

preface: I thank the East San Joaquin coalition (Parry Klassen) and SCCWRP (Steve Weisberg) for making my presentation to the expert panel possible.

fact-of-problem: agriculture leaks chemicals into the environment.

science-at-a-glance: Toxaphene was an insecticide used on cotton, nut crops and in cattle rubs for decades, until it was banned. Like nitrates, it had the ability to cause methemoglobinemia - stop a baby's blood from carrying oxygen and turn the baby blue, among things. A 1995 SCIENCE December issue reported on Lake Siskiyou, Isle Royal, an isolated lake on an isolated island in Lake Superior free of industry - the national park had never seen industry. Scientists cored the lake's sediments and found toxaphene and PCBs in the layers stacked after 1940. Scientists cored the Arctic's ice and in the layers after 1940, they found toxaphene. That easily explained: farmers have been growing cotton in the Arctic for years! The recent WACAP study looked at the purest of pure water in the United States - western National Parks like Sequoia - and they found DDT dieldrin and mercury in the flesh of trout in highcountry streams, sometimes above the EPA's threshold for consumption. Del Cabo (Jacobson Farms) sued Western Farm Services for spray drift and won in court. Where is Harry Potter when we need him! All we have is the ILRP.

purpose of the ILRP: The Central Valley Regional Water Quality Control Board is to muzzle these chemical vipers and keep them caged so that they don't wander off into the environment and bite an unsuspecting person.

backdrop of laws applicable to the ILRP: I heard it said that California's Porter-Cologne Act is older than the federal Clean Water Act, and the federal CWA doesn't apply. That fact is wrong. Congress adopted the Federal Water Pollution Control Act in 1948, long before Porter-Cologne. In 1968 Congress adopted the federal Antidegradation statutes. In 1972 Congress combined the two and renamed the act "the Clean Water Act," and revised it again in 1977 with more amendments. The CWA focused on 'point-source' pollution, and "agricultural and silvicultural activities, including runoff from fields and crop and forest lands" were labeled as "nonpoint sources of pollution" not covered by the act. In the later amendments, states were directed - but not required - to enlist "best management practices" (BMPs) to control NPS, nonpoint sources of pollution.

Meanwhile, California engaged in the federal Coastal Zone Management Act (CZMA) and had adopted the Porter-Cologne Act in the Water Code. Later amendments to CZMA, known as the Coastal Zone Act Reauthorization Amendments, or CZARA, required the BMPs not required in the CWA. To help regulators out, the US EPA published two guides which are on line: "GUIDANCE SPECIFYING MANAGEMENT MEASURES FOR SOURCES OF NONPOINT POLLUTION IN COASTAL WATERS and NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE. The Board was already at the plate battling the Porter-Cologne Act's ILRP. But CZARA applies too.

Congress then added and made changes to 7 CFR part 634 known as the Rural Clean Water Program that furnished federal funds to monitor water quality and to make Water Quality Plans that identified BMPs. Marin County Extension developed a template for water quality on the farm and UCCE patented it.

The laws that the Board operates under are piecemeal. The State's water Resources Control Board's (differs from the Water Quality Control Board) Office of Chief Counsel put a summary of California's

water laws on line which states that the Board is "the state water pollution control agency for all purposes under the Clean Water Act."

These, I believe, are the facts of California's regulatory agonies and ecstasies.

compliance: Emory University (2018) analyzed milk samples across the U.S., and (excluding organic milk which was free of antibiotics) 37% of the samples had sulfamethazine, which is banned from milk. Dairies must pitch out the milk from a period of time after a cow is treated with it. 26% of the samples contained sulfathiazole, another banned antibiotic. More than half the conventional dairies were cheating. 59% of the samples contained traces of the use-restricted pesticide chlorpyrifos, damning the enforcement network and mocking compliance. I have a hunch that Parry Klassen's farmers are doing a better job of compliance, but I have no way of telling.

flawed ILRP/ analytical standards: Contaminants in water when they reach a lab are called analytes, and labs follow certain analytical procedures to measure their presence. These standards are identified by number. (See "Additional handouts" ESJWQC's "Field Collection and Laboratory Measurement Methods Presentation" from Melissa.) For example, the APPL lab used EPA 8151A to test for 2,4-D.

This is an EPA-approved method of monitoring this analyte in a laboratory' the standard was published in the Federal Register, received comments, and adopted into the Code of Federal Regulations. The Water Board demands EPA-approved methods because it makes it easier for them to walk a violator into court. Many times, an analyte can have more than one analytical method that's EPA approved - different detection limit, or twin methods, one for the chemical and another for its family group - or a method for its breakdown product in the soil or water. EPA-ACCEPTED methods (differ from EPA-APPROVED) may be accepted by one EPA region and rejected by another. 'Barefoot methods include counting earthworms in a shovelful of soil. More earthworms this year than last mean that the soil is improving; Organic farmers have to demonstrate improvements to soil and water quality (7 CFR 200 et seq). Proprietary instruments are patented meters that companies sell, such as Hach Chemical Company's DO luminescence meter for measuring dissolved oxygen. The meter doesn't need periodic recalibration and replaces the EPA-approved Winkler method.

The Board requires only lab-assisted, EPA-approved methods in monitoring, and this requirement may not be cost-effective.

For example, turbidity meters in the field produce a more accurate NTU measurement than the lab can, because samples age and degrade in the lapse of time getting them to the lab. EBMUD data from the Mokelumne River shows both lab and field data, which differ! A turbidity meter is reliably accurate and spares the extra steps of laboratory analysis, which can be more precise but less accurate.

The Board used to require data to be SWAMP-comparable, and now it requires data to be CEDEN-compatible so that a broader range of scientists can use the data. Macroinvertebrate studies meeting CEDEN standards will have used meters in the field.

For cost-effective monitoring, and for richer data, some methods can be swapped for others in the ILRP.

But other issues exist. For example, East San Joaquin tests for atrazine - the mcl is 3 micrograms per liter of water. Simazine is about the same. Hexazinone has no mcl, and no one tests for it. All three are triazines, and all three have some of the same breakdown products. All these triazines are pyrimidine-

based, and they cause the same kind of birth defects and health effects. But we don't regulate complex mixtures, even though 6 micrograms of atrazine has about the same effect as 2 micrograms of atrazine, 2 micrograms of simazine and 2 micrograms of hexazinone. Hexazinone is the silvicultural version of atrazine that we don't test for - it has no mchl!

If Tesla built an EV with no doors to the car, people would scratch their heads. If I scrutinized the constituent list and analytic methods that the Board requires, I'd go bald from scratching.

We still reside in the dark ages of chemical safety testing, but that is about to change. The EPA is using "computational toxicology" to figure out the toxicity of molecules. 40 years ago the same process called RPAR was used to re-register pesticides under the revised FIFRA, but we now have molecular structures that computers model and identify safety hazards. And we are envisioning new hazards. The December ENVIRONMENTAL FACTOR newsletter of NIEHS recognized that the epidemic of autism comes from exposures to EDCs, endocrine-disrupting compounds, particularly, those that disrupt thyroid hormone balance. Phthalate esters (surfactants in pesticides) in 2019 studies were linked to hypospadias, a birth defect in males on the 'rise'.

If lab results show that a chemical is out of line, an exceedance, in other words, the management plan to control it can mean that half the farmers switch to an alternate pesticide. The number of exceedances goes down, the amount of chemical loading goes up.

The ILRP's cage door was left open and chemical vipers can get out. The program needs tightening.

It is necessary to monitor water quality and to monitor BMPs, because the future of computational chemistry promises edge-of-field monitoring. In a few years, we take a sample, run it through high-resolution mass-spec' and send the data by cell phone to the EPA's mainframe that returns a list of contaminants in the sample. The comptox chemical dashboard is already on line, but it's accuracy is 50%, leaving room for improvement in the program. A few more years to dash the kinks!

Changes to the ILRP can be reconciled with the future. Labs test individual substances, we need to work with complex mixtures.

The CWA provisions for alternative methods to be used in monitoring water quality. The Board demands lab-assisted, EPA-approved methods which cost more. Since budgets are usually fixed amounts, the data can be enriched with cheaper analytic methods that demonstrate the same utility.

audit fatigue: The Board has heard this suggestion many times before, and the CWA provisions for a reduction in duplicated paperwork. Paperwork and audits can be a burden. For example, the Water Board staff may inspect a farm, and the Board requires paperwork that is duplicated in other required paperwork. An Organic farmer is required to have an OSP, an "organic system plan" that reflects how the farmers meets 7 CFR 200 et seq - that is, shows how he or she improved the natural resources, including soil and water. Companies like WalMart, General Mills and Pepsico demand that their suppliers be certified "sustainable," Sustainability is based on the pillars of people, profit and planet - to WalMart that means zero waste by 2025, an ambitious goal. Certified agronomists and certified crop advisors certify farms as sustainable, and that means, IPM, rotation of crops, etc. BMPs! The same BMP gets reported to the Water Board, the Organic certifier, and to the CCA. GAP, FSMA also require inspections and reports of the same data. Theoretically, a farmer could be tied up for five consecutive days with inspections, all auditing the same BMPs in different reports.

The CWA outlaws this, but the Board insists that the CWA doesn't apply to California, and since it's not in the Porter-Cologne Act, the hell with "audit fatigue."

I sat with the stakeholders' group to advise the Board on the ILRP, and many itmes I made a point reiteration after reiteration - their solution: they wanted CCOF to be a coalition group, and therefore, do the Board's inspections as well as condense the paperwork. CCOF is looking at combining sustainability certification with the OSP.

bad eggs versus good eggs: The ILRP runs on peer pressure. If a exceedance shows its ugly head, the whole coalition is on the lam for it, polluters and nonpolluters alike. Somehow it just doesn't seem fair. On the flipped side of my mixed feelings, I see the work that Parry and other coalition leaders have done, and I have no problem calling them "miracle workers." That makes the predicament real for the expert panel - chemicals still leak, and the program needs to be tightened, but if it is tightened, the added burden is a disincentive and a punishment for the coalition that has worked so hard. I'll say Steve, Kevin Jon, John Charles, and the other members of the panel have incredible pluck to tackle the insurmountable task ahead.

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