METRO WASTEWATER RECLAMATION DISTRICT

Catherine R. Gerali, District Manager

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Via Email and U.S. Mail:
cdphe_tenormpolicyrevision@state.co.us
and steve.tarlton@state.co.us

Mr. Steve Tarlton, Radiation Program Manager
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246

Re: Public Comments on Draft TENORM Guidance

Dear Mr. Tarlton:

This letter provides comments, on behalf of Metro Wastewater Reclamation District, to the proposed revisions to the February 2007 "Interim Policy and Guidance Pending Rulemaking for Control and Disposition of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), Rev. 2.1" (the "Guidance"), as summarized by the "TENORM Policy and Guidance, Revision 2013, draft overview of 10/1/13" ("Draft Overview"). We also appreciate the opportunity to have participated in the October 8, 2013 stakeholder meeting.

The Metro Wastewater Reclamation District ("Metro District" or "District") is the wastewater treatment authority for much of the metro Denver area, including Arvada, Aurora, Denver, Edgewater, Lakewood, Mountain View, Thornton, Wheat Ridge, and parts of Englewood and Westminster, as well as numerous water and sanitation districts. The Metro District is committed to protecting the environment and providing for the community's future needs. The District serves approximately 1.7 million people, treating about 130 million gallons of wastewater per day. Our mission is to provide wastewater transmission and treatment services to Metro District ratepayers in an efficient, cost-effective manner, while continuing to meet all statutory and regulatory requirements. The District land-applies most of its biosolids, sends some to a private composter, and maintains contracts with multiple landfills for emergency operations when beneficial use outlets are unavailable. The Metro District does not generate nor receive TENORM with concentrations of regulatory concern. Our comments to the Guidance and the Draft Overview are as follows:

1. <u>The Guidance is an Unlawful Regulation</u>

The Guidance uses words like "shall," "must," "applicable," and "exempt" throughout the document. This means that the Guidance is intended to be binding. Guidance should be non-binding, otherwise it is invalid and unlawful.

The Guidance is tantamount to State "rule making" without following the requisite State administrative rulemaking procedures set forth in C.R.S. § 24-4-103. In general, guidance

documents cannot be mandated upon any person because it would render them to be–in effect–binding regulations, not non-binding guidance documents. *Appalachian Power Company v. EPA,* 208 F.3d 1015 (D.C. Cir. 2000); *General Electric Co. v. EPA*, 2002 U.S. App. Lexis 9507 (D.C. Cir. May 17, 2002); *Tabb Lakes Ltd. v. United States*, 715 F. Supp. 726 (E.D. Va. 1988).

To create regulations, the Colorado Department of Public Health and Environment ("CDPHE") must follow the Colorado Administrative Procedures Act (APA). CDPHE does not have the authority to create regulations by adopting or inserting non-binding guidance documents into a license as mandatory conditions. Unauthorized licensing actions related to Colorado radioactive materials are void. *Western Colorado Congress v. Colorado Department of Health*, 844 P.2d 1264 (Colo. App. 1992). The purposes of the APA are to ensure rational and fair government decisions, preserve personal freedom with an institutional check on arbitrary government action, improve agency decision-making by ensuring stakeholder participation, and create an administrative record to allow for judicial review. The Guidance does not meet any of the APA purposes. The normal process is to first promulgate a regulation, and then issue guidance to elaborate and clarify the regulation without creating new substantive requirements.

2. <u>The Fix Should be Proportionate to and Tailored to the Problem</u>

The existing Guidance is targeted to water treatment residuals that have TENORM concentrations of concern. The existing Guidance does not apply to other industries or materials. As we understand from CDPHE comments during the stakeholder meeting, the current proposal to revise the existing Guidance is a result of TENORM concerns with the oil and gas industry and water treatment facilities, not other industries. Yet, the proposal seeks to expand the scope of the Guidance to wastewater treatment facilities and all other industries, which would require members of those industries to show that they do not have TENORM at concentrations of concern. In other words, these other sectors would have to spend considerable resources (*e.g.*, sampling and analysis costs, consultants, attorneys, monitoring land application areas for cumulative impacts over time, etc.) to prove they do not have a TENORM problem. The Metro District requests that the scope of revisions to the Guidance be narrowed to address the problem at hand: the oil and gas industry and water treatment residuals/backwash, or facilities accepting or generating TENORM wastes. The Guidance document and any monitoring requirements would be more appropriate and more meaningful if applied to the source of the TENORM. Because the TENORM levels in biosolids are comparable to soil and fertilizer, does the Guidance cover that media also? Guidance should be limited to situations with TENORM concentrations of concern.

CDPHE has expressed concern about TENORM in biosolids from wastewater treatment facilities as a whole. That concern is based on data from only one wastewater treatment facility that shows TENORM concerns with its biosolids. However, that one wastewater treatment facility accepts backwash from a water treatment facility known to have elevated radionuclides. The backwash contains TENORM in concentrations of concern. It is not surprising that a wastewater treatment facility that accepts wastes from the oil and gas industry or backwash or residuals from water treatment facilities would have TENORM with concentrations of concern in its biosolids. The facility is accepting a waste known to have TENORM with concentrations of concern. In fact, based on history of biosolids regulations and studies done to date (as summarized below), that Publicly Owned Treatment Works (POTW) is not representative of the typical POTW and that facility should not dictate guidance, but be dealt with individually.

To allow and regulate the land application of sewage sludge, the U.S. Environmental Protection Agency ("EPA") promulgated Standards for the Use or Disposal of Sewage Sludge in the Code of Federal Regulations, Title 40, Part 503, of the Clean Water Act in 1993 ("Reg 503"). The regulations were the result of more than two decades of research, analysis, and risk assessment by EPA, based in part on a long history of land application for beneficial reuse that predated the regulations. Far from being a regulation to "recharacterize sludge", Reg 503 simply brought national standards and practices into the regulatory program to ensure that sludge—or biosolids—application would meet national criteria for environmental and public health protection. There were no identified situations in the U.S. where radioactive materials in sewage sludge (biosolids) have posed a threat to the health and safety of workers in the POTW or to the general public.

In addition, from 1998 to 2000, through the Interagency Steering Committee on Radiation Standards (ISCORS), the U.S. Nuclear Regulatory Commission (NRC) and EPA conducted a joint survey to collect information on radioactivity in sewage sludge (biosolids) from POTWs. Questionnaires were sent to 631 POTWs requesting information regarding wastewater sources, wastewater and sludge treatment processes, and sewage sludge disposal practices. From the 420 returned questionnaires, NRC and EPA selected 313 POTWs to be sampled. The results of the analyses revealed that samples primarily contained NORM such as radium, and that the levels were generally comparable to what is found in other media (*e.g.*, soil and fertilizer). The nearly ten-year ISCORS effort found the levels of radioactive materials in sewage sludge from most POTWs were generally low and the associated radiation exposure to workers and the general public very low, and not likely to be of concern, including radiation exposure to the general public through the use of sludge as a soil amendment for growing food crops.

Therefore, a wastewater treatment facility that does <u>not</u> accept wastes from the oil and gas industry or backwash or residuals from water treatment facilities, should not be required to expend considerable financial resources and personnel time to prove that they do not have a TENORM problem. Data from only one facility should not trigger regulatory requirements for an entire industry, particularly where data from that facility is not representative of the entire industry. The Guidance should be tailored to address the issues of concern, and therefore only apply to wastewater treatment facilities that accept oil and gas waste or backwash from water treatment facilities. These facilities accept TENORM wastes, and thereby have a potential problem and should be required to collect data to evaluate TENORM issues. This is especially appropriate due to recent drinking water regulations requiring water treatment facilities to treat for and remove radionuclides resulting in water now reaching waste water treatment facilities having fewer radionuclides than before.

For example, the Metro District's biosolids do not have radionuclides in concentrations of concern because it does <u>not</u> accept wastes from the oil and gas industry nor backwash or residuals from water treatment facilities. Radium 226+228 concentrations are less than 3 pCi/g, and usually range between 1-2 pCi/g, and uranium is less than 50 ppm. These results include background concentrations, so the amount of TENORM is actually less than the numbers reported. The levels of radioactivity in the District's biosolids are comparable to soils in this area. Moreover, after the above samples were taken, new drinking water treatment regulations were implemented that require the removal of radionuclides to meet the new uranium drinking water standard. This means that there is less uranium and radium in the influent coming into Metro District's facility today, so the results now would reasonably be expected to be lower than those noted above.

In addition, the RESRAD mrem Dose Exposure Scenarios pdf attached to the e-mail from CDPHE about the December 11, 2013 stakeholder meeting is not an accurate representation of biosolids land application. Enclosed is a FAQ about the Metro District's biosolids and two photos of the actual biosolids land application process. Biosolids are applied with a manure spreader pursuant to predetermined agronomic rates that result in very little material being applied (not even a quarter inch layer), let alone the one foot depth assumed in the RESRAD calculations.

3. The Guidance Should Stay Material Specific

The Draft Overview (p. 1) states that the Guidance will shift from a material-specific approach (*e.g.*, water treatment residuals) to a media-specific approach (*e.g.*, soil, liquids). This approach would subject every waste-producing sector to this Guidance even if there is no known reason to suspect that a particular sector has TENORM with concentrations of concern. That will result in a large and unnecessary expenditure of financial resources for anyone needing to dispose of a soil-like material such as soil, cuttings from well drilling, ash or slag from incineration or smelting processes, tailings from non-uranium or thorium milling, and wastewater treatment residuals like grit and biosolids), or a liquid material, or surface-contaminated objects (*e.g.*, piping, equipment, and other items where TENORM or "unimportant quantities" of source material may have been deposited) to prove they do not have a TENORM problem; for no regulatory reason or environmental benefit. Metro District supports a guidance that focuses only on those sectors and facilities known to have TENORM concerns.

4. The Guidance Must Adhere to the Limits Set Forth in SSRCR

The Guidance claims that CDPHE has complete legal authority to regulate TENORM and NORM, and that CDPHE may exercise its discretion to not regulate certain types of TENORM. Guidance, § 6. The Guidance claims to find that authority in its enabling statute and regulations, particularly the regulations related to general licenses. However, Colorado statutes and regulations set limits to CDPHE's authority. The Guidance exceeds the limits set forth in statute and regulation.

CDPHE may not regulate the disposal of NORM unless federal Environmental Protection Agency regulations are first promulgated. § 25-11-104(1)(b), C.R.S. Because there are no EPA regulations in existence at this time, CDPHE may not adopt any rules concerning the disposal of NORM. The Guidance is at odds with this statutory prohibition. Colorado statute expressly acknowledges that NORM, including a subset of NORM known as "technologically enhanced" NORM (TENORM), may be disposed of as solid waste in solid waste landfills in Colorado without being subject to, or requiring, a radioactive materials license. § 25-11-201(1)(c), C.R.S. TENORM is a subset of NORM because it is NORM whose concentrations are increased by human activity. *See* § 25-11-201(4), C.R.S.

Even if the federal government had promulgated NORM disposal regulations, which it has not yet done, any NORM or TENORM regulations promulgated by CDPHE "shall be consistent with the model regulations proposed" in the "Suggested State Regulations for Control of Radiation" ("SSRCR"), unless the Board of Health concludes on the basis of detailed findings that a substantial deviation is warranted. C.R.S. § 25-11-104(2). Even if CDPHE had properly promulgated NORM regulations, which it has not done, then those regulations would have to be consistent with the SSRCR model regulations, as would the Guidance.

The Guidance, however, has many inconsistencies with the SSRCR. Listed below are some of the inconsistencies.

- The SSRCR regulations exempt from radiation control regulation TENORM with a concentration of Ra-226 and Ra-228 below a combined 5 pCi/g. SSRCR, Sec. N.4(a) (2004). Tthe Guidance identifies 3 pCi/g as the exemption threshold for Ra-226+228. Guidance at § 5.1. Moreover, the Guidance states that TENORM with concentrations of Ra226+228 less than 3 pCi/g may be disposed of in any landfill, but this is a disposal criterion into any landfill with protections to the public, not as a free release criterion like the SSRCR regulations.

- The SSRCR regulations exempt TENORM from radiation control regulation when the total effective dose equivalent (TEDE) is less than 100 mrem/yr. Sec. N.4(f). The proposed policy statement says it is the "policy" of CDPHE to limit potential annual exposures to 25 mrem/yr. Draft Overview at 1. Throughout the Guidance, the Guidance does not adhere to the SSRCR's exemption of 100 mrem/yr and lowers that threshold to 25 mrem/yr, and even 1 mrem/yr in some cases. *See e.g.*, Guidance § 4.4 (TENORM with doses above 25 mrem/yr require a radioactive materials license); Draft Overview at 7 (dose assessments will use 25 mrem/yr and as low as reasonably achievable (ALARA) as benchmarks). The 25 mrem/yr unrestricted use criteria in Colorado's regulations (RH 4.61.2) is for licensees, not unlicensed activities that involve TENORM. The SSRCR regulations exclude TENORM from its 25 mrem/yr license decommissioning criteria. Sec. N.7(b)(i). SSRCR applies the 5 pCi/g concentration above background for Ra-226+228 for soil layers of 15 cm for release criteria. Sec. N.7(b)(ii). Therefore, the CDPHE policy of 25 mrem/yr for TENORM exposures, and requiring licenses for such exposures, is inconsistent with the SSRCR regulations. The Guidance should change its policy for annual exposures to 100 mrem/yr for TENORM. There is no regulatory basis to require a radioactive materials license for TENORM below 100 mrem/yr.

- The SSRCR regulations state that doses from inhalation of indoor radon and its short half-life (less than 1 hour) progeny shall not be included in calculations of the TEDE, except when the dose is due to effluent releases from licensed operations involving the handling or processing of TENORM. Sec. N.5(c). The Guidance, however, relies on radon inhalation to make policy from non-licensed facilities. The CDPHE RESRAD dose slides for the December 11, 2013 stakeholder meeting show that the only significant risk from biosloids land application is from indoor radon, which should be excluded.

- With respect to water treatment residuals or waste water treatment biosolids, the SSRCR exempts materials with a concentration of Ra226+228 less than 10 pCi/g for farmland application. Sec. N.4(g). By contrast, the Guidance states that residuals with concentrations up to 9 pCi/g may be disposed of in a municipal solid waste landfill only if the landfill has extra controls. It does not make sense to allow direct farmland application on land without any controls of biosolids up to 10 pCi/g under the SSRCR and yet limit landfill disposal to 9 pCi/g at an approved landfill that has controls. If unrestricted use on farmland without protections is allowed for TENORM up to 10 pCi/g, then disposal in a landfill with special protections should be greater than 10 pCi/g.

- The Guidance references the SSRCR criteria of land application of water treatment residuals less than 10 pCi/g of Ra226+228, but states that CDPHE will consider this land

application on a case-by-case basis. Guidance at 3.2.11. It is inconsistent with the SSRCR to require case-by-case consideration for land application of biosolids. A land applicator should be able to apply its biosolids without regulatory approval if its biosolids meet the SSRCR criteria (again, this assumes that the federal government has regulated NORM, which it has not done). A land applicator should be allowed to apply biosolids consistent with existing federal and state biosolids regulations without having to sample for radionculides and without having to monitor the land, unless that land applicator accepts materials from the oil and gas industry or water treatment residuals/backwash with elevated TENORM. The federal and state biosolids regulations do not have provisions for radionuclides because the issue was studied extensively and the conclusion was that there was no radioncuclide risk. The biosolids regulations are the product of deliberate consideration of the TENORM issue. The Guidance should not supplant those regulations.

- Nothing in the SSRCR requires monitoring of farmland over time to measure impacts of biosolids land application, as proposed. Draft Overview at 5. Metro District applies its biosolids to approximately 15,000 acres of land a year, with over 55,000 total acres of active sites available for land application. It is impractical to monitor the land – at great expense – when there are standard radiological risk models available (at relatively low cost) to measure impacts over long periods of time, and these models are routinely used to assess future risks at sites without requiring expensive long-term monitoring. Where biosolids are less than 10 pCi/g for Ra226+228, there is no good reason to monitor the land.

If CDPHE had authority to regulate NORM at this time, including its subset of TENORM, the regulations would have to follow the SSRCR model regulations. Guidance must be consistent with statutes and regulations. *Appalachian Power Company v. EPA,* 208 F.3d 1015 (D.C. Cir. 2000); *General Electric Co. v. EPA*, 2002 U.S. App. Lexis 9507 (D.C. Cir. May 17, 2002); *Tabb Lakes Ltd. v. United States*, 715 F. Supp. 726 (E.D. Va. 1988). Accordingly, there is no legal authority at this time for CDPHE to regulate the disposal of TENORM. Moreover, even if there was legal authority, the authority is limited and the limitation requires the Guidance to be consistent with the SSRCR model regulations unless the Board of Health makes specific findings when it promulgates TENORM regulations, which it has not done.

5. <u>The Biosolids Regulations Were Revised By Deleting the 40 Gross Alpha Criteria</u>

The Guidance refers to now-outdated criteria in the biosolids regulations. The Guidance references 40 pCi/g gross alpha as a regulatory criteria for land application (§ 4.3.3), but that criteria was removed from the biosolids regulation in March 2003. The Guidance needs to be updated to take into account the changes to the biosolids regulations and the fact there were no monitoring requirements associated with this criteria in Regulation 64 because previous monitoring had indicated the likelihood of biosolids exceeding the criteria to be minimal. This Guidance should not be more restrictive than the regulation.

6. <u>Methods to Determine Background For Wastewater Treatment Facilities is Necessary</u>

TENORM regulation is about the regulation of radionuclides above background concentrations. In particular it is about the human activity that increases radionuclide concentration. As it reads now, the Guidance does not provide a method, or list of alternative methods, to wastewater

treatment facilities to identify background concentration. As a result, generators of TENORM will likely sample and analyze the resulting materials, such as biosolids, and then compare the number from the lab to the numbers in the Guidance without subtracting the background concentration. This would result in the unnecessary, over-regulation of materials in some cases. Metro District supports the development of methods for wastewater treatment facilities to first determine background concentrations that will then be subtracted from the concentration found in the biosolids concentration to determine the appropriate management method of the TENORM. Of course, if the concentrations in the biosolids are below the TENORM thresholds for unrestricted use, then there is no need to determine background. Determining background is appropriate only when the biosolids are above the relevant threshold. In any event, the Guidance should include a section that discusses and alerts generators about the issue and identifies methods to determine background. The Guidance should also include a section to deal with analytical issues, such as proper methods, count times, counting errors, detection limits, etc.

7. The Disposal Tiering System Should be Modified

The Metro District also disposes of some of its biosolids in landfills from time to time. The landfill disposal tiering system used by the Guidance has no scientific basis. For example, the Guidance states that TENORM may be "released from radiological control if the upper 90% confidence interval of combined Ra-226 and Ra-228 is less than 3 pCi/g and natural uranium is less than 30 pCi/g." Guidance, § 4.4.1. According to the Guidance, TENORM meeting this criterion may be disposed of at any solid waste landfill.

This criterion of 3 pCI/g of Ra-226+228 and 30 pCi/g of U should be changed. The criterion is derived from the Health Physics Society's "Surface and Volume Radioactivity Standards For Clearance" published by the American National Standards Institute, Inc. (ANSI) in 1999. ANSI/HPS N13.12-1999. The criterion is a "screening" standard. A "screening" standard is different than a "clearance" standard. A screening standard is a level set well below a clearance standard so that a material may be screened relatively quickly and inexpensively and excluded from further analysis that would be more costly and more time-consuming. The clearance standard is higher (in concentration) than the screening standard; thus, a material may have a higher concentration than the screening standard, but upon further analysis it may be less than the clearance standard and thus allowed to be released from a radioactive materials license.

The ANSI standard of 3 pCi/g above background is not a screening standard for disposal at solid waste landfills. The ANSI standard is a "clearance" standard for unrestricted use. *See Table 1 of ANSI N13.12-1999, Surface and Volume Radioactivity Standards For Clearance*. "Clearance" means the removal of materials "from any further control of any kind," according to the ANSI standard. In other words, if the TENORM material is less than 3 pCi/g for the group that includes Ra-226, according to ANSI it may be left wherever it is: on the surface, in a hole, or land applied to any property. According to ANSI, the risk-based reason for this conclusion is that 3 pCi/g is the equivalent of only 1 mrem/yr. Colorado law says that licensed material less than 25 mrem/yr may be released from radiological control. Therefore, the Guidance would lower the standard for unlicensed TENORM material to 1 mrem/yr standard for unlicensed TENORM material. There is no regulatory or scientific basis to set a 1 mrem/yr standard for landfill disposal.

Furthermore, it is highly significant that the Nuclear Regulatory Commission (NRC) (June 1, 2005) rejected adoption of the ANSI standard of 1 mrem/yr as a clearance rule. In rejecting the proposed rule, NRC Chairman Diaz noted that the "National Academy of Sciences has

concluded that the current approach [i.e. 25 mrem/yr] [to clearance] 'is sufficiently protective of public health and safety'." Colorado should do the same: it should not develop standards more stringent than federal rules.

Moreover, the ANSI standard is based on average concentrations, not the 90% confidence interval. In addition, the ANSI standard does not apply to soils, soil-like material, and NORM, which the Guidance does.

Metro District supports the development of a risk assessment that realistically models landfills to develop new criteria for TENORM disposal in landfills.

8. Averages Should be Used

The Guidance requires the use of a sample population's 90% upper confidence level for determination of whether a material meets tiered disposal standards. This, in effect, makes each proposed tiering level much more conservative and restrictive than would be the case if the population mean (average) were to be used. CDPHE does not cite to any authority for requiring this unnecessary and unrealistic standard.

Concentration averaging should be used by CDPHE. According to the 1999 ANSI standard, concentration averaging is "inherent to the radiological measurement process for determining both surface activity and volumetric activity concentration." P. 5. The ANSI standard does support the use of the 90% upper confidence interval.

Moreover, the Resource Conservation and Recovery Act (RCRA) requires representative sampling. RCRA does not require a 90% confidence interval for the characterization of wastes to be disposed of in landfills. The Guidance effectively amends RCRA regulations.

Folllowing are a few examples of authoritative sources where concentration averaging is endorsed as the proper way of measuring waste concentrations. Colorado should base its Guidance on concentration averaging.

9. Radioactive Materials Licenses are Not Required for TENORM

There is no regulatory basis to require radioactive materials licenses for TENORM. It is inconsistent for the Guidance to require the generators of TENORM to obtain radioactive materials licenses, but not require the landfills that accept TENORM for disposal to have radioactive materials licenses. Under RCRA, a generator of hazardous waste must dispose of hazardous waste at a hazardous waste facility. A generator of non-hazardous solid waste may dispose of the waste at a non-hazardous solid waste facility. If a TENORM generator may dispose of TENORM at a solid waste facility, then it should not need a radioactive materials license. The Guidance requires a radioactive materials license for some TENORM, but the Guidance allows that same TENORM to be disposed of at a solid waste facility that does not have a radioactive materials license. If it may be disposed of as solid waste, then it should be regulated as solid waste throughout its life cycle. It is inconsistent to require a radioactive materials license for that TENORM if it can be disposed of in a landfill not licensed for radioactive materials.

The Draft Overview (P. 8) states that CDPHE will require licenses if certain concentrations of radionuclides are exceeded. There is no technical or regulatory support for these numeric thresholds. This "requirement" is tantamount to new regulation. The numeric thresholds should be established by regulation, after a public hearing that contains scientific evidence supporting the numeric thresholds and legal authority for those thresholds. The numeric thresholds are arbitrary and unauthorized. They should be removed from the Guidance.

CONCLUSION

The Metro District appreciates the opportunity to comment on the proposed revisions to the Guidance and looks forward to further opportunity to sit down with all stakeholders. Thank you for your consideration.

Sincerely,

Theresa Pfeifer

Theresa Pfeifer
Regulatory Compliance Officer

Enclosures

TAP:wlh
cc: Robert Thomas, Metro District
Maki Iatridis, Berg Hill

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METROGRO™ Biosolids FAQ

Agriculture plays a significant role in the beneficial reuse of biosolids. As biosolids are becoming a more widespread form of fertilizer, Farmers and Ranchers inquire quite often to learn how their farm or ranch can benefit.

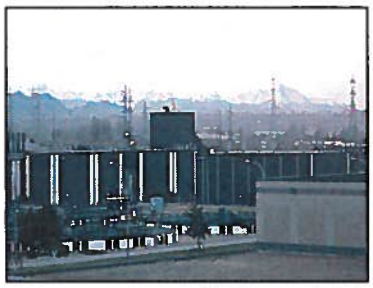
What are Biosolids?

Biosolids are nutrient-rich, organic matter that is generated as a by-product of the wastewater treatment process. This by-product can be recycled and used as a fertilizer and soil amendment and applied to agriculture, forest, rangeland, and reclamation area soils to improve soil condition and stimulate plant growth.

The Metro District markets its biosolids cake product under the trade name of METROGRO™.

Do Biosolids have an Odor?

Since Biosolids are treated sewage solids they can have an odor. Typically the odor is a musty-like earthy smell. Normally it does not pose any problem because the odor quickly dissipates into the atmosphere.



Are Biosolids Different from Sewage Sludge?

Absolutely. Sewage sludge encompasses *untreated* solids from wastewater that remain after being processed at a wastewater treatment facility. Regulations dictate that biosolids are to be processed and treated to remove pathogens that are found in sewage sludge.

How can my Farm/Ranch Benefit from Biosolids?

- ✓ Biosolids are nutrient rich and are a good source of organic matter
- ✓ Water-holding capacity of the soil will improve
- ✓ Soil porosity will improve
- ✓ Timing of fertilizer uptake by plant (slow-release)
- ✓ Biosolids are rich in Nitrogen, Phosphorous, and Potassium
- ✓ Biosolids are also a good source of micronutrients such as Zinc and Copper
- ✓ Soil tilth will improve
- ✓ Decrease in soil erosion potential
- ✓ Decrease in need for pesticide use
- ✓ Decrease in fertilizer/operating costs

How often can Biosolids be Land Applied?

Biosolids typically are land applied once per cropping cycle, or once per year. Keep in mind biosolids can only be land applied if the soil is showing nutrient deficiencies for the crop to be grown.