does not go straight to the farm field or forest. Wastewater and biosolids treatment processes significantly change the character of incoming material and degrade most organic compounds (Morin and Switzenbaum, 1993). Chemicals vary greatly in how they behave, how and when they degrade, and what potential impacts they have to public health and the environment. Maine DEP requires testing for priority pollutants and other compounds to ensure that the levels in biosolids are safe.

TAC may want to envision a world where no toxic chemicals exist or are used by people, but nature produces many toxic chemicals and we have to use chemicals throughout our daily lives, many of which are human-made. Fortunately, most of the commonly used chemicals that might be present in wastewater have no impact on biosolids quality.

Specifically, how is "sludge" regulated and permitted in Maine? (See pages 24 – 27.)
Much of the information about Maine's regulatory structure provided in the TAC report is accurate. However, here is additional clarification of several points of interest:

Maine requires that every biosolids that is to be recycled first have a Sampling and Analysis Plan (SAP) specific to the facility generating the biosolids. The SAP must be approved by the Maine DEP prior to allowing any use of the material. Based on a review of the plant, data submitted, and a variety of other factors, the DEP dictates the biosolids SAP to the generator. As part of this review, the DEP can require screening for over 575 compounds and elements to ensure proper characterization of the material. The final SAP stipulates a monitoring program that the wastewater treatment plant must follow, including analytes tested, sample frequency, and test methods used on the samples. The SAP is structured to provide a statistically valid sampling of the biosolids product as part of its overall beneficial use program.

In addition, biosolids producers must file regular reports (typically quarterly) to the DEP that must include, among other items, detailed testing records in accordance with the SAP. This data is reviewed by the DEP to ensure compliance with the overall Program Approval. While one or two random tests of the biosolids from a particular treatment plant does not provide much confidence about the quality of the material, when scores of test data from many years are evaluated, it is possible to be quite confident about the quality of Maine biosolids (New England Biosolids and Residuals Association, 2001). Even though there is some variability in the test results, overall, biosolids quality does not tend to vary much. This is because sewage sludge is produced through processes that involve a great deal of mixing over several days or weeks of treatment. MWWCA, NEBRA, or DEP staff can provide extensive information about the quality of Maine biosolids.

Finally, given the TAC's interest in trace metals standards, the following information on the low average trace metals levels in Maine biosolids may provide some perspective as to how insignificant trace metals are as an issue in Maine.

Trace metal (all data in mg/kg)	Maine average of 10 facilities, as reported in 1999	Maine ceiling concentration	U. S. EPA Part 503, Table 3, Exceptional Quality Biosolids	Background Soil Average	Background Soil Maximum	
Arsenic (As)	6	41	41	7.40	73	
Cadmium (Cd)	3	39	39	0.37	1	
Chromium (Cr)	17	3000	no standard	30	140	
Copper (Cu)	310	1500	1500	23.3	237	
Mercury (Hg)	1	10	17	0.003	0.4	
Molybdenum (Mo)	13	75	no standard	0.79	15	
Nickel (Ni)	19	420	420	18	72	
Lead (Pb)	50	300	300	17	75	
Selenium (Se)	2	100	36	0.45	3.9	
Zinc (Zn)	419	2800	2800	68.5	153.4	

- "Background Soil Average" means the estimated arithmetic mean of actual soil samples. For all metals except arsenic, molybdenum, and selenium, the sample results are based on 1990-1994 reports from land application site operators in Maine, based on soil samples collected in Maine agricultural fields. For arsenic, molybdenum and selenium, the sample results are those for the Eastern United States by Shacklette and Boerngen, USGS Report #1270, 1984.
- "Background Soil Maximum" means the maximum reported value in soil. Sample results obtained from sources referenced above for Soil Average.
- "Maine Screening Standard" means the screening standards for sewage sludge in Maine DEP regulations 06-096 CMR Chapter 419, table 419.3.

Were Maine trace metals standards changed to encourage more out-of-state biosolids to come into Maine? (See page 26, side-box.)

TAC's assumption that the 1999 adjustment of regulatory numerical standards for biosolids was done to intentionally "allow more toxic out-of-state sludge to be spread on our lands" is false. State and

federal regulations are built on risk assessments and the best current scientific understanding possible. There is no evidence that DEP made changes for any other reason than to apply the most reasonable, scientifically defensible regulations possible, and there is no evidence that the changes have had any impact on biosolids coming into Maine. In fact, in recent years Maine has been a net *exporter* of biosolids and biosolids based products. For example, several treatment plants use out of state compost facilities to manufacture Class A compost. Furthermore, a significant amount of Class A compost, manufactured in Maine, is shipped to more profitable end use markets in the greater Boston area (over 40,000 cubic yards in 2002).

What about local input, oversight, and local control of biosolids land application? (See pages 27 – 28).
The best biosolids programs involve strong communications among all stakeholders, including farmers/landowners of biosolids recycling sites, neighbors, local town officials, the biosolids manager, and the wastewater treatment facility operators. Separate, but equally important to the process, are state (and federal) regulators who have ultimate permitting, oversight, and enforcement authority in Maine.

Neighbors to biosolids land application sites have legitimate questions and concerns that need to be heard and addressed. Local officials need to be well informed about projects so they can answer questions that citizens bring to them, or they can at least know who to call. There needs to be time and many different opportunities for neighbors and other community members to learn about biosolids recycling. At the same time, farmers and other biosolids product end users often have planting and harvesting schedules that don't wait, which is why some of the comment periods for biosolids permits and notices are short.

Biosolids managers in Maine are generally glad to work constructively with site neighbors and interested citizens and town leaders to address real concerns, provide information, and receive feedback. We encourage working in a joint-problem-solving mode, rather than an adversarial role. We encourage towns to adopt ordinances that allow biosolids recycling, that do not create roadblocks, but that do ensure that there is local oversight and local input so that local citizens can be well-informed and confident that someone they know is watching to make sure the local biosolids recycling program is being done right. Biosolids managers welcome that oversight! The Maine DEP has recently issued the *Guidance for Municipalities* on the regulation of septage and biosolids land application by municipalities to assist communities in this effort.

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