Bob Bastian
2Oct2008update

SUBJECT: EPA Update

Essentially all states have adopted Part 503 or something more restrictive

- Typically include additional requirements to address local factors
- Eight states are formally delegated (UT, OK, SD, WI, TX, AZ, OH & MI) and another ~15 actively seeking delegation

Choice of use/disposal practice remains a local decision

EPA's Response to NRC Report Final Action Plan – 14 Projects

- Biennial Review Under CWA … 2003 Review COMPLTETED – Biennial Reviews for calendar years 2003, 2005 and 2007; results of 2003 review published in Dec'2003 - ID'd 15 pollutants (out of >800) for further evaluation; 9 were identified as presenting a potential hazard to either human health or the environment and were focused on in the Targeted National Survey; 2005 and 2007 reviews ID'd no new pollutants for further evaluation.

- Compliance Assistance & Enforcement … COMPLETED/ONGOING – EPA continues to actively address reports of violations. EPA Regions and the States have the responsibility to address situations where compliance monitoring, compliance assistance and enforcement actions to address biosolids violations are appropriate and necessary. OECA's website (www.epa.gov/compliance/complaints/index.html) now invites the public to report possible environmental violations or crimes; working on improving the process for tracking complaints & informing public of violations. EPA continues to work on improving the current processes for routing and tracking citizen complaints and enhancing efforts to inform the public about possible environmental violations.

- **Methods Development, Optimization, and Validation for Microbial Pollutants in Sewage Sludge … COMPLETED** – *Fecal coliform* and *Salmonella* spp. methods validation studies reports published in Sept'05 - Reports #821-B-04-007 and #821-04-008 (Jt. ORD &OW effort);
COMPLETED – improved biosolids holding time study (EPA-821-R-07-003);
IN PROGRESS – improved enteric virus methods studies underway; an initial report titled *Preliminary Comparative Study of Methods to Extract Virus from Raw and Processed Sewage Sludges* (EPA/600/R-07/118) published in Sept'07; two simple virus extraction techniques were compared to an EPA standard method for isolating human enteric viruses from raw sewage sludge and Class A biosolids. Efforts will continue to optimize methods.

ONGOING – a new molecular method was published that can detect helminth ova in a few days instead of several weeks; improved viable helminth/*Ascaris* ova method expected to be completed by end of 2009.

- Field Study of Application of Treated Sewage Sludge …
COMPLETED – collaborative field study with USDA in Charlotte, NC, (methods-evaluation focused) was conducted in 2005; draft final report undergoing internal review.

- 2006 Targeted National Survey of Pollutants in Sewage Sludge
ONGOING – survey (involving sampling of 74 POTWs, analyses of 145 analytes in 84 samples) - final analytical results report (covering metals, organics, PBDEs and PPCPs) to be completed in fall of 2008; results will help determine exposure to target pollutants in biosolids and whether target pollutants may need to be regulated under 40 CFR Part 503.

- Participate in an Incident Tracking Workshop Aimed at Development of Response Mechanism … ONGOING – WERF-sponsored workshop held in Jan'05; PSC members developed/issued an RFP, selected a contractor; Phase I effort completed and report issued – (06-HHE-5PP; *Epidemiologic Surveillance and Investigation of Illness Reported by Neighbors of Biosolids Land Application Sites*), including a protocol designed for use by local, state, and federal health and environmental officials; pilot testing and refinement of the draft protocol by WERF are being conducted during Phases 2 & 3 over the next two or three years

- Conduct Exposure Measurement Workshop … COMPLETED – An Exposure Measurement Workshop was held during Mar'2006 in Cincinnati; workshop attendees helped identify research projects aimed at addressing exposure following land application of biosolids; a final report ***(Proceedings of the Biosolids Exposure Measurement Workshop***; EPA/600/R-07/055) was issued in Sept'2007 that includes presentations and suggested priority research needs - "http://www.epa.gov/nerlcwww/biosolids/biosolids_exps_workshop.pdf".

- Assess the Quality and Utility of Data, Tools and Methodologies to Conduct Microbial Risk Assessments … ONGOING – EPA is beginning to assess microbial risk assessment models; initial efforts include a literature review, evaluation of current risk methodologies, and applying various models using data for Salmonella via the ingestion pathway. A preliminary conceptual model and problem formulation for human health risk assessment of pathogens in land applied biosolids was drafted and circulated for internal-EPA review in 2005; a revised version was recently released (75 FR 54400) for public comment (due by the end of Oct'2008); the final product will include an evaluation of human health endpoints relevant to land application along with conceptual models, and a discussion of necessary data and assessment tools; a Public Peer Review Workshop has been scheduled for 19Nov2008 at the EPA/ORD Lab in Cincinnati, OH.

- **Support Pathogen Equivalency Committee … ONGOING** – The PEC has developed a more formal approach for evaluating equivalency applications; the new approach with QA requirements has been posted on the EPA Science Advisory Board's webpage; an improved PEC website ("http://www.epa.gov/nrmrl/pec") allows requests to be submitted online using a consistent format that should help expedite reviews; evaluation criteria are being modified to provide a better understanding of the proposed disinfection process' capabilities; a PEC retreat & workshop was held in Sept'05 to help the PEC members on emerging pathogens, analytical methods, disinfection techniques, risk assessment, preparation of QA plans, and expected application and evaluation procedures for assessing equivalency; numerous technology equivalency submittals are in different stages of review by the PEC.

- **Development and Application of Analytical Methods for Detecting Pharmaceutical and Personal Care Products in Sewage Sludge … COMPLETED** – EPA published a document titled ***Research Towards Developing Methods for Selected Pharmaceutical and Personal Car Products (PPCPs) Adopted for Biosolids*** (EPA/600/X-06/017; Sept'2006. Analytical methods were developed for over 100 PPCPs for biosolids, water, soil and sediment (issued in Dec'2007).

- **Publish Proceedings of USEPA-USDA Workshop on Emerging Infectious Disease Agents and Issues Associated with Animal Manures, Biosolids, and Other Similar By-Products … COMPLETED** – proceedings of the June'2001 workshop were published in Apr'2005 as special publication, *Contemporary Perspectives on Infectious Disease Agents in Sewage Sludge and Manure*, by JG Press; WEF is also distributing the document.

- **Supported *"Sustainable Land Application"* Conference … COMPLETED** – held the first week of Jan'04; peer reviewed papers from conference were published in the Jan/Feb'05 issue of JEQ; proceedings articles available at "http://jeq.scijournals.org".

- **Review Criteria for Molybdenum in Land-Applied Treated Sewage Sludge … ONGOING** – EPA is assessing the appropriate level for a numerical standard for Mo in sewage sludge using additional data developed since 2000, including results of the targeted national targeted survey; expect to complete assessment in 2009.

- **Improve Stakeholder Involvement and Risk Communication … ONGOING** – outreach efforts include modernizing EPA's biosolids website(s); development of brochure on how EPA conducts exposure and hazard assessments; assessment of how to include stakeholders at various stages of policy development; new websites have been established including a new Public Involvement webpages at "ExpectMore.gov" and "www.epa.gov/stakeholders/index.htm", as well as a new online interactive website at "www.epa.gov/askepa" where you can discuss a wide range of environmental and human health issues with EPA's senior officials.

Recent/Ongoing Studies/Projects of Potential Interest

- **National demonstration projects:**
  - King Co. (Seattle) 1MW Direct Fuel Cell Project - (COMPLETED) - "http://dnr.metrokc.gov/wtd/fuelcell/index.htm"
  - Columbus Water Works (GA) Flow-Through Thermophilic Treatment ($CBFT^3$) Process - (ONGOING)
- **Field evaluation of digester performance** - ORD/NRMRL **-** (ONGOING)
- **Fate and Transport of Biosolids-borne Triclorocarban (TCC) -** U.FL/IFAS – (ONGOING)- recently expanded to include Triclosan (TCS)
- **Presence, Fate, and Feasibility of Estro-and Androgenic Contaminants in Wastewater and Biosolids** - Duke University (COMPLETED)- draft final report undergoing revision
- **Survey of Biosolids Quality, Treatment, Practices, Use, and Disposal in the U.S.** – NEBRA, JG Press, etc. -(COMPLETED)- "http://www.nebiosolids.org/intro.html"
- **New EPA Alkaline Treatment Manual** -(ONGOING)
- **Update of 1979 EPA Sludge Treatment & Disposal Manual w/WEF & WERF -** (ONGOING)
- **New Emerging Technology Reports** (COMPLETED)
  - Conveyance Systems –"http://www.epa.gov/owm/mtb/epa-conveyance-report.pdf"
  - Biosolids Management –"http://www.epa.gov/owm/mtb/epa-biosolids.pdf"
  - Wastewater Treatment/Wet Weather Management – "http://www.epa.gov/owm/mtb/emerging_technologies.pdf"

United States Environmental Protection Agency
Office of Water, Office of Wastewater Management
Water Permits Division

August 2008

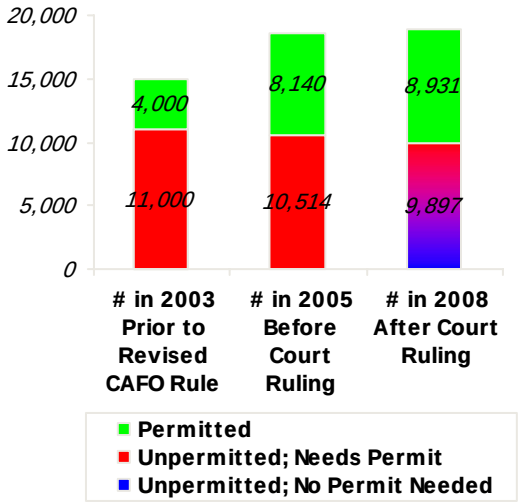
CAFO Rule Status

❑ Status of "*Waterkeeper*" Rule:

- EPA expects to finalize the *Waterkeeper* rulemaking forty days following completion of interagency review, which is currently underway.
- New supplemental proposed rule published March 7, 2008; included a proposed voluntary option for CAFOs to certify to the permitting authority that they do not discharge or propose to discharge and therefore do not need NPDES permit coverage.
- The final rule will address the court's mandate to:
  - Remove the unilateral Duty to Apply for permits for all CAFOs
  - Add requirements for Nutrient Management Plans (NMPs) to be submitted with permit applications, reviewed by permit authorities and the public, and incorporated into permits
- Final date extension rule published on July 24, 2007; extended deadlines for newly defined facilities to seek permit coverage and for all CAFOs to submit NMPs from July 31, 2007, to February 27, 2009.

❑ 2008 CAFO Permitting Update (as of March 2008, as reported by EPA Regions):

- Total CAFOs holding steady at roughly 19,000 operations
- 47% of CAFOs have NPDES permits
- *Waterkeeper* decision (February 2005) vacated the requirement for all CAFOs to apply for NPDES permits
- Based on types of operational characteristics associated with discharges, as many as 75% of CAFOs could ultimately need NPDES permits



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For More Information:
Your Name, email address & phone number

Biosolids Projects Update
5-Sep-08

Status of 68 FR 75531 projects

Project No.	Project Title	Status	Comments
1	Biennial Review (BR) Under CWA Section 405(d)(2)(C)	**BR 2003 Completed. Other BRs underway**	Under Section 405(d)(2)(C) of the Clean Water Act, every two years EPA is to conduct a review of existing sewage sludge regulations for the purpose of identifying and regulating, if appropriate, additional toxic pollutants in sewage sludge to adequately protect human health and the environment from the reasonably anticipated effects of such pollutants. EPA issued the 2003 Biennial Review (BR) (68 FR 75531), in which EPA identified 9 pollutants as having a potential hazard to either humans or the environment following use or disposal of sewage sludge. EPA continues to evaluate these pollutants and others of potential concern to determine if any of these pollutants warrant possible regulation. BRs 2005 and 2007 will be made available this fall. EPA will initiate BR 2009 in 2009.
2	Compliance Assistance and Enforcement Actions	**Ongoing**	EPA and states continue to actively address biosolids violations and require proper land-application of biosolids to prevent risk to human health or the environment. The public can now report possible environmental violations or crimes through EPA's Office of Enforcement and Compliance Assurance website. EPA will also be working to improve current processes for routing and tracking citizen complaints and enhancing efforts to inform the public about possible environmental violations.
3	Methods Development, Optimization, and Validation for Microbial Pollutants in Sewage Sludge [includes multiple components with different status]		
3a	Optimization of the Methods for Detecting, Enumerating, and Determining the Viability of Helminth / Ascaris Ova in Sewage Sludge	**Underway**	Recently a new molecular method was published that can be used to detect helminthes ova in a few days instead of several weeks. EPA plans to complete the Helminth ova biosolids method by the end of 2009.
3b	Improved Methods for Detecting Viruses in Sewage Sludge	**Interim Method Completed. Final Method Underway**	A report was published in September 2007 titled *Preliminary Comparative Study of Methods to Extract Virus from Raw and Processed Sewage Sludges* , EPA/600/R-07/118. Two simple virus extraction techniques were compared to an EPA standard method for the isolation of human enteric viruses from raw sewage sludge and class A biosolids. The technique were used to detect both indigenous and seeded virus from a wastewater treatment plant that distributes class A material produced by a heat drying process. Work will continue in 2009 on further optimizing the virus method.
3c	Development and Validation of Analytical Methods for Fecal Coliform in Sewage Sludge	**Completed**	An EPA report (821-B-04-007) was published in September 2005 establishing a new and improved method for detecting and quantifying fecal coliform in sewage sludge.
3d	Development and Validation of Analytical Methods for Salmonella in Sewage Sludge	**Completed**	An EPA report (821-B-04-008) was published in September 2005 establishing a new and improved method for detecting and quantifying *Salmonella* in sewage sludge.
3e	Microbial organisms	**Completed**	EPA conducted a new biosolids holding time study to determine appropriate holding times for fecal coliform and *Salmonella* in biosolids samples. An EPA report (EPA-821-R-07-003) was published and results have been incorporated into analytical methods.
4	Field Studies of Application of Treated Sewage Sludge	**Field Study Completed. Report Underway**	In 2005, a collaborative USDA and EPA field-scale evaluation of biosolids application in North Carolina was conducted to assess releases of pollutants (chemicals and microorganisms) to air and soil. Several different sampling and analysis methods were used to assess and optimize the sampling techniques. A draft report is undergoing internal review.
5	Targeted National Sewage Sludge Survey	**Sampling Completed. Report in progress.**	EPA completed sampling at 74 POTWs and analyses of 145 analytes in 84 samples for the Targeted National Sewage Sludge Survey. A final analytical results report for target analytes, including metals, organics, inorganic ions, PBDEs and PPCPs will be completed in Fall 2008. Data from the survey will help determine exposure to target pollutants in biosolids and whether target pollutants may need to be evaluated for possible regulation pursuant to 40 CFR 503.
6	Participate in Incident Tracking Workshop	**Workshop Completed**	EPA attended the first Water Environment Research Foundation (WERF) sponsored incident-tracking workshop held at WERF's facility in 2005. WERF-led follow-up activities from the workshop included developing research that could provide information about the occurrence of reported symptoms near sites where soil amendments, including biosolids, animal manures, food residuals, septage, compost, and other residuals that are applied to land. One action item is completed (WERF report 06-HHE-5PP; Epidemiologic Surveillance and Investigation of Illness Reported by Neighbors of Biosolids Land Application Sites), which includes a protocol designed to be used by local, state, and federal health and environmental officials. Activities in progress include pilot testing and refinement by WERF of the protocol over the next two to three years.
7	Conduct Exposure Measurement Workshop	**Completed**	An exposure measurements workshop was held in Cincinnati in March 2006. Attendees of the workshop proposed a list of research projects aimed at addressing exposure following land-applied biosolids. An EPA report was issued September 2007 (EPA/600/R-07/055) that includes presentations by attendees and suggested priority research needs.

8	Assess the Quality and Utility of Data, Tools and Methodologies to Conduct Microbial Risk Assessments on Pathogens	**Literature Review Complete. Analysis Underway**	The Agency is beginning to assess the utility of various microbial risk assessment models. Initial plans include review of literature, evaluation of current microbial risk methodologies, and applying various models using data for *Salmonella* via the ingestion pathway. EPA completed the literature review and remaining efforts are underway.
9	Support Pathogen Equivalency Committee (PEC)	**Upgrade of the PEC website is Completed. Evaluation of Equivalency Applications are Ongoing**	The PEC developed a more formal approach for evaluating equivalent treatments to current required treatments. The new approach, with its QA requirements, is posted on the Science Advisory Board's webpage. EPA improved the PEC website (http://www.epa.gov/nrmrl/pec/) so applicants can submit requests online using a consistent format that should help expedite reviews. Evaluation criteria are being modified to provide a better understanding of the proposed disinfection process' capabilities. Numerous technologies are in different stages of receiving a recommendation from the PEC of Processes to Further Reduce Pathogens equivalency.
10	Development and Application of Analytical Methods for Detecting Pharmaceutical and Personal Care Products in Sewage Sludge	**Completed**	EPA published a document titled "Research Towards Developing Methods for Selected Pharmaceutical and Personal Care Products (PPCPs) Adapted for Biosolids", EPA/600/X-06/017, September 2006. EPA also developed analytical methods for over 100 pharmaceutical and personal care products for biosolids, water, soil, and sediment. These analytical methods were made are publicly available in December 2007 and are being used by EPA in a number of studies.
11	Publish the Proceedings of USEPA-USDA Workshop on Emerging Infectious Disease Agents and Issues Associated with Animal Manures, Biosolids, and Other Similar By-Products	**Completed**	A special issue of Compost Science, *Contemporary Perspectives on Infectious Disease Agents in Sewage Sludge and Manure* , was printed and distributed at the Water Environment Federation's Specialty Conference on Biosolids, April 17-21, 2005 in Nashville, TN.
12	Support “Sustainable Land Application Conference”	**Completed**	The proceedings (many of the papers prepared from the presentations) from the Sustainable Land Application Conference were published in a special issue of Journal of Environmental Quality (JEQ) in February 2005.
13	Review Criteria for Molybdenum in Land-applied Treated Sewage Sludge	**Underway**	EPA is assessing the appropriate level for a numerical standard for molybdenum in sewage sludge using additional data developed since 2000, including results from the Targeted National Sewage Sludge Survey. EPA expects to complete this assessment in 2009.
14	Improve Stakeholder Involvement and Risk Communication	**Ongoing**	EPA is working to make EPA information on biosolids more readily available to the public through the web. EPA has also made a number of overall improvements to its websites, including: (1) a new Public Involvement webpage at www.epa.gov/stakeholders/index.htm, (2) a new government web site at ExpectMore.gov, and (3) an online interactive forum ***Ask EPA*** (www.epa.gov/askepa) where you can discuss a wide range of environmental and human health issues with EPA's senior officials.

Targeted National Sewage Sludge Survey

The Targeted National Sewage Sludge Survey (TNSSS) is being conducted to examine sewage sludge for new types of contaminants that may accumulate in it during wastewater treatment and subsequently be present in sewage sludge following land application.

About the Study

EPA is working to understand the potential sources of pharmaceuticals and other contaminants of emerging concern (CECs) to the environment. Because many chemicals tend to accumulate in sewage sludge as a consequence of wastewater treatment, EPA initiated the TNSSS to characterize what CECs may be present in sewage sludge to be land applied. The survey included metals, inorganic ions, organics, and the subset of emerging contaminants that included polybrominated diphenyl ethers (PBDEs) and pharmaceuticals and personal care products (PPCPs).

EPA collected sewage sludge from 74 of 80 randomly-selected publicly owned treatment works (POTWs) that employ at least secondary treatment. The remaining facilities were not sampled either because they did not produce a final sludge product (e.g., partial treatment only) or because they employed ponds or lagoons as part of their sludge treatment process. Materials in lagoons continue to undergo physical and chemical changes and do not represent a “final product” until they are removed from the lagoon. Sample collection began in late August 2006 and continued through late March 2007.

EPA collected 84 samples of sewage sludge and analyzed sewage sludge samples (see attached Table 1 for a list of analytes). Additional sewage sludge samples were analyzed for a large suite of pharmaceuticals, drugs, steroids, and hormones (see attached Table 2 for a list of analytes).

We expect to complete the study in the fall of 2008.

Table 1. Target Analytes for the TNSSS, by Analyte Class

Analyte Class	Analyte	
Metals	Aluminum	Manganese
	Antimony	Mercury*
	Arsenic*	Molybdenum*
	Barium	Nickel
	Beryllium	Phosphorus
	Boron	Selenium*
	Cadmium*	Silver
	Calcium	Sodium
	Chromium*	Thallium
	Cobalt	Tin
	Copper*	Titanium
	Iron	Vanadium
	Lead*	Yttrium
	Magnesium	Zinc*
Polycyclic Aromatic Hydrocarbons (PAHs)	Benzo(a)pyrene	2-Methylnaphthalene
	Fluoranthene	Pyrene
Semivolatiles	bis (2-Ethylhexyl) phthalate	4-Chloroaniline
Inorganic Anions	Fluoride	Water-extractable phosphorus
	Nitrate/Nitrite	
Polybrominated diphenyl ethers (PBDEs) -focusing on the following congeners of potential environmental and public health significance	2,4,4'-TrBDE BDE-28	2,2',3,4,4',5'-HxBDE BDE-138
	2,2',4,4'-TeBDE BDE-47	2,2',4,4',5,5'-HxBDE BDE-153
	2,3',4,4'-TeBDE BDE-66	2,2',4,4',5',6-HxBDE BDE-154
	2,2',3,4,4'-PeBDE BDE-85	2,2',3,4,4',5',6-HpBDEBDE-183
	2,2',4,4',5-PeBDE BDE-99	DeBDE BDE-209
	2,2',4,4',6-PeBDE BDE-100	

* Metals currently regulated at 40 CFR 503

Table 2. Pharmaceutical Analytes of Interest (72 total)

Analyte	CAS #	Analyte	CAS #
Acid-Extractable Fraction Analyzed Under Positive Electrospray Ionization Conditions			
Acetaminophen	103-90-2	Miconazole	22916-47-8
Azithromycin	83905-01-5	Norfloxacin	70458-96-7
Caffeine	58-08-2	Norgestimate	35189-28-7
Carbadox	6804-07-5	Ofloxacin	82419-36-1
Carbamazepine	298-46-4	Ormetoprim	6981-18-6
Cefotaxime	63527-52-6	Oxacillin	66-79-5
Ciprofloxacin	85721-33-1	Oxolinic Acid	14698-29-4
Clarithromycin	81103-11-9	Penicillin G	61-33-6
Clinafloxacin	105956-97-6	Penicillin V	87-08-1
Cloxacillin	61-72-3	Roxithromycin	80214-83-1
Codeine	76-57-3	Sarafloxacin	98105-99-8
Cotinine	486-56-6	Sulfachloropyridazine	80-32-0
Dehydronifedipine	67035-22-7	Sulfadiazine	68-35-9
Digoxigenin	1672-46-4	Sulfadimethoxine	122-11-2
Digoxin	20830-75-5	Sulfamerazine	127-79-7
Diltiazem	42399-41-7	Sulfamethazine	57-68-1
1,7-Dimethylxanthine	611-59-6	Sulfamethizole	144-82-1
Diphenhydramine	58-73-1	Sulfamethoxazole	723-46-6
Enrofloxacin	93106-60-6	Sulfanilamide	63-74-1
Erythromycin – total [A]	F14001	Sulfathiazole	72-14-0
Flumequine	42835-25-6	Thiabendazole	148-79-8
Fluoxetine	54910-89-3	Trimethoprim	738-70-5
Lincomycin	154-21-2	Tylosin	1401-69-0
Lomefloxacin	98079-51-7	Virginiamycin	11006-76-1
Acid-Extractable Fraction Analyzed Under Positive Electrospray Ionization Conditions (Tetracyclines)			
Anhydrochlortetracycline	4497-08-9	4-Epichlortetracycline	14297-93-9
Anhydrotetracycline	4496-85-9	4-Epioxytetracycline	14206-58-7
Chlortetracycline	57-62-5	4-Epitetracycline	23313-80-6
Demeclocycline	127-33-3	Isochlortetracycline	514-53-4
Doxycycline	564-25-0	Minocycline [B]	10118-90-8
4-Epianhydrochlortetracycline	158018-53-2	Oxytetracyclin	79-57-2
4-Epianhydrotetracycline	4465-65-0	Tetracycline	60-54-8
Acid-Extractable Fraction Analyzed Under Negative Electrospray Ionization Conditions			
Gemfibrozil	25812-30-0	Triclocarban	101-20-2
Ibuprofen	15687-27-1	Triclosan	3380-34-5
Naproxen	22204-53-1	Warfarin	81-81-2
Base-Extractable Fraction Analyzed Under Positive Electrospray Ionization Conditions			
Albuterol	18559-94-9	Metformin	657-24-9
Cimetidine	51481-61-9	Ranitidine	66357-35-5

[A] Results reported for the sum of Erythromycin and Erythromycin-hydrate; no CAS number applies to the total.
[B] CAS number listed corrects typographical error in Method 1694.

Table 2 continued. Steroid and Hormone Analytes of Interest (25 total)

Analyte	CAS #	Analyte	CAS #
Steroids			
Campesterol	474-62-4	Epi-Coprostanol	516-92-7
Cholestanol	80-97-7	Ergosterol	57-87-4
Cholesterol	57-88-5	β-Sitosterol	83-46-5
Coprostanol	360-68-9	β-Stigmastanol [B]	19466-47-8
Desmosterol	313-04-2	Stigmasterol	83-48-7
Hormones			
Androstenedione	63-05-8	Estriol	50-27-1
Androsterone [A]	53-41-8	Estrone [C]	53-16-7
17α-Dihydroequilin	651-55-8	17α-Ethynyl Estradiol	57-63-6
Equilenin	517-09-9	Norethindrone	68-22-4
Equilin	474-86-2	Norgestrel	6533-00-2
17α-Estradiol	57-91-0	Progesterone	57-83-0
17β-Estradiol	50-28-2	Testosterone	58-22-0
β-Estradiol-3-benzoate	50-50-0		

[A] Earlier versions of the method for steroids and hormones listed this analyte as Androstenone, with a corresponding CAS number. However, Androsterone is the analyte of interest for this study.

[B] The method lists this compound under the CAS number 83-45-4, but the standard used by the laboratory lists the CAS number as 19466-47-8. CSC and the laboratory suspect that the difference reflects a stereoisomer and has used the identifier from the standard in the EPA database.

[C] Earlier versions of the method for steroids and hormones listed this analyte as Estriol-tris Estrone.