Comments to NYS DEC regarding Proposed Revisions to Part 360 Rules

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On behalf of:
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Thank you for this opportunity to comment on the proposed revisions to the Part 360 Rules. Many of us have eagerly awaited these revisions. We are pleased that the department has persevered and has been able to bring them forward. In our work we have become familiar with programs in many other states, and we believe that the NYS DEC has a progressive program for the management of organic residuals of which it should be proud.

These revisions have been in the works for many years. Because this is a dynamic field, we would hope that DEC will undertake more frequent reviews and revisions as technology and knowledge changes.

As the Land Grant University for NYS, many of the faculty in the College of Agriculture and Life Sciences at Cornell have substantial knowledge and interest in the issues which these regulations address. Some of us have been in contact with DEC staff over the past several years to discuss some of these issues. We are disappointed that much of what we discussed and presented did not find its way into the proposed revisions. We are particularly surprised that the expertise at Cornell was not tapped by DEC in developing a proposed standard for molybdenum. Potential impact on dairy cattle is the primary concern for molybdenum added to NYS soils. Since dairy is the major agricultural industry in NYS, ensuring that the health of that industry is protected by these rules is of major importance. Recognizing the importance of this issue for NYS agriculture, several of us have been engaged in research pertaining to the relationship between sludge use and molybdenum in soils and crops. We would welcome the opportunity to work with DEC on this and other aspects.

Please feel free to contact me if I can be of assistance in clarifying any of these comments or in otherwise providing any assistance.

Sincerely,
Ellen Z. Harrison

There are many aspects of the proposed rules that we support. These include:

Establishment of cumulative limits that are appropriate for preventing phytotoxicity. The limits for the phytotoxic elements Ni, Cu, and Zn in the proposed rules are similar to those suggested in the 1985 NE guidelines document out of Penn State. (We are incorporating that document into the record by this reference. We believe that DEC

already has a copy, but if not, we would be happy to provide a copy.) Those recommendations represent the views of many soil and crop scientists, and, in particular, address Northeast conditions.

Requirements for soil testing. The concentrations of a contaminant in soil is the concern for a number of the regulated contaminants. Thus measuring soil concentrations rather than relying on calculations based on loading, and on fate and transport is desirable. The requirement in the proposed rule for soil testing at land application sites is a step in the right direction, although it is not clear how these data will be used. In the future, for both these rules and other DEC programs, we suggest that soil quality criteria and standards be developed.

We suggest that the soil sampling as proposed, one composite sample representing 50 acres, is too coarse a sampling scheme to provide adequate information. In developing certified nutrient management plans, it is a requirement that the recommendations for soil sampling published by the state's land grant university be followed. The recommendations from Cornell are to take 15-20 subsamples from each area that differs in cropping, soil, or past management. This area is usually no larger than 5-10 acres due to the variability caused by soil forming processes and human practices. Soil testing should include the agronomic series (nitrate, pH, K, P, Ca, Mg, Zn, and soluble salts). These tests are inexpensive and would provide information that could help assess the agronomic rate of application. Recently collected data on fields to which N-Viro was applied showed large variation in the concentration of measured parameters (pH, Mo, and other metals) indicating uneven application. Thus 1 sample/50 acres would not provide meaningful data.

Requirements for monitoring of organic chemicals. The proposed required testing of materials for some organic chemicals is an important step, particularly since sludges and some other organic residuals contain inputs from industrial sources that may include toxic organic chemicals. Discharges from homes and streets that enter sewage systems may also convey these types of contaminants. Since these chemicals are not regulated and thus not monitored in sludges, we lack the data needed to consider whether they may be present in sludges. These data are a necessary step prior to considering whether they may be there in concentrations that represent a potential risk to health or the environment. There is a need to monitor sludges for organic contaminants, especially since many are preferentially deposited into the sludge rather than remaining in the wastewater.

As proposed, however, we are concerned that the list of chemicals is not particularly suited to address the chemicals that are potentially found in sludges. The nature of the wastewater process is such that we do not expect to see volatile chemicals concentrate in sludges, whereas those with an affinity for organic matter will be preferentially deposited in the sludges. We suggest that the list of chemicals be revised to include persistent, bioaccumulative, lipophilic organics. There are some data generated in Europe and Canada where screening of sludges has taken place. (We are incorporating these into the record, by reference to them. However, since they are long documents, we are not sending a copy at this time, but would be pleased to provide these if they are not already available to you) While there may be some differences between those sludges and what might be expected in NYS, a review of those studies would assist in the selection of chemicals to potentially be monitored. Some recent research in the US has demonstrated the presence of surfactants (Laguardia, Hale – appended). Of particular concern are those

based on nonylphenols because they are estrogenic, present in high concentrations in sludges, and their degradation products are more toxic than the parent compounds. Brominated flame retardants have also been detected in sludges (Laguardia, appended). The penta forms are of particular concern due to their bioaccumulative and persistent nature. Levels in breast milk are rising. We would also suggest that the DEC urge the USEPA to do a new survey of sewage sludges since the 1988 survey (the last relatively comprehensive survey) is out of date and used methods inadequate to detect a number of chemicals.

Requirements for incorporation of sludges. This is especially important in light of the numerous incidents around the US in which neighbors of some Class B application sites are reporting illness that may be associated with airborne contaminants and pathogens. Unfortunately there have been no systematic investigations of any of these incidents, so it is not known what conditions may lead to problems. It would seem reasonable to suggest that incorporation would be helpful, although the methods and timing of incorporation may be important to minimize launching of contaminants and pathogens into the air.

The requirement with respect to incorporation should be extended to a prohibition on application to pastures. Ingestion of lipophilic toxic organics by grazing animals and the subsequent transfer into milk and meat is the most significant potential health concern associated with these chemicals and application of sludges. Since these chemicals may be present in Class A products regulated under section 360-5, this same prohibition should be extended to sludge products as well as direct land application. Many countries do not allow pasture application. This prohibition would also limit the potential for transmission of diseases to grazing livestock from Class B materials. It seems inconsistent in the draft regulations to have an incorporation requirement while at the same time allowing animals to graze after 30 days. If it is not surface applied to pasture, it is hard to conceive of such a grazing scenario. The National Research Council (1996) called into question the adequacy of the 30 day restriction.

Setbacks. Requiring setbacks for land application from watercourses, residences, wells etc. is appropriate. It is not clear that the proposed distances will be protective, but they are at least an attempt to protect neighbors and the environment.

Label requirements. The ability of consumers to readily obtain information about products is important and we strongly support this requirement in the proposed rules. The label would presumably state that sludge derived products can not be used on food crops unless specified waiting periods are observed.

Explicit requirements for out-of-state products. Creating a level playing field for all products sold or used in NYS is highly appropriate. Consumers should be assured that all products sold in NYS meet the same standards. We thus support extending to out-of-state products the same requirements as for products manufactured in NYS. For products such as Milorganite which are sold in garden stores in NYS, we assume that if the proposed rules are adopted, that unless the product has been stored for the waiting periods specified, the bag would have to state that the product cannot be used on food crops.

Prohibition against the use of cement kiln dusts from facilities that burn hazardous wastes. The potential for these dusts to contain higher levels of toxics than other dusts makes it prudent to exclude them from land application.

There are several aspects that we believe should be revised.

Molybdenum

Summary: The proposed 52 ppm concentration limit would pose a potential threat to NYS livestock. A significantly lower limit as well as a cumulative limit is warranted.

We have been conducting research on molybdenum levels in soils and uptake of Mo into crops, and have looked at the potential impact of Mo on dairy cattle nutrition. This work suggests the need for significantly tighter standards for molybdenum in NYS than the proposed 52 ppm. We find that despite significant losses of Mo (presumably through leaching), residual levels of Mo persist for more than 20 years after sludge additions, resulting in elevated levels of Mo in crops grown on the sites. Soil Mo levels of only 2.5 mg/kg were associated with crop levels ranging from 2.6 in corn leaves to 25.5 in soybean seeds (McBride et al., 2000, appended).

The regulatory limits selected will depend on the assumptions made regarding animal diet and uptake, and dietary copper supplements. This is in part a policy determination of whether the goal is to be protective of the average NYS dairy herd, or rather to be more protective, and address those farms which might represent a relatively high level of exposure (higher intake of sludge-amended leguminous forage for example) and/or a low level of herd management. The following discussion addresses some of these considerations.

Cattle are the most sensitive to excess Mo and dairy cattle are the primary concern in NYS. It is estimated that the **average** NYS dairy cow eats approximately 60-70% forage, and that this is about 1/2 corn, and 1/2 legumes and/or grasses. Soybean meal, which contains relatively high Mo (see Chase, appended), makes up about 5-7% of the diet. Other dietary sources are relatively low in Mo. At certain times in the cow's cycle (late in lactation, for example), the percentage of forage may rise to 80-90% and be comprised primarily of legumes (particularly in southern NYS). This may persist for about 1-2 months. Unfortunately there does not appear to be information on the significance of the duration of exposure to high Mo on animal health, so whether there would be significant health or reproductive implications of a month or two of excessive Mo intake (if that forage were from sludge-amended land and high in Mo) is not known. There is an increasing emphasis on grazing versus using imported feed on NYS farms. This is, in part, a move towards balancing the nutrient inputs and outputs as well as a means to address acid problems caused by feeding grains. (Source: Professor Larry Chase, Dept. of Animal Science, Cornell University, 2002, personal communication.) Thus we would project an increasing percentage of cattle diets will come from on-site.

Uptake of Mo into crops varies with crop and sludge type. Higher uptake is associated with legumes and with alkaline sludges. Estimated uptake coefficients (UC) for legumes is approximately 4 according to O'Connor (2001). This value is in reasonable agreement with that calculated by McBride (2000, appended) for red clover and alkaline sludge (4.27). Somewhat higher levels were measured by Stehouwer for alfalfa in fields to which N-Viro type sludge was added (2001, presentation to NE 1001, appended).

The issue with Mo is that it can depress Cu absorption, especially in the presence of S. The addition of sludges tends to increase S and Mo in soils and crops, and while sludge addition may increase Cu in soils, data show that the increased Cu is not reflected as an increased uptake into the crops (McBride et al, 2000, appended). Thus, sludge additions

will tend to decrease the ratio of Cu to Mo in the crops, in some cases bringing the ratio below the 4:1 considered desirable and the 2:1 considered minimal. Since S concentrations are an important determinant of impacts and sludges are a significant source of S, consideration should be given to establishing a standard for S, or at least for monitoring for it.

The National Research Council has suggested that 10ppm Mo in cattle diets is a lowest effect level, so that at lower levels we would expect subtle, subclinical effects (O'Connor et at, 2001, appended). Calculations of expected Mo concentrations in cattle diet show that under various assumptions, a sludge limit of 52ppm would result in dietary intakes of somewhere between 17.6 and 58.5ppm. A spread sheet is being submitted with these comments that poses several alternative assumptions including: 100% or 60% of the diet as forage, 50% of the forage is legumes, 50% is grass, UC for the legumes is 4, UC for the grass is 0.5, sludge concentration is diluted 50% by mixing with soil, no leaching or 50% leaching, the non-forage diet has 1.8ppm Mo. Depending on which set of assumptions one selects, sludge concentrations of 8ppm up to 27ppm would result in dietary intakes slightly below 10ppm.

Reviewing the paper by O'Connor et al (2001) that develops a proposed sludge Mo standard of 40ppm, there are several assumptions made which we question. One is that only 20% of the diet comes from sludge-amended soils. This seems to be based on calculations having to do with how much land is available. For a farm that uses sludge or sludge products, this is not relevant. It is also based on the hypothesis that sludges would be used only once every 3-5 years, which is perhaps the case for some products but not for others. Thus the assumption that 20% percent of the diet is grown on sludged soils is not a reasonable assumption. The paper also emphasizes that where Mo is high, farmers know to supplement diets with Cu. However, farmers would not know about the Mo/sludge issue and so would not be providing more than normal Cu supplementation.

Health-based contaminant limits

Summary: The proposed limits for As, Cd, and Hg in the proposed rules and the lack of standards for any organic chemical are not adequately protective of human health, particularly for the farm family applying sludges and the home gardener. There is no explicit statement of how the proposed standards were developed (are they based on an analysis of risk? or of achievable levels? Or?). If they are risk based, who is the receptor for which risk that is being assessed? We are assuming that the rules would seek to be at least strict enough to achieve an acceptable risk to the farm family.

We recognize and appreciate that the proposed standards for Cd and Hg are more restrictive than those in the EPA 503 rules. However, the proposed levels are still higher than what we believe would provide appropriate protection. . In the risk assessment performed to develop the 503 standards, risks were not summed across the various pathways to which a receptor may be simultaneously exposed. The standards were set such that each pathway was assessed independently. However, the receptor is generally exposed simultaneously via a number of pathways.

The risk analyses on which several of the proposed standards appear to be based do not adequately address the particular risks to the farm family. A discussion of the difference in diet between that used by EPA in developing standards and that relevant to a farm family is used here as an example. The appended analysis of the dioxin risk assessment also addresses the particular risks to the farm family.

Elimination of PCB standard

The proposed rules eliminate the standard for PCBs and allow DEC to set PCB standards on a case-by-case basis. It is not clear why the concentration limit for PCBs were eliminated, nor what basis will be used to set standards if PCBs are detected. The proposed rules require testing for 7 PCB congeners. Why these particular congeners were selected is not clear. Pressure to allow spreading of PCB contaminated materials is likely to increase with dredging of the Hudson. It seems prudent to maintain a standard rather than eliminate it at this time.

Testing and Data Analysis

We recognize and agree with requirements for more frequent testing than that required by EPA for small POTWs. Data indicate that variability is greater for small treatment plants. In large plants, the variation that might be caused by a single discharger's actions is buffered by the large flow from an array of sources. We would thus support more frequent testing of small facilities. We are also concerned that the provision to allow reduced testing after 2 years is not advisable. Users need to have these data.

Managing and reviewing the volumes of data seems to be a problem, given the limited staff at DEC. We suggest that electronic submission of data be required, which could aid in simplifying this requirement.

Some of the test methods specified allow one to choose from several methods, some of which are antiquated. Lead, cadmium, and molybdenum are of concern because the levels can be quite low in sludge yet still be a health concern. The most modern method of SW-6020 is not specified for these pollutants which is ICP-MS based. The ICP-OES method 6010 does not specify an axial torch which allows you to get close to the detection limits of 6020. Also, you can choose to use direct aspiration AA 7130 (for Cd), 7420 (for Pb) or 7480 (for Mo) for these elements which would have a detection limit 10 or more times less sensitive than the ICP methods. For As and Se you can also choose an inappropriate (read high detection limit) method which is 6010 ICP-OES without the axial torch or a hydride method specified. In summary, the rules as they are now written allow you to choose an out of date insensitive method. (Note: ICP-MS designates a mass spectrometer on the ICP whereas ICP-OES is an optical emission detector on the instrument.) We would recommend that insensitive inappropriate methods such as direct aspiration AA and radial torch ICP not be given as a choice for Cd, Pb, Mo, As and Se.

Pathogen testing as proposed retains the use of either Salmonella or E. coli to meet Class A requirements. This provision has been questioned by a number of knowledgeable sources. Beyond the question of whether "either/or" should be allowed, there is a problem with the accuracy of tests to determine compliance (Yanko, et al, 1995). The method for Salmonella specified in the 503 rules are not reliable for ensuring compliance with the standards.

The whole basis on which testing for "indicator" pathogens is based has been called into question (EPA Emerging Pathogens workshop, June 2001, copy sent via email). At this time alternatives have not been developed. We urge DEC to remain at the forefront and to consider modifications to the pathogen testing requirements over the next several years as new developments take place. In the mean time we suggest that the requirement be to meet both E. coli and Salmonella standards.

Frequency of Use/Total Quantity Used.

One measure used by many other countries and Canadian provinces to reduce the overall risk is to limit the amount that can be applied in any one year and/or in a period of several years. This is not based on agronomic calculations, but rather on a precautionary approach, and, perhaps, also as a means to address the concerns of neighbors. We suggest that such a limit be imposed in NYS. An application of 10 tons/acre within a 3 year period might be a reasonable limit.

Recommendations for Municipal Sludge Ordinance/Rules
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Groundwater

The current rules do not take into account current understanding of how contaminants may move through soils. Examples are such processes as macropore flow (rapid movement through holes in the soil created by worms, roots, freezing/thawing, etc.) and facilitated transport (contaminants moving by "tagging along" with other more leachable constituents). Recent research suggests not only that sludge-borne contaminants may leach, but that sludges increase the leaching of pesticides.

The risks to the quality of water in wells in the vicinity of sludge application sites is likely low if recommendations concerning the type of sludge, limitations in amount of sludge applied and sludge quality are followed. If they are not followed, then any wells used for water supply for people or animals within approximately one mile should be tested for pathogens (including viruses), metals and nitrates before biosolids are applied (perhaps funding should be provided so local health can do this), and quarterly thereafter. If tests of the biosolids confirm absence of pathogens, the pathogen testing might be reduced to annual testing.

Proposed Ordinance Provisions:

Ban Class B which has the potential to pose pathogen risks

Everywhere (or at least within 3 miles of occupied buildings including places of employment)

Where there is a need to protect groundwater and surface water resources from pathogens (i.e. Over groundwater recharge areas, within a mile of wells used for drinking water for humans or animals, within watershed in which surface waters are used for drinking water

supplies).

Limit frequency of application and total amount
maximum which may be applied to any land in a period of 3 years is 10 tons/acre.
total amount that may be applied to any piece of land shall not exceed 60 tons/acre.
The proportion of land receiving biosolids shall not exceed ~5% of the watershed of any second order or higher stream.
Prohibit application over significant aquifers or ground water recharge areas.
Prohibit application on lands subject to flooding in a flood event with a 25 year or more chance of occurrence.

Require land applied sludges to meet stricter standards for inorganic elements than 503 Table 3.
Limiting the concentration in the final soil is the goal. To calculate the recommended maximum level in sludges, the amount of increase over background levels in the soil and the total amount of sludge that may be applied are taken into account. The table below shows the results of such calculations. If a greater quantity of sludge was applied to the land, then the concentration of the contaminant in sludge should be reduced to maintain the same final soil concentration.
These soil limits depend on the soil type for some elements (Cu, Zn, Ni, Mo).

Testing and reporting
The frequency of biosolids monitoring shall comply with 503 or state rules, whichever is more stringent. However in no case shall monitoring frequency be less than quarterly.
Limits of detection and methods shall be reported for all tests.
Test parameters
Testing for inorganic elements in biosolids shall use EPA approved methods and shall include:
Arsenic, beryllium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, sulfur, zinc.
Each batch of biosolids delivered shall be tested immediately before soil incorporation for endotoxins.
Each batch of biosolids delivered shall be tested immediately before soil incorporation for stability and composts shall be tested for maturity.
At least annually biosolids shall be tested for radioactivity and for organic chemical contaminants including EPA semi-volatiles (using EPA approved methods or equivalent), PAHs, chlorinated pesticides, brominated diphenyl ethers, nonylphenols and related compounds, linear aliphatic sulphonates, triclosan, methyl triclosan, PCBs, musks, dioxins and furans. In addition, the 25 highest peaks that are found in the GC/MS scan for the semi volatile priority pollutants shall be identified. The findings shall be discussed in the annual report and the concentrations shall be compared with other standards for these chemicals (such as soil screening levels).

Prohibit application and incorporation during winds >5mph.

Reporting

Any violations of the permit or excursions from the approved plans will be reported within 12 hours of their discovery. This includes significant rainfall occurring within 24 hours of application.
File report within 60 days of application stating source, treatment method and quality of biosolids, quantity applied and how they were managed on-site. Include certification by registered professional that biosolids were applied according to the approved permit and land spreading plan.
File annual report that includes certification by registered professional that biosolids were applied according to the approved permit and land spreading plan; results of any required monitoring, including annual medical screening of workers to detect sludge-related injuries or diseases; copies of any informational materials provided to workers, farmers, neighbors; any complaints received and how they were handled;
Vehicles and transportation
Require trucks to be plainly labeled with contents and with contact information for responsible party.
Require trucks to be covered.
Prohibit tracking of biosolids onto roadways.
Consider limiting the roadways that may be used to move the biosolids.
Time of operation
Consider limiting the time of day during which delivery and spreading may take place.

Enforcement
The permit authority or its delegee has the right to:
Obtain and analyze samples;
Inspect vehicles, facilities, monitoring equipment
Have access to and copy records
Obtain photographs
Interview employees.
By reference require compliance with federal and state sludge rules.
Permit or approval of spreading plan may be revoked if violate any provision of the permit or for any violation of this rule, of any federal or state laws or regulations.
Sanctions for non-compliance must be substantial. Civil fines should be meaningful as to amounts, and graduated based on knowledge, severity of violations, past violations, profits realized by noncompliance, etc. Criminal penalties (including jail terms) should be available for repeated offenses, “reckless endangerment,” severe environmental impacts, etc. Natural resource damages should be recoverable in case of ecosystem damages.
Co-permitees are jointly and severally liable for all damages that may be caused by sludge application (whether legally applied or not) as well as any cleanup and remediation that may be ordered by relevant governmental authorities.

Establish and require a procedure for receiving and handling complaints:
Who should complainants contact and how;
What is the system for and who is responsible for recording complaints;
What is the system for and who is responsible for investigating complaints;
What is the system for and who is responsible for responding to complaints.
Require posting of signs at bulk application sites

Signs to include
What is being spread
By whom
information on who to contact if complaint
Multi-lingual if appropriate.
Specify distance between signs along site boundaries – perhaps 50 feet between signs.
Fees

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