

OSWW NONPOINT SOURCE UPDATE: ONGOING AND EMERGING ISSUES

(Centralized Intern Training Fact Sheet)

For further information:

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It is estimated that as much as 70% of the water pollution in the US comes from nonpoint sources (NPS). Nonpoint sources of pollution can contaminate local and regional surface and ground waters. Pollutants that potentially come from OnSite Systems include nutrients, pathogens, and endocrine disrupting chemicals. The goals in pollution reduction and some of the important environmental and human health issues are described. Pollutants, such as nitrates, are important in designated nutrient sensitive river basins (in NC Neuse and Tar-Pamlico). The NPS program in the Onsite Wastewater Section- DEH, stems from the Clean Water Act and the 319 NPS Program (DWQ) in NC. Web links and other resources** for further study are linked below to the NPS links section.

NUTRIENTS:

Goals: reduce amount of ammonium, nitrates, and phosphates leaching to surface and groundwater.

Lowered amounts = reduced toxic or environmental effects.

Effects:

nitrates (human and environmental effects) harmful algal blooms (HAB's) –

Cultural eutrophication - Methemoglobinemia (blue baby) – Some evidence of spontaneous miscarriages – Low levels of nitrates prove toxic to amphibian tadpoles

phosphates – Harmful algal blooms & cultural eutrophication.

PATHOGENS:

Goals: reduce pathogens introduced into groundwater and surface waters. Reductions not effective unless below infectious doses of viruses, bacteria, protozoa, fungi, nematodes, tapeworms (see list of selected wastewater pathogens below.)

Effects: The list lengthens –potential increasing incidence, human travel, population increases, etc...

Viruses – very tiny – do not reproduce outside body - one fate, transport & persistence model does not fit all ---

Bacteria – some may keep on reproducing

Protozoa – many have resistant stages.

One of top 4 emerging pathogens – Cryptosporidium (cryptosporidiosis) –

One tough bug –physiology more like ours –

Persistent (18 months in surface waters) –

Extremely resistant to disinfection –

many (fecal – oral) routes of infection: day care/ recreational waters/ drinking water/handling infected animals/ contaminated food / etc. – Host list lengthens: humans/ cattle/ swine/ geese etc. – High mortality rates in individuals with weakened immune systems (immunocompromised & immunosuppressed).

Worms: May live years / children at risk

(Good news – given proper conditions, free-living microbes may treat and/or eat many pathogens!)

EMERGING ISSUES - EMERGING ISSUES - EMERGING ISSUES - EMERGING ISSUES –

ENDOCRINE DISRUPTING CHEMICALS (EDC) and PHARMACEUTICALS –

Emerging Issues: Potential and identified EDC and Pharmaceuticals pollutants from wastewater.

Goals: To identify contributions, if any, to surface and groundwater from onsite systems in comparison to those being identified in wastewater in general. To identify and evaluate wastewater treatment technologies and reduce pollution from these chemicals.

EDC - These chemicals have hormonal effects in humans and animals –

- A wide variety of chemicals –
- Data being gathered in surface and groundwater (USGS, DEH, etc..)
- Significant human and environmental effects are being documented related to exposure to these chemicals

Pharmaceuticals: These compounds are implicated in increasing rates environmental antibiotic resistance.

WASTEWATER TECHNOLOGIES:

Emerging Issues: Identify and implement use of alternative (innovative) OSWW technologies, reducing NPS pollution and decreasing the risk of surface and groundwater contamination from onsite systems.

Goals:

- Identify contributions to surface and groundwater from onsite systems in comparison to those being identified in wastewater in general.
- Identify wastewater treatment technologies that effectively reduce pollutants (nutrients, pathogens, etc) from onsite systems.
- Identify areas, target watersheds, and implement programs in NC, where more stringent onsite requirements would be most effective in pollutant reduction.

These requirements might include: new on-site technology requirements, advanced pretreatment systems, disinfection requirements, increased setback distances, life cycle management strategies and inspection requirements.

*LIST OF SELECTED POTENTIAL WASTEWATER PATHOGENS/DISEASES		
Category	Pathogen	Disease
VIRUSES		
	Enteroviruses > many types	gastroenteritis, meningitis, respiratory infections
	Coxsackie A, B	meningitis. other diseases
	Hepatitis A	infectious hepatitis
	Adenovirus (>40 types)	respiratory disease/ eye infections
	Rotavirus	gastroenteritis
	Parvovirus	gastroenteritis
	Norwalk virus (Norwalk-like virus)	diarrhea, fever, vomiting
	Reovirus	respiratory disease
	Astrovirus	gastroenteritis
	Calicivirus	gastroenteritis
	Coronavirus	gastroenteritis
FUNGI		
	<u>Aspergillus fumigatus</u>	respiratory infection
	<u>Candida albicans</u>	skin/membrane infections
BACTERIA		
	<u>Shigella</u>	shigellosis (dysentery)
	<u>Salmonella typhi & S. paratyphi</u>	typhoid fever
	<u>Salmonella (>1,000 serotypes)</u>	salmonellosis

	<u>Vibrio cholerae</u>	cholera
	<u>Escherichia coli (enter)</u>	gastroenteritis
	<u>Yersinia enterocolitica</u>	yersiniosis/ gastroenteritis
	<u>Leptospira spp.</u>	leptospirosis
	<u>Campylobacter jejuni</u>	gastroenteritis
	<u>Clostridium perfringens</u>	gastroenteritis
PROTOZOA		
	<u>Balantidium coli</u>	dysentery/ gastrointestinal ulcers
	<u>Cryptosporidium parvum</u>	diarrhea / nausea / fever
	<u>Entamoeba histolytica</u>	amoebic dysentery
	<u>Giardia lamblia</u>	giardiasis (diarrhea)
ROUNDWORMS		
	<u>Ascaris lumbricoides</u>	ascariasis
	<u>Ancylostoma duodenale</u>	hookworm
	<u>Necator americanus</u>	necatoriasis / hookworm
	<u>Trichuris trichiura</u>	whipworm / trichuriasis
	<u>Toxacara</u>	roundworms
TAPEWORMS		
	<u>Taenia saginata</u>	taeniasis
	<u>Taenia soleum</u>	taeniasis
	<u>Vampyrolepis(Hymenolepis) nana & H. diminuta</u>	worm infection -(brain)