

# California Integrated Waste Management Board

## Board Meeting

April 13-14, 2004

### AGENDA ITEM 4

#### ITEM

Presentation Of Background On Issues Impacting Biosolids Management In California

#### I. ISSUE/PROBLEM STATEMENT

Biosolids are the nutrient rich by-product of wastewater treatment, generated by channeling human waste through nearly 250 treatment plants and collection systems throughout California. Although the terms biosolids and sewage sludge are often used interchangeably, biosolids are the end product after treating sewage sludge with anaerobic digestion in combination with heat. With the prohibition of ocean disposal of wastewater residuals in 1992, the use of biosolids as soil amendments (soil conditioners or fertilizers) or for land reclamation has increased to reduce the volume of biosolids that must be landfilled, incinerated, or disposed of at surface sites.

In the last several years, numerous scientific, political and social factors have contributed to a growing public concern over the safety of biosolids which has resulted in strict local ordinances banning or severely restricting biosolids use in several California counties. The management of biosolids in this state is layered and complex. This complexity is amplified by overlapping federal, state and local laws and ordinances, competing and fragmented jurisdictional oversight, shifting scientific evidence on human health and environmental safety and sometimes short-term political solutions. This item provides background information on some of the challenges facing California in managing biosolids and examines the potential impact of those challenges on the California Integrated Waste Management Board (Board) and the management of solid waste in future years.

#### II. ITEM HISTORY

This item is being presented for the first time.

#### III. OPTIONS FOR THE BOARD

No action needs to be taken by the Board at this time. This item is an information item.

#### IV. STAFF RECOMMENDATION

No recommendations are being proposed since there is no action by the Board at this time.

#### V. ANALYSIS

##### A. Key Issues and Findings

##### Background:

##### **Biosolids definitions:**

Biosolids can be used as a soil amendment/fertilizer but are also disposed of when land application uses are not available or accessible, and too costly. When land applied, biosolids are generally used in four forms: as a rich moist soil amendment, dried pellet, liquid, or compost. There are essentially three categories of biosolids: Class B biosolids, Class A biosolids, and Exceptional Quality (EQ) biosolids.

Class B biosolids may have low levels of pathogens which rapidly die-off when applied to soils, essentially becoming pathogen free within a short period following application when the "Part 503" Rule requirements are followed. "Part 503" refers to

the section in Vol. 40 of the Code of Federal Regulations, where various standards related to pathogens and metals in biosolids are codified.

Class A biosolids are essentially free of pathogens prior to land application. The metal contents requirements under the Part 503 Rule are the same for Class A and Class B biosolids.

Exceptional Quality biosolids have lower metals concentration requirements than either Class A or Class B biosolids and have the same pathogen levels as Class A biosolids.

**Biosolids usage:**

According to the California Association of Sanitation Agencies (CASA), California generates 750,000 dry tons of biosolids every year, most of which are Class B biosolids. Of this 750,000 dry tons, 54% is land applied, 16% is composted, 12% is used as alternative daily cover at landfills, 6% is disposed of in landfills and 4% is surface disposed. Additionally, 8% of biosolids generated annually in California are incinerated or stored. Note that the 6% landfilled (approximately 45,000 tons) represents about 0.1% of all materials disposed in Class I landfills.

Land application is the primary way biosolids are used in California and is currently the most controversial. Biosolids are used to enrich nutrient-depleted and/or barren soil with essential nutrients that, because they are organically bound, are released gradually to plants. Concerns about the land application of biosolids have been expressed by members of the general public regarding potential health effects related to such application. Some of the specific concerns include the presence of pathogens, heavy metals, and other chemical constituents in biosolids, and odors in areas where land application occurs. While no studies have directly linked the use of biosolids in this manner to harm in human or ecosystem health, a review by the National Research Council (NRC) of current federal regulations on biosolids (i.e., the Part 503 rule) cites problems in risk assessment methodologies and call for additional research into biosolids safety. See Section B at the end of the item for more details on the NRC study.

Composting is the second largest use of biosolids with approximately 16% of the biosolids being composted for agricultural, horticultural, and land reclamation uses. Biosolids can be composted using a bulking agent such as wood chips or co-composted with green waste. Biosolids composting requires accessibility to an existing permitted facility with capacity to accept additional material or a significant capital investment and operational outlay to fund the permitting, construction, and operation of a new facility. There are currently several biosolids composting operations operating in California with the majority of operations located in Southern California. At this time, the overall size of the market for composted materials is uncertain and competition exists with the greenwaste composting market. Market considerations are an important aspect of composting since in the absence of an end market, composted materials would, by necessity, have to be landfilled. Composters who end up landfilling biosolids would incur financial losses due to tipping fees plus the costs incurred during the production of the biosolids into compost.

Approximately 12% of the biosolids generated in California are used as alternative daily cover (ADC) at some landfills. ADC is material used to cover and contain landfilled materials at the end of each day and is a critical part of vector control at

landfill facilities. Certain materials are permitted for use as ADC because of their physical characteristics and manageability. Of the 161 active landfills in California, three routinely accept biosolids for use as ADC. Regionally, there are areas in California where there are no landfills that accept biosolids as ADC and thus ADC is not a widespread biosolids management option.

Approximately 6% of the biosolids generated in California are disposed of at landfills. Biosolids can only be disposed of at permitted landfills. Some landfills permitted for the disposal of biosolids do not accept biosolids on a routine basis. Of the 161 landfills located in California, 60 are permitted to accept biosolids for disposal while only a portion of this 60 actually accept biosolids for disposal. As with ADC, there are regions in California where there are no landfills that accept biosolids for disposal. Due to limited landfill availability and the fact that the materials are disposed of rather than being beneficially used, landfill disposal is not a widespread management option.

Surface disposal methods account for 4% of the biosolids produced in California. Surface disposal methods require large amounts of vacant land which is lined with an impermeable material prior to the implementation of disposal operations. These operations are individually permitted and monitored by the California Regional Water Quality Control Board. Surface disposal is used on a limited basis by several wastewater treatment agencies and is not used on a widespread basis due to the dedicated land area requirements.

Approximately 5% of the biosolids generated in California are incinerated. Incineration involves the high temperature burning of biosolids using a fuel supply such as natural gas or diesel fuel. The resultant ash is significantly lower in volume than the feedstock (biosolids) and, since the incineration process concentrates the trace metals that were present in the biosolids, there is a higher metal content. The ash is typically landfilled. Incinerators require significant capital investment and have high operating costs. There are three operating facilities statewide, each with a very limited capacity relative to the total amount of biosolids produced statewide. Due to existing and increasing air quality regulations, permitting of additional facilities is not considered likely and thus incineration is not considered a widespread management option.

Approximately 3% of the biosolids generated in California are stored temporarily in onsite facilities, such as lagoons. The biosolids are dried and further processed while in storage prior to the final deposition of the material using one or a combination of the management options described above.

### **Regulatory Framework for Managing Biosolids in California:**

Biosolids reuse and disposal practices are currently regulated by multiple federal, state, and local agencies. Due to the many agencies, issues, and perceptions associated with biosolids management, the regulatory environment in California is very dynamic. The following provides a brief description of key regulations impacting biosolids reuse and disposal practices and their current status.

#### Federal Regulations:

The US Environmental Protection Agency (USEPA) is responsible for the development and implementation of federal rules and regulations regarding biosolids processing,

use, and disposal. The primary federal regulation for biosolids management is 40 Code of Federal Regulations (CFR) 503 (Part 503). Please see Table 1 for summary of key federal regulations in addition to Part 503. In California, the 503 rule is enforced through National Pollutant Discharge Elimination System (NPDES) permits. Promulgated in 1993, the regulations under Part 503 apply to land application, surface disposal, and incineration of biosolids. The Part 503 standards include pollutant limits, management practices, and operational criteria, as well as monitoring, record keeping, and reporting requirements for biosolids use and disposal. For land application, the rule establishes metal limits, pathogen reduction requirements and vector attraction reduction requirements. Since 1993, several revisions to the rule have also been proposed. In December 1999, USEPA proposed “Round II” of the rule, which primarily addresses dioxins. Like the existing metal limits in the rule, the proposed dioxin concentration is based on the results of a risk assessment.

National Academy of Science Study:

Since Part 503 was promulgated in 1993, a variety of environmental groups, local governments, and others have expressed concern regarding the adequacy of the Part 503 regulations. Concerns have primarily focused on the land application of Class B biosolids. In response to these concerns, USEPA requested the National Research Council (NRC) of the National Academy of Science (NAS) to conduct a study to assist USEPA in evaluating regulatory requirements and nonregulatory measures with respect to the land application of biosolids. In July 2002, the NAS completed this 18-month study and issued a report entitled “Biosolids Applied to Land: Advancing Standards and Practices.”

The overarching findings of the NAS report concluded that there is no documented scientific evidence that the Part 503 rule has failed to protect public health, but there is a persistent uncertainty on the potential for adverse health effects. In light of recent scientific advances, the report finds that additional studies should be conducted and risk assessments performed to update the scientific basis for the rule. In late October 2002, USEPA issued its plan to respond to the NAS report, and issued advice to USEPA Regional Administrators regarding biosolids programs as the response plan is developed and implemented. Based on public comments and other relevant information, USEPA published a final action plan in the Federal Register in January 2004.

In light of the NAS report findings, and the questions that have been raised by states, local governments, and concerned citizens since the release of the report, USEPA has issued the following guidance to each USEPA Regional Administrator:

- USEPA recommends that biosolids continue to be managed in full compliance with the Part 503 rule. USEPA agrees with the NAS and its conclusions regarding the need for additional studies on the potential effects of biosolids.
- USEPA believes that “pursuant to Part 503, it is a matter of local government’s choice whether their biosolids are land applied, landfilled, or incinerated and that the report does not affect the viability of any of these options.”
- USEPA recommends that biosolids management processes be reviewed during normal state or federal inspections at wastewater treatment facilities; and that

violations of the Part 503 rule should be addressed through appropriate administrative enforcement.

State Regulations:

Under Part 503, state and local agencies are allowed to impose more stringent requirements for the use and disposal of biosolids than those specified in Part 503. See Table 2 for summary of key regulations in the state of California.

The following provides a brief discussion of key state agencies involved in Biosolids management.

*California Department of Health Services (DHS):*

The DHS administers the California Hazardous Waste Control Law (HWCL) and has responsibility for determining whether biosolids are a hazardous or nonhazardous material according to CCR Title 22, Division 4, Chapter 30, Articles 9 and 11.

*State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs):*

Through its nine RWQCBs, the SWRCB allows for individual waste discharge requirements (WDRs), or general waste discharge requirements (GWDRs) to regulate the discharge of biosolids to land. A land application permit with individual WDRs involves a more complicated permitting process and includes more stringent conditions. Application forms for individual WDRs are very detailed and are designed to provide the RWQCB staff with in-depth site information.

In order to streamline the permitting process, the SWRCB authorized the RWQCBs to prescribe GWDRs for Class B and Class A biosolids. The GWDRs may be issued for the discharge of biosolids to land for use in agricultural, horticultural, and land reclamation activities. To obtain coverage, the permit applicant for the biosolids and application project must complete a Notice of Intent (NOI) form.

*General Waste Discharge Requirements (GWDRs) and the Statewide Environmental Impact Report (EIR):*

The Central and South Delta Water Agency filed a lawsuit regarding the Central Valley's WDRs for biosolids land application. The judge in the case accepted the proposal from the SWRCB for development of a statewide Environmental Impact Report (EIR) to address GWDRs for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities. The EIR was completed and a final General Order was adopted in 2000.

*California Integrated Waste Management Board (Board):*

In 1995, the Board established composting regulations that are applicable to biosolids composting. The regulations were amended by the Board in November 2002 and last revised effective April 2003. The regulation includes a concentration limit for selenium of 36 mg/kg. The major difference between this and the Federal regulations are that the current Part 503 regulation concentration for selenium is 100 mg/kg.

*California Department of Food and Agriculture (CDFA):*

The CDFA completed a process in 1998 to regulate heavy metals in organic fertilizers. Heavy metals in organic fertilizers are expected to be addressed in the future.

*Department of Toxic Substances Control (DTSC):*

In October 2001, the DTSC prepared a Draft Mercury Report that raised concerns regarding the problem of mercury contamination in California by the disposal of mercury-containing wastes that are not currently regulated as hazardous waste. In August 2002, DTSC opened for public comment their proposed rule for mercury. DTSC eliminated some earlier options that could have caused biosolids and waste-to-energy ashes to be classified as hazardous. In December 2002, the DTSC issued its final analysis on the rule, which focuses on source control and on mercury recycling.

*California Air Resources Board (CARB):*

Airborne particulate matter (PM) has been linked to a wide range of adverse health outcomes including acute and chronic bronchitis. The CARB conducted a review of the PM-10 (10 microns in diameter) standard as a requirement of the Children's Environmental Protection Act (Senate Bill 25, 1999, Chapter 731). The anticipated tightening of air particulate standards will increase regulatory control of agriculture, particularly the application of biosolids products, such as compost at agricultural sites. Greater regulatory control will increase the costs of applying biosolids products, especially products that emit dust when spread and incorporated at land application sites. This issue is further discussed in the South Coast Air Quality Management District (SCAQMD) discussion below.

Local Regulations/County Ordinances:

Land application projects must comply with local laws, ordinances, and regulations. The project proponent may have to obtain a Conditional Use Permit (CUP), building permits, and other local permits. Generally, California counties place CUP requirements on land application sites for biosolids. However, since the increase in permitting of large land application sites in the early to mid-1990s, some counties and their respective farm bureau chapters became concerned. In 1994, Merced County adopted the first California county ordinance that placed restrictions on biosolids land application.

There are now many county ordinances that place varying restrictions on land application of biosolids. The county ordinances generally include requirements that are more stringent than required by federal or state regulations including:

- Setback requirements for certain types of uses that greatly increase the land area needed for Class B land application, thereby reducing the feasibility of this practice.
- Limits on depth to groundwater to minimize groundwater contamination.
- Restrictions on the application of biosolids to irrigated land.
- Additional biosolids and soil testing requirements.
- Inspection fees.
- Bans on Class B and/or Class A biosolids.

Some key local ordinances and rules that will have a significant impact on the direction of biosolids use and management in California include:

*Kern County:* Kern County developed a County Ordinance that banned land application of all but Exceptional Quality (EQ) biosolids by January 1, 2003.

*Kings County:* In 2000, Kings County decided to implement local regulation of biosolids that bans land application of Class B biosolids starting in February 2003. The current ordinance allows for the use of Class A EQ biosolids until February 2006 and then only composted Class A EQ biosolids will be allowed.

*Riverside County:* In response to complaints and local demonstrations during biosolids land application at some sites, Riverside County decided to evaluate revisions to their ordinance that would ban Class B biosolids. In November 2001, a final ordinance was enacted that effectively implemented a ban on all but 600 acres in the County. Land application in the County has ceased except for some in-County Class A solar dried biosolids.

*South Coast Air Quality Management District (SCAQMD) Rule 1133*

The SCAQMD adopted Rule 1133 on January 10, 2003, to control emissions from co-composting and chipping/grinding operations in the basin. The rule was adopted to reduce the emissions of ammonia (NH<sub>3</sub>) and volatile organic compounds (VOCs), which are precursors to particulate matter less than 10 microns in diameter (PM-10) and ozone. The SCAQMD conducted source assessment tests at four co-composting sites starting in 1995. In order to assist with the rulemaking, the Southern California Alliance of POTWs (SCAP) conducted a study to determine whether the emissions figures the SCAQMD used in their rulemaking process accurately reflected emissions rates from co-composting facilities that use negative aeration and venting to a biofilter during the active composting portion of the process. SCAP's perspective is that these emissions can be dramatically reduced depending upon the compost piles' geometric shape, the type and moisture content of the carbon matter (i.e., green waste) used, the size of the blowers, and numerous other variables. The SCAP report is currently being finalized. It should be noted that the Board conducted emissions on greenwaste composting, in addition to SCAP's testing on co-composting and that the current research on Best Management Practices (BMPs) for greenwaste may be transferable to co-composting operations containing biosolids.

**Potential Issues for CIWMB Programs:**

1) Potential Disposal Impacts:

Because of the continued uncertainty over biosolids safety and a call for more stringent and modern risk analysis, it is possible that USEPA will move in the direction of amending its pathogen and chemical standards and conducting additional epidemiological and risk assessment studies. Several scenarios are possible, depending on the findings, that could impact the way biosolids are handled and disposed of in California.

From a disposal impact viewpoint, the best outcome would be for the additional data to conclusively show that biosolids do not have a negative impact on human health or environment. This would most likely have the effect of maintaining the status quo of land applying nearly 54 % of annually produced biosolids in California. In fact, conclusive data showing that biosolids are safe to land apply could possibly shift these percentages even further away from disposal and more towards land application and composting due to an increased demand for biosolid products which could tout their benefits as soil amendments without the perceived downsides. This could consequently fuel a market increase to meet the renewed

demand, in both the composting and biosolid markets.

One wildcard variable in this scenario however is the negative public perception of biosolids that might not be altered with additional scientific data. This is particularly true in the agricultural sector, where biosolids are used as fertilizer or soil amendments for food crops, public opposition and consequent jurisdictional land bans have been fueled by public perception and rhetoric more than hard scientific data. This is evidenced by the recent land bans in Riverside and Kern counties, with other counties and jurisdictions threatening to follow suit. This is notable given the paucity of scientific data to date showing that biosolids are patently unsafe or, as EPA has pointed out, evidence suggesting that the Part 503 rule has failed to protect the safety of the public. Nevertheless, good scientific data conclusively showing the safety of biosolids could head off additional land bans and at the very least, maintain the balance of biosolids being land applied and or/composted vs. being landfilled.

A far greater impact on the disposal waste stream would occur if biosolids are found to be unsafe, either categorically, or specifically, depending on chemical composition, mixture, etc. This could have the effect of decreasing demand for biosolids as a land application tool and accelerating moves by jurisdictions towards imposing land bans. Such a move could affect the flow of biosolids away from land application towards landfilling, daily cover reuse, incineration and composting. Because California currently produces approximately 750,000 dry tons of biosolids annually, potentially up to 60% (450,000 tons) could enter the waste stream. The landfilling could have the affect of decreasing jurisdictional and diversion rates. It should noted that the jurisdictions whose diversion rates would be most affected by increased landfilling would be those that host the Publicly Owned Treatment Water Plants (POTWs) since this is the point where wastewater is processed into solid waste (biosolids).

This scenario could be exacerbated by the fact that treatment of sludge into biosolids could fall off significantly, since demand for such highly treated end products would be curtailed. Consequently, the costs associated with treatment would not be willingly incurred by POTWs or other processors if they could not recoup those costs by selling a value added product. The result would be hundreds of thousands of tons of unprocessed sludge entering the waste stream that would find its way into already space-limited landfills.

## 2) Markets Development Issues:

One mitigating circumstance is existing data showing that biosolid pathogen reduction is achieved through the composting process. Although the pathogen problem is not completely eradicated, it is mitigated through co-composting (using biosolids as a feedstock with other materials to produce a finished compost product) which in turn can be land applied with less problems (health and ecological) than pure biosolids.

However, although seemingly attractive from an end-user perspective (safer product, more likely a higher grade soil amendment due to composting), there are problems on the production side which could manifest itself as higher costs passed on as higher prices to end-users.

On the production side, there is the question of whether the composting markets

and infrastructure can absorb the additional biosolid feedstocks in large quantities. From a purely supply perspective, introducing a large, cheap supply of biosolids could potentially cannibalize markets for other feedstocks (e.g. food, agricultural residues, municipal greenwaste, etc.). Although some of these materials could be used in conjunction with biosolids, materials would most likely be displaced due to a limited demand for composting products which would in turn be outstripped by a high supply. This could consequently have a downward pressure on price and could ultimately depress composting markets and hurt the industry.

On the infrastructure side, there is also the question of whether co-composting facilities would run afoul of recent air emissions rules (PR 1133 in particular) if they tried to increase their capacity to accommodate that large additional tonnage of biosolids. Although the emissions might not be significantly different at a composting facility versus land application, the air district where the emissions occur would not want to incur those emissions in their district. For example, a substantial amount of the biosolids generated in the South Coast Air Quality Management District are currently handled with land application into agricultural soils in the Central Valley. If land application is eliminated as an option, the biosolids may be re-routed to compost facilities in the South Coast District. PR 1133 requires expensive emission reduction controls, e.g. facilities that handle biosolids have to show a 70% *reduction* in emissions and are required to provide partial enclosure and biofilters or the equivalent. Tight emission standards, the high costs associated with technologies needed to comply with those standards and the high costs passed on to end-users may also serve to dampen both supply and demand for co-composted products which in turn would serve to divert biosolids to landfills.

The Board has received inquiries on using biosolids as a feedstock for conversion technology operations and although no such facilities exist in California presently, such operations could provide another venue for biosolids in the future. The Board is currently working on researching such technologies and gauging the possibility of siting operations in California.

**Health Effects:**

The National Academy of Sciences report put out last year by the National Research Council (NRC) found that toxic chemicals, infectious organisms and endotoxins or cellular material may all be present in biosolids. There are anecdotal reports attributing adverse health effects to biosolids exposure ranging from relatively mild irritant and allergic reactions to severe and chronic health outcomes. Odors are a common complaint and the NRC recommends further research into whether odors could have adverse health effects. The report notes that to date, no causal association between biosolids exposure and health effects have been documented or established due to the fact that no epidemiological studies have been conducted on exposed populations, such as biosolid applicators, farmers who use biosolids on their fields, and communities near land-application sites.

Because of the anecdotal reports of adverse health effects, the public concerns, and the lack of epidemiological investigation, the NRC has concluded that EPA should immediately conduct studies that examine exposure and potential health risks to worker and residential populations. NRC also notes that studies of wastewater treatment workers exposed to raw sewage sludge should not be used as a substitute for

studies of populations exposed to biosolids since the types and routes of exposure to sewage sludge and biosolid constituents can be quite different and there are major differences in the populations exposed. For example, exposures to biosolids go beyond the wastewater treatment plant to other worker populations, such as applicators and farmers, and to the general public, such as communities living near land-application sites and consumers of crops grown on biosolid-amended soils. Exposed populations may also include sensitive subpopulations, such as children, immuno-compromised individuals, and the elderly, who are unlikely to be prevalent in the workplace.

Several recommendations have been proposed by NRC to assess the larger issue of biosolids safety that is not currently being addressed by the current regulations. Although routine human health surveillance of all populations exposed to biosolids is impractical, the committee recommends that USEPA promote and support response investigations, targeted exposure surveillance studies, and a few well-designed epidemiological investigations of exposed populations

Most importantly, NRC stresses that complete epidemiological studies of biosolids use need to be conducted to provide evidence of causal association (or lack thereof) between biosolids and adverse human health effects. Such studies would need to include an assessment of the occurrence of disease and an assessment or measurement of potential exposure. Because complete epidemiological studies are expensive and require extensive data analysis, NRC feels that the priority should be given to studies that can address serious or widespread problems and help reduce uncertainty.

**B. Environmental Issues**

See "Health Effects" section above.

**C. Program/Long Term Impacts**

No information is available on program/staff impacts at this time

**D. Stakeholder Impacts**

An assembly bill (AB 1427, Maddox) was introduced in 2003 that would have required Cal EPA and stakeholders to conduct a study on the feasibility of establishing a statewide policy on biosolids treatment, disposal, and recycling. The bill did not make it through the legislative process in 2003 but may be reintroduced at a later date. The bill was sponsored by the Orange County Sanitation district. Other stakeholders interested in this legislation and other biosolids issues include the California Association of Sanitation Agencies (CASA), environmental groups, growers and the general public.

**E. Fiscal Impacts**

N/A/

**F. Legal Issues**

N/A

**G. Environmental Justice**

N/A/

**H. 2001 Strategic Plan**

N/A

**VI. FUNDING INFORMATION**

N/A - Information item

**VII. ATTACHMENTS**

1. Current Federal Biosolids and Sludge Rules and Regulations
2. State of California Sludge and Biosolids Rules and Regulations

**VIII. STAFF RESPONSIBLE FOR ITEM PREPARATION**

**A. Program Staff:** Ronald Lew

**Phone:** (916) 341-6592

**B. Legal Staff:** Elliot Block

**Phone:** (916) 341-6080

**C. Administration Staff:** N/A

**Phone:**

**IX. WRITTEN SUPPORT AND/OR OPPOSITION**

**A. Support**

N/A - Information item

**B. Opposition**

N/A - Information item