

Contaminants of Emerging Concern

Harvey Packard
September 23, 2016

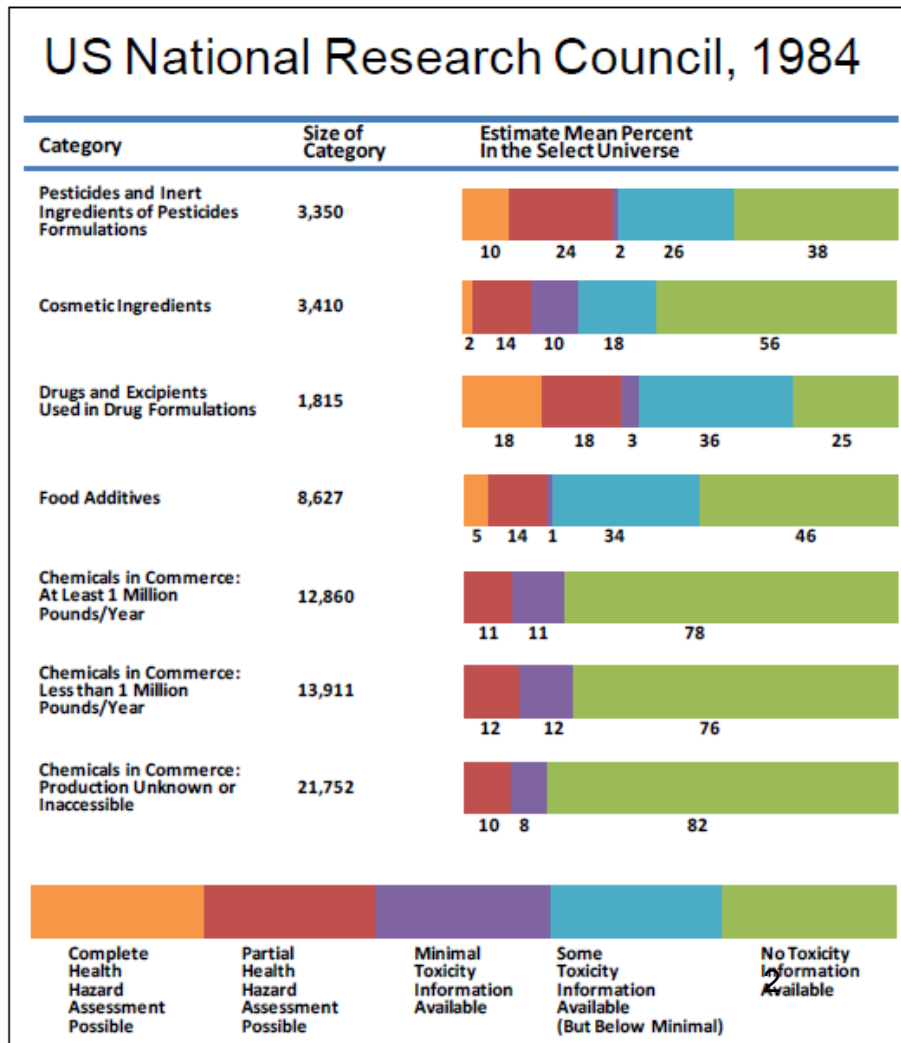


Risk Assessment and the Chemical Universe

A Long-Term Problem

1974 US NRC report

- Major challenge is too many chemicals and not enough data
- Estimated number of chemicals = 65,725
- Number of chemical with no toxicity data of any kind = 46,000



Chemical Universe

- *Since 1984 some progress has been made*
- *Other estimates of the chemical universe*
 - *Chemical Abstract Registry - >100 million*
 - *TSCA Inventory = ~85,000*
 - *REACH Inventory = ~150,000*
 - *US & Canadian estimates of ~30-40k substances in active commercial use*

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Office of Research and Development
National Center for Computational Toxicology

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STATE OF CALIFORNIA
CENTRAL COAST WATER BOARD
Received
JUL 18 2006
895 AeroVieta Place, Ste. 101
San Luis Obispo, CA 93401-7973

TASK 3
LOS OSOS UPPER AQUIFER
WATER QUALITY CHARACTERIZATION

Prepared for the
LOS OSOS COMMUNITY SERVICES DISTRICT



June 2006

CLEATH & ASSOCIATES
1390 Oceanaire Drive
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004915

Table 6 - Emerging Contaminants

ANALYTE	R.L.	UNITS	NL/RL	RESULTS							
				BLANKS			13F1	13Q1	7Q1	17E9	18F1
				EQ#1	EQ#2	CW					
PPCPs											
Acetaminophen	5	ng/l		ND	ND	ND	ND	ND	ND	ND	
Caffein	16	ng/l		ND	ND	ND	ND	ND	ND	ND	
Carbamazepine	1	ng/l		ND	ND	ND	ND	26	31	98	
Cotinine	1	ng/l		ND	ND	ND	ND	ND	ND	ND	
1,7-Dimethylxanthine	1	ng/l		ND	ND	ND	ND	ND	ND	ND	
DEET	10	ng/l		ND	ND	ND	ND	ND	ND	ND	
Ibuprofen	7	ng/l		ND	ND	ND	ND	ND	ND	ND	
Lincomycin	2	ng/l		ND	ND	ND	ND	ND	ND	ND	
Sulfadimethoxine	2	ng/l		ND	ND	ND	ND	ND	ND	ND	
Sulfamethazine	1	ng/l		ND	ND	ND	ND	ND	ND	ND	
Sulfamethoxazole	1	ng/l		ND	ND	ND	115	300	92	250	
Sulfathiazole	10	ng/l		ND	ND	ND	ND	ND	ND	ND	
Triclosan	1	ng/l		2.1	ND	ND	ND	ND	ND	1.4	
Trimetoprim	2	ng/l		ND	ND	ND	ND	ND	ND	ND	
Tylosin	2	ng/l		ND	ND	ND	ND	ND	ND	ND	
Hormones & Steroids											
Testosterone	1000	ng/l		ND	ND	ND	ND	ND	ND	ND	
Equilenin	50	ng/l		ND	ND	ND	ND	ND	ND	ND	
Estriol	200	ng/l		ND	ND	ND	ND	ND	ND	ND	
Progesterone	1000	ng/l		ND	ND	ND	ND	ND	ND	ND	
Coprostan-3-ol	100	ng/l		ND	ND	ND	ND	ND	ND	ND	
Cholesterol	50	ng/l		430	420	600	350	310	570	420	
Dihydrocholesterol	100	ng/l		ND	ND	ND	ND	ND	ND	ND	
Stigmaterol	100	ng/l		ND	ND	230	270	ND	ND	310	
Sitosterol	100	ng/l		100	ND	1600	1900	120	180	2200	
Stigmastanol	100	ng/l		ND	ND	ND	ND	ND	ND	ND	
Other											
1,4-Dioxane	2	µg/L	3/300	na	na	na	ND	ND	ND	ND	
N-Nitrosodimethylamine (NDMA)	2	ng/L	10/200	na	na	na	ND	(12)	(17)	ND	

Table Notes

R.L. = reporting limit
MCL = Maximum Contaminant Level
NL/RL = Notification Level (customer notification required)/ Response Level (source removal recommended)
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
µg/L = micrograms per liter
ng/L = nanograms per liter
EQ#1 = Equipment Blank #1
EQ#2 = Equipment Blank #2
CW = Clean Water (distilled water)

Results exceeding MCL or RL are bolded with shaded background
Results exceeding NL are bolded and in parentheses

News

The following article was posted on February 18th, 2009, in the New Times - Volume 23, Issue 29

[[Submit a Story](#)]

Share:   

Tumors and sex changes: a goby story

Cal Poly researchers suspect a chemical is affecting Morro Bay fish

BY COLIN RIGLEY



POISONED

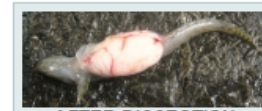
Cal Poly biologists thought Morro Bay goby fish were just pregnant before they cut them open and found liver tumors.

PHOTO COURTESY OF SARAH JOHNSON

It's hard not to see the irony: A common chemical sometimes used in spermicides may be turning fish into hermaphrodites.

The chemical is called nonylphenol (pronounced "non-il-fe-NALL") and it is increasingly being eyed as the cause of some unexpected developments in goby fish.

The compound is used most commonly for industrial purposes, but is also a common ingredient in detergents, cosmetic products, and spermicides.



AFTER DISSECTION

PHOTO COURTESY OF SARAH JOHNSON

Studies suggest the chemical could be responsible for giving male fish female parts. Transgender fish haven't turned up in local waters yet, but in Morro Bay the same chemical is suspected of causing goby fish to grow pale, vein-coursed liver tumors.

Local biologists can't be certain there's a connection, but they are suspicious. Last spring, Cal Poly biologist Lars Tomanek, along with others from Cal Poly and the Central Coast Regional Water Quality Control Board, went to investigate what chemicals might be leaching into local waters. They tested gobies because they're bottom dwellers and a good indication of what's in the sediment.

Tomanek said some of the gobies looked pregnant—they weren't. The group soon found that the gobies, and particularly their tumors, were riddled with nonylphenol.

"That's all we found," Tomanek said. "And we're like, OK, what the heck is that?"

He estimated about 10 percent of the fish they found had tumors.

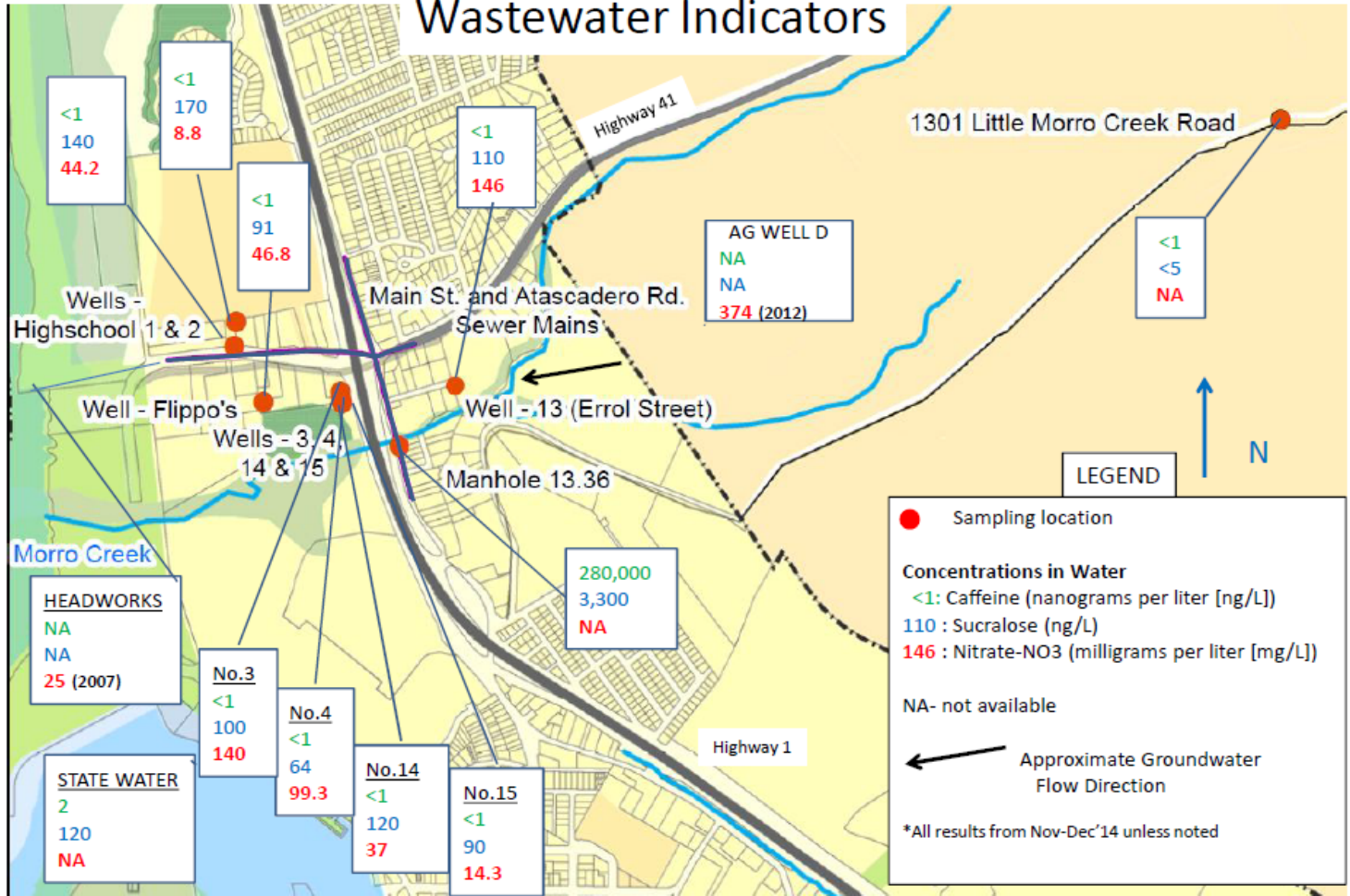
Nonylphenol is a degraded form of the chemical nonylphenol ethoxylate. That chemical helps break down other compounds, which makes it useful in products such as detergents. But when the chemical goes through sewage treatment it breaks down to the more hazardous nonylphenol form.

Such chemicals as nonylphenol have some environmentalists concerned because they often slip through sewage treatment and end up in the ground and water. Sewage sludge, the solid byproduct, and septic tanks are big contributors of nonylphenol. County officials have banned sludge application to local lands, but that ban will expire in a year. A new ordinance that would allow some land application is working through the approval process, but some environmentalists have raised questions over how the ordinance would prevent chemicals and heavy metals from being leached.



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Wastewater Indicators



Item 16 Presentation
 May 28-29, 2015
 Staff Presentation

2015 - 2016 Constituents of Emerging Concerns Sampling Results

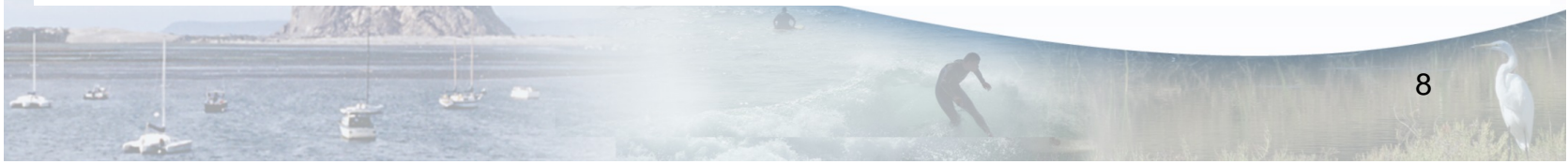
All Results in nanograms per Liter (1 part per trillion = 0.000000001 gram per Liter)

Results reflect only detected compounds -- analysis included testing for 96 Constituents of Emerging Concern

Sampling Dates		9/01/15: 1st quarter				11/02/15: First Flush		12/15/15: 2nd quarter				3/01/16: 3rd quarter				4/07/16: High steady flow				6/07/16: 4th quarter									
Sampling Locations (Note: Not all sampling locations were included in every sample collection)		GHWTP (treated water)	SLR @Felton	SLR @Taft	North Coast Composite	loch Lomond	SLR @Felton	SLR @Taft	GHWTP (treated water)	SLR @Felton	SLR @Taft	North Coast Composite	loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Taft	North Coast Composite	loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Taft	North Coast Composite	loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Taft	North Coast Composite	loch Lomond	Raw Blend (treatment plant influent)
Chemical Type or Use with Common Name if Applicable	Detected Analytes																												
Herbicide	2,4-D						28																						
Artificial sweetener (Sunett and Sweet One)	Acesulfame- K	55	170	130			150	140						57	100	94													
Beta blocker drug used to treat heart conditions	Atenolol						34	44	16	98	99	10		8.3	5.7	9.9	5.1			21	54	24				61	95	89	68
Herbicide	Atrazine								6.2																				
Antibiotic	Azithromycin													68															
Fibrate drug used to treat high cholesterol	Bezafibrate						15																						
Industrial chemical found in polycarbonate plastics and epoxy resins	BPA (bisphenol A)						14																						
Stimulant (coffee, tea, some energy drinks)	Caffeine						270																						
Herbicide	Cyanazine						11		96	24	7.5	17		7.7															
Foaming agent and thickener used in cosmetics, shampoo and soaps	Diethanolamine (DEA)																										10	9.6	
Insect repellent	DEET		30				32	13		12																20	27	33	44
Non steroidal anti-inflammation drug (NSAD) (Advil, Motrin)	Ibuprofen						63																						
Contrast media used for x-ray imaging	Iohexal						34		13	27		15																	
Contrast media. IV use for CT scans	Iopromide						120																						
Paraben family of preservatives in personal care products (body lotion and deodorant)	Isobutylparaben						13																						
Paraben family of preservatives in personal care products (body lotion and deodorant)	Methylparaben						470																						
Non steroidal anti-inflammation drug (NSAD) (Aleve, Naprosyn)	Naproxen						29																						
An organic chemical used in the manufacture of a variety of other products such as dyes, some pharmaceuticals, and niacin (vitamin B3)	Quinoline																			12									
Artificial sweetener (Splenda)	Sucralose		110				230							150	300	280				150	160							190	
Methylxanthine drug used to treat lung problems such as asthma, emphysema and chronic bronchitis.	Theophylline									41																			

GREEN Detected only in 1st flush event
 BLUE Frequently detected in moderate parts per trillion amounts (50-300 ng/L)
 BLACK Infrequently detected in low parts per trillion amounts (<100 ng/L)
 Cells with no data = Non Detect (ND) or below Method Reporting Level (MRL)

Final July 28, 2016



Upcoming USGS Study

- 100 wadeable streams including in Salinas and Santa Maria watersheds
- 6 weekly samples
- Water quality, sediment, tissue, bioassessment
- Pesticides, PPCPs, EDCs, nutrients



Current OCWD CEC Monitoring Targets

Hormones

Compound	Type/Use
17a-Estradiol	hair loss & hormone therapy
17a-ethynylestradiol	estrogen, contraceptive
17b-Estradiol	human sex hormone & steroid
4-androstene-3,17-dione	steroid hormone
Diethylstilbestrol	synthetic estrogen
Epitestosterone (cis-testosterone)	natural steroid
Equilin	horse estrogen, Premarin
Estril	estrogen
Estrone	estrogen
Progesterone	steroid hormone

Personal Care Products & Other

Compound	Type/Use
Aspartame	artificial sweetener
Bisphenol A	plasticizer
Caffeine	stimulant, food additive
N,N-diethyl-m-toluamide (DEET)	insect repellent
Neotame	artificial sweetener
Sucralose	artificial sweetener
Triclosan	antibacterial, antifungal
Tris-2-chloroethyl phosphate	flame retardant
NDMA	disinfection by-product

Pharmaceuticals

Compound	Type/Use
Acetaminophen	analgesic medicine
Atenolol	beta blocker
Azithromycin	antibiotic
Carbamazepine	anticonvulsant
Diclofenac	anti-inflammatory (Volaren)
Dilantin	anti-convulsant
Erythromycin	antibiotic
Fluoxetine	anti-depression (Prozac)
Gemfibrozil	anti-cholesterol (Lopid)
Ibuprofen	anti-inflammatory (Advil, Motrin)
Iohexol	phase contrast media
Iopromide	phase contrast media
Meprobamate	anti-anxiety
Naproxen	anti-inflammatory (Aleve)
Primidone	anti-convulsant (Mysoline)
Sulfamethoxazole	antibiotic
Trimethoprim	bacteriostatic antibiotic

Covers original CDPH/DDW requirements + newer SWRCB CEC monitoring requirements

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GWRS CEC Monitoring Results



- ▶ **Quarterly Final Product Water (FPW) testing since 2008**
 - Hormones & other EDCs never detected (RDLs = 1-2 ng/L)
 - Quantifiable detections of PPCPs are rare
 - NDMA: a bit more frequently detected, but consistently < 10 ng/L DDW NL

- ▶ **Periodic assessments CEC removal by RO + AOP systems**
 - CEC detections rare in RO permeate, similar to FPW
 - Paired AOP testing consistently ND
 - Loss of RO salt rejection w/ membrane age appears to generally precede loss of CEC rejection

Table M-13: Constituents of Emerging Concern

Constituent	Relevance/ Indicator Type	Type of Sample	Minimum Frequency of Analysis	Reporting Limit (µg/L)	Monitoring Locations ¹⁴	
					Prior to RO	Following treatment prior to well injection
17β- estradiol	Health	grab	Annually	0.001		X
Caffeine	Health & Performance	grab	Annually	0.05	X	X
NDMA	Health & Performance	grab	Quarterly	0.002	X	X
Triclosan	Health	grab	Annually	0.05		X
DEET	Performance	grab	Annually	0.05	X	X
Sucralose	Performance	grab	Quarterly	0.1	X	X

Monitoring Unregulated Drinking Water Contaminants

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About the Unregulated Contaminant Monitoring Rule (UCMR)

Meetings and Materials

Laboratory Approval Program

Occurrence Data

Reporting Requirements

UCMR 4

Learn About the Unregulated Contaminant Monitoring Rule

EPA uses the Unregulated Contaminant Monitoring Rule (UCMR) to collect data for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act (SDWA).

The SDWA Amendments of 1996 provide for:

- Monitoring no more than 30 contaminants every five years
- Monitoring large systems and a representative sample of small public water systems serving less than 10,000 people
- Storing analytical results in a National Contaminant Occurrence Database (NCOD)

EPA's selection of contaminants for a particular UCMR cycle is largely based on a review of the Contaminant Candidate List (CCL).

EPA pays for the analysis of all samples from systems serving 10,000 or fewer people.

EPA coordinates an approval program for laboratories that wish to analyze public water system samples.

- > Why was the UCMR program developed?
- > How does EPA select the contaminants for UCMR?
- > What are the public health benefits of UCMR?

[Contact Us](#) to ask a question, provide feedback, or report a problem.

FDA Bans 19 Chemicals Used In Antibacterial Soaps

September 2, 2016 · 12:56 PM ET



The FDA says there's no evidence that antibacterial soaps do a better job cleaning hands, and chemicals in them may pose health hazards. The FDA ban applies only to consumer products, not those used in hospitals and food service settings.

Mike Kemp/Blend Images/Getty Images

Consumers don't need to use antibacterial soaps, and some of them may even be dangerous, the Food and Drug Administration says.

On Friday, the FDA issued a rule [banning](#) the use of triclosan, triclocarban and [17 other chemicals](#) in hand and body washes, which are marketed as being more effective



No Drugs Down the Drain!



SHARP SOLUTIONS
for home medicines

IN SANTA CRUZ COUNTY,
INCLUDING THE CITIES OF SANTA CRUZ,
WATSONVILLE, CAPITOLA AND SCOTTS VALLEY

*Safe, Free, Disposal
of Medicines and Sharps*



What do I do with...

RESIDENTS 	BUSINESS 	SCHOOLS 	ABOUT THE IWMA 	RECYCLING GUIDE 	
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Medicine & Prescription Drugs

HAZARDOUS WASTE

★ See Alternatives

Your local pharmacies and the San Luis Obispo County IWMA have teamed up to provide a **free** disposal program for household over-the-counter and prescription medications, including pills, ointments and lotions. Any resident of San Luis Obispo County may dispose of their unwanted medicine through the program.

How Does it Work?

Most pharmacies will offer you a free prepaid, pre-addressed envelope when you pick up your prescription. Use this envelope to mail unwanted medicine off for safe disposal. You can also get a free mail-back envelope if you previously purchased your prescription from the pharmacy. Other pharmacies have kiosks where you can discard of unwanted medicine. Some kiosks cannot accept controlled substances. At those locations, the pharmacy will provide a mail-back envelope for the proper disposal of controlled substances, such as Tylenol with Codeine, Valium, Vicodin and Percocet. See the [full list of commonly controlled substances](#).





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PRESS RELEASE

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June 22, 2016
FOR IMMEDIATE RELEASE

Santa Barbara County Board of Supervisors Adopt Safe Drug Collection Program Ordinance

On June 21, 2016, the Board of Supervisors became the first County in Southern California to pass an Extended Producer Responsibility ("EPR") ordinance which will provide a new program for residents to safely dispose of their unused household medications at pharmacies in Santa Barbara County.

The average American uses a dozen prescriptions per year, many of which go unused. Yet there are limited options for residents to safely dispose of unused medications. The accumulation of medication increases the opportunity for misuse, abuse and diversion. Further, improper disposal of medications pollutes our environment, including our water supply.

Third District Supervisor Doreen Farr, who has led local efforts to establish the program, stated, "This new program is critically important to protect the public health and safety of Santa Barbara County residents and our environment. This drug collection program will help reduce toxic pollutants in our water supply and decrease the availability of addictive drugs in our homes and community."

Conclusion

- CECs are widespread
- Effects not well understood
- Board can
 - Monitor
 - Advocate
 - Promote

