

APPENDIX A: PUBLISHED LITERATURE KEYWORD LIST

Search categories (not to be confused with review categories):

1. Collection Components and Corrosion
 - a. Review categories: 1, 3, 4 (from phase 1 outline)
 - b. Search team: LACSD
2. Containment, Ventilation, and Gas-Phase Treatment
 - a. Review categories: 7, 8 (from phase 1 outline)
 - b. Search team: OCSD
3. Liquid Phase and Biological Treatment (Enzymes, Bugs, etc.)
 - a. Review categories: 5, 6 (from phase 1 outline)
 - b. Review team: Stuetz and Cesca
4. Emissions Modeling and Compounds
 - a. Review categories 2, 9 (from phase 1 outline)
 - b. Review team: Corsi and Ward

Group 1

["Wastewater collection" OR Odor OR Sewer* OR "Collection System*"] AND
"Pump station"
"Force Main"
Gravity AND
Sewer OR Interceptor OR Line
Siphon
"Wet well"
Manhole
Interceptor
"Air release valve"
"Chemical feed"

“Odor control equipment”
“Oil water separator”
Drop
corrosion
Liner*
Coating
Pig*
Tunnels
“CSO/SSO system”
Hydrogen sulfide
Sulfides
Air jumper
Corrosion resistant concrete
Grease trap

Group 2

[“Wastewater collection” OR Odor OR Sewer* OR “Collection System*”] AND
Ventilation
 “Odor containment”
 Duct*
 “air handler”
 Headspace
 Cover*
 “Odor capture”
 “Ventilation rate”
 “Air exchange”
“Wet scrub*”
 “Packed Tower*”
 “Mist scrub*”
 Carbon
 Media
 Adsorption
 Absorption
 Biofilter
 Biotower
 Thermal
 Natural Ventilation
 Thermal
 Natural ventilation
 Forced ventilation
 corrosion

Group 3

[“Wastewater collection” OR Odor OR Sewer* OR “Collection System*”] AND
Hydrogen Peroxide
 Chlorine

Hypochlorite
Iron
“sulfur precipitation”
Nitrate
“Liquid phase”
Oxidation
Permanganate
Chlorite
Ferrous
Ferric
Caustic
Hydroxide“Anaerobic layer”
Biofilm
“Slime layer”
Anthraquinone
“Biological treatment”
Bacteria* AND
Additives OR inhibitors OR anaerobic OR “sulfur reducing”
“Caustic shocking”
Corrosion

Group 4

[“Wastewater collection” OR Odor OR Sewer* OR “Collection System*”] AND
Wastewater AND Emissions AND Models
INTERCEPTOR
BASTE
WATER9
TOXCHEM
(other models)
“Sulfide generation”
“Odor models”
“Hydrogen sulfide emissions”
“Reduced sulfur”
“Odor panel”
“D/T”
ammonia
mercaptan
sulfide
corrosion rate
sulfide formation

APPENDIX B: GRAY LITERATURE SOLICITATION LETTER AND UTILITY PARTNER LIST

May 10, 2007

Utility or POTW Manager
Water Reclamation Facility
One Breezy Lane
Anytown, Your State 12345

Subject: Water Environment Research Foundation (WERF)
Minimization of Odors and Related Corrosion in Collection Systems (WERF
Project #04-CTS-1)

Dear Utility Manager:

Before you is a timely and important request to support WERF by providing “gray” literature information related to odors and corrosion from your collection systems.

Odors that create nuisance conditions and citizen complaints often originate in wastewater collection systems because of their proximity to the public. As a result, odor impacts from wastewater collection systems have been targeted recently by many national and local newspapers, citizens groups, and regulatory agencies. Whether there are regulatory implications or not, most wastewater utilities recognize that reduction of odors from their operations is simply good policy. Corrosion related to odor emissions can also cause collection system failures and result in costly impacts to capital improvement programs. WERF has initiated a study focused on the prevention and mitigation of odors and related corrosion in collection systems. This study is intended to provide useful operational and design guidance to collection systems owners and operators.

As such, we request your consideration in providing important information of potential interest to WERF in connection with the referenced project. The first phase of the project will include a comprehensive assessment of recent technical literature that addresses the sources and control of wastewater collection system odors and corrosion. The research team is using several

Utility or POTW Manager

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methods to find and identify pertinent, "published" literature, but the team also recognizes some important literature and information on the subject may exist in the form of unpublished reports, many of them prepared for (or by) wastewater utilities such as yours. We refer to unpublished but important literature such as this by the term "gray literature."

The research team is interested in first obtaining information about the type and subject matter of gray literature that you have that addresses wastewater collection system odors and corrosion, then obtaining copies of any gray literature that the team feels is pertinent to the project. The team has developed a form for listing information about gray literature that you may have. The form is attached. We would appreciate if you could take a few minutes to complete the attached form and return it.

In order to stay on schedule, the project team is soliciting the participation and support of your organization with this gray literature request by December 16, 2005. Please fill out the attached form and either email or fax it to Dirk Apgar, Principal co-investigator from King County , whose email address is dirk.apgar@metrokc.gov and fax no. is 206-684-1945.

Mr. Apgar is responsible for collecting the survey forms and forwarding them to the WERF research team for compilation and review. He will then be back in touch with you or your designee for the purpose of obtaining copies of gray literature designated by the research team as being of interest to this project.

As with all WERF research efforts, the timeliness of responses to requests for information such as this is critical to timely completion of the research reports for the benefit of the WERF subscribers and the wastewater industry as a whole.

If you need further information regarding the technical background of the study feel free to contact Dirk Apgar or the project team leader Chris Easter at ceaster@ch2m.com, or call him at 804-559-4993.

Thank you in advance for your cooperation.

Best regards,

Dirk Apgar
Co-Principal Investigator
King County

APPENDIX C: VENDOR LIST

Appendix C. Vendors Contacted for Gray Literature	
Vendor	Contact
Praxair	Layana Moris
Aire Liquide	Philip Bost
Tridon Chemical	Elizabeth Cattana
Kemiron (formerly Eaglebrook)	Scott Selsethal
Bay Chemical	Doyle Keller
General Chemical	Karen Ruehl
Basic Chemical (formerly Vulcan)	Jerry Nemis
Davis Process/US Filter	Patrick Laidlaw
Carus Chemical (Permanganate)	John Boll
Premiere Chemical (Thioguard)	Matt Madolora
Advance Oxidation (VTX)	Mr. Cox
Alivia (Nitrazyme, and VX-456)	Jennifer Miller
FMC Chemicals	Marketing Division
US Peroxide (peroxide, PRI-SC)	John Walton
Filter Innovations Inc. (BioStreme, Hydralogic)	Irene
Byo-Gon*	Gary Sober
Ortec	Antonio Gisbert, CEO
Novozymes Biologicals	Greg DeLozier and Bernie
Enzymatic Odor Solutions, Inc. (EOSI)	Mike Durham & Wolfram Pinker
Drew Industrial (Ashland Chemical)	Marketing Division

APPENDIX D: LITERATURE REVIEW FORM

WERF Article Review Form

Tracking Number	
Author(s)	
Year	
Title	
Journal or Conference	
Reviewer	
Topic Statement	Enter a sentence Highlighting Main Topic
Topics Categories:	List, in order of importance, topic category numbers of topics addressed by the paper
Quality Rating	Rate quality A, B, or C
Important Conclusions:	List important findings or conclusions of the paper.
Presents Experimental Data?	Enter 'Yes' or 'No'
Presents Model Results?	Enter 'Yes' or 'No'
Presents Case Study(ies)?	Enter 'Yes' or 'No'
Identified Data Gaps:	List potential topics or areas that are underrepresented in the technical literature.

- Topic Category Number
- 1 Collection System Component Physical Design Guidelines
 - 2 Odor and Corrosion Compound Formation Mechanisms
 - 3 Corrosion Mechanisms
 - 4 Corrosion Protection including linings and coatings
 - 5 Liquid Phase Chemical Treatment
 - 6 Liquid Phase Biological Treatment including Enzymes and bacterial seeding
 - 7 Ventilation Approaches
 - 8 Gas Phase Treatment Approaches
 - 9 Emissions corrosion models
 - 10 Pump Stations and force mains
 - 11 Gravity Sewers
 - 12 Tunnels
 - 13 CSO/SSO systems
 - 14 Misc. (Junction Boxes, Drop Shafts, Siphons, etc.)

- Quality Rating
- A Highly applicable pertinent paper published in peer reviewed journal and provides sufficient data to backup conclusions. Essentially this is a high priority valuable paper with an excellent rating.
 - B Applicable pertinent paper providing sufficient data to backup conclusions but does not have to be from a peer reviewed journal (i.e. could be from a conference proceeding, or well documented gray literature). Essentially this is a valuable paper with valuable information and a good rating.
 - C Paper that either proves not to be pertinent to our areas of interest or that does not provide backup information for major conclusions. Essentially this is a poor quality paper that either does not apply to our interest or has questionable conclusions.