General Comments only!

Comments of Bud Hoekstra regarding the draft WDR General Order for discharges from irrigated lands for dischargers not participating in a third-party group, order R5-2012-XXXX

Under the federal Clean Water Act of 1972, the EPA addresses water quality issues through programs that identify impairments. An impairment, by definition, does not meet a water quality standard.

The standards in use are mostly mostly single–parameter standards, chosen by means of a scientific evaluation of single chemical's presence in water. This is a terribly artificial way to go about it, because a chemical never appears as a lone contaminant in water, but always in concert with other chemicals that can have mutual effect. In the real world, mixture-loading is the reality, chemicals act in concert, but laboratories test and determine safety margins of lone, solitary chemical constituents. Polluted water may have 5, 10, 500 or 50,000 different contaminants in it, each differing in its trace amount. A body of water may be contaminated to the level of 500 parts per million with 400 different chemicals. One chemical, agent X, has a standard of 5 parts per million, and because its quantity is only 4 parts per million in the stream, the stream where it's found is clean. There's no exceedance of the standard. If Agent X resides in a stream , and Agent X's concentration is 6 parts per million when the standard is 5ppm, the stream is dirty – impaired. The body of water with 500 parts per million of a mixture of 400 chemicals is clean, if no one chemical exceeds the limit of the standard, but the same body of water would be dirty if it has only 6 ppm of Agent X and nothing more. The dirtier water (containing the greater chemical load) is cleaner. Organic regulations were designed in the CFR to minimize the chemical loads in runoff.

Cocktail chemistry sees no regulation. Scientists who study margins of safety look at a chemical in isolation to set its standard. The science done is single-parameter research, and almost no research probes into the health effects of cocktail mixtures of chemicals. The reality check isn't there – no one regulates complex mixtures of substances. The exceedances of a standard that result in impairments condemn too much of this chemical or that chemical, but never take into account the mixture as a whole as if the total effect on health were the sum of individual parts. A stream may contain an exceedance of contaminant X and no contaminant Y and no contaminant Z, and be deemed dirty, and the same stream can be clean with twice the bulk load of contamination if the contaminants X,Y & Z do not exceed their individual limits. In short, regulations condemn the solitary exceedances of a single chemical but condone the collective impact of mixture-loading.

Disch Farm has two fields that are bounded on one side by a stream, the same stream, meaning that the stream splits the farm into two fields. If both fields were cropped with the same crop, thyere would be an exceedance of pesticide residue X in the stream. The farmer decided to grow crop A in one field and crop B in the other, thereby avoiding an exceedance of pesticide X. The Arger Farm is organic with the same setup – fields flanking the stream on opposite banks. The Arger Farm uses no pesticides and does not contribute to the pesticide load of the stream; but the Arger Farm still has to perform a toxicity test that will reveal the net toxic effect of the upstream Disch Farm's pesticides: residue A + residue B.

Fifty years ago – chemical-reliant agriculture has been around for only 70 years – organophosphate pesticides, or OP's, dominated the farm. Twenty-five years ago, the armentaria of pesticides began to diversify. Val Connor, research scientist with the state water board, placed petri dishes in orchards around Sacramento and caught the first drizzle of rain as it fell. Armed with the standard toxicity test which uses Daphnia, the water flea, she found the rainwater so laden with the washout of pesticides [first flush] from the air that no Daphnia survived and the mortality of the water flea – the base of the food chain! – was near 100%. The single constituent of the washout was an OP named Diazinon. The washout of diazinon from the air killed off all the Daphnia in the tests, by and large wiping out the base of the food chain. Since that untoward discovery, OP's no longer dominate the agricultural landscape. OP's are just one of many kinds of pesticide in use on the farm: organochlorines, pyrethroids, neonicotinoids to name others. Now, instead of having 6 parts per million of agent X, streams have 4 parts of agent X and 4 parts of agent Y and 4 parts of Agent Z. Streams are cleaner because of fewer exceedances but dirtier because of the total load of contaminants from a broad range of new substances. 6 ppm of agent X is impaired; a chemical soup of 4 ppm of agent X and 4 ppm of agent Y and 4 ppm of Agent Z is clean. Once upon a time, the solution to pollution was dilution, diversification has that role today. Chemical diversification down on the farm maintains clean water standards for dirty water.

The default belief is that an effect has but one cause, and there is a safety threshold for that one cause, a no-effect level. But in truth a stranger chemistry occurs among individual chemicals of a mixture. Chemical pesticides like rotenone, paraquat and maneb are known to induce PD, Parkinson's Disease. Each chemical is tested in the laboratory for safety, and an observed-effects level or threshold is established. Regulators use the threshold to prescribe a margin of safety and to set a safety standard. Rotenone, paraquat and maneb each have their own safety standard, but maneb and paraquat interact synergistically, which is to say – by the definition of synergism – two plus two equals five or six or ten. Thus, paraquat has a safety standard that becomes unsafe in the presence of maneb concentrations. There is no standard for this complex mixture of maneb and paraquat, only for the individual chemicals as they stand alone, solitaire. As for rotenone and paraquat – no science has been done into their probably synergism. DPR ignores synergism is setting standards for complex mixtures of pesticides. The Water Board sets a basin standard as if the whole watershed were sown in one crop. The reality is many farms with many fields, many diffuse sources of diverse chemicals with undivided effects. The regulatory scheme promotes diversification to avoid exceedances; it does not curb the quantity of pollution. Nor does the regulatory program reward farmers, like certified organic or certified biodynamic, whose practices reduce the total load.

Stranger still is the regulation of pesticides and other agricultural chemicals. The administrative process that sets the standard is open to manipulation. The EPA has a standard for atrazine, California has a standard for atrazine, and the European Union has a standard for atrazine. The science is the same for all three political entities, the safety net is essentially the same for all three. But the standards differ. The standards differ considerably. The standards differ enormously. The European Union's standard for atrazine in water, until atrazine was banned, was 300 times tougher that the U.S. standard. How can the same science be so flexible and plastic? Well – one standard is set with current science, and the other is set with science thirty years old. Industry pushes to have a standard (which may last for years) set before a brand-new study is completed and published, foreknowing what the results are likely to be. Or they pay scientists to conduct an opposing study with fuzzy results, so that the science is indeterminate. The law, FIFRA, has the fox guarding the chicken coop. The once popular pesticide cyhexatin was removed from the market when Dow scientists admitted to having misreading their tox data. The law mandates that the industry present the safety data for active ingredients in a formulation. Hence, the synergist piperonyl is listed on the label of some pesticides as an active ingredient and on others it is not listed because it is deemed an inert ingredient. Phthalate esters have been used as surfactants and carriers for active ingredients, but the EPA considers this hormonally active substance to be inert. So, in complex mixtures containing pyrethroids, piperonyl synergizes making the safe level of pyrethroid unsafe. Back when the USDA sampled fresh supermarket food, it found phthalate contamination in a number of fresh fruits – phthalates have no safety standard, not even in water. The International Journal TOXICOLOGY AND INDUSTRIAL HEALTH, volume 16, number 8, December 1999, calculated the average dose of phthalate "per day in your diet" to be 250 micrograms of this estrogenic, antoandrogenic substance – 250 micrograms of the estrogen ethinylestradiol is normally the dosage of a birth control pill. When we throw in air and drinking water, the dose of diethylhexylphthalate was calculated to be 270 micrograms. Great grandmothers and –fathers had no DEHP in their diet or water. Phthalates are hormonally active, they have been used as surfactants and pesticide carriers, but no basin plan has a standard and there is no mcl to protect public health. Estrogenically substances enhance the effect of many pesticides on their target insects.

The problem: Water is contaminated with multiple substances that may cause health effects individually or collectively. Regulation focuses on the individual chemical's health effects only. This is single-parameter regulation, based on research and science which is largely single-parameter. Mixture-loading is the real world – what occurs in the environment are complex mixtures. Scientists do not study the cocktail chemistry of complex mixtures, regulators do not regulate complex mixtures of substances. Yet such regulation is required by the Porter Cologne Act and the federal laws. In particular, the 1995 Food Quality Protection Act and the 1996 amendments to the Safe Drinking Water Act; both require the EPA to investigate complex mixtures of substances with estrogenic activity, for example.

The solution: Apart from more science, notions about complex mixtures do not ripen into regulation that protects water quality. These complex mixtures are known to cause epigenetic changes that invite disease – among the diseases known to have an epigenetic predisposition are diabetes, birth defects, autoimmune disorders like rheumatoid arthritis and lupus. California Public Health experts predict that 1 in 8 children of the current generation will fall victim to type 2 diabetes, a staggering health cost and loss of productivity, yet complex mixtures which probably induce it have no regulation. Agriculture has a solution for contaminated runoff: no use of chemicals. No-use is a BMP, genres of agriculture like certified organic, certified biodynamic, certified "natural" use no synthetic products in growing plants and animals. No-use is the best BMP for protecting water quality, and some kinds of agriculture are better than others at protecting water quality, hugely better. Natural inputs – like soil, water and manure – cannot be jammed into a no-use category. Water makes things grow, and no farm can be without water. Pastured cows will poop in the field, and manure is inevitable with animals. But sustainable operations strive to keep these natural inputs below nature's own thresholds of contamination. The current body of WDR regulation bears no incentives to stop use, merely to diversify, and the goal was to build incentives into the WDR orders. I see incentives to indirectly create complex mixtures of farm chemicals, but I see no incentives to halt the mixture's volume.

Incentives: For example, the scope of regulation includes both surface water and groundwater, but regulation does not apply to the water that lies on the surface of a field or in the pores of the soil below the surface. This makes it possible to increase infiltration and use rain-fed agriculture or dry-farming and escape the burden of regulation. Both those terms, dry-farming and rain-fed agriculture, mean no use of irrigation water, and no-use of irrigation exempts a farm from the new WDR's. This, however, is the only visible incentive contained in the order, and the design of the regulation promotes no-use of irrigation water. The CDC on its website endorses rain-fed agriculture because irrigation taints water quality.

But the regulatory design has a short-coming. The first year or two after transplanting, a commercial almond tree needs water for survival, until its root system enlarges enough to suck of soil moisture. The regulation is black or white – irrigation is defined by the Water Board staff as "throw a pail of water on an almond tree from which almonds may be harvested in the future." Dry-framing almonds starts the third year, depending on rainfall. A farmer in eastern Washington State's dry region achieved a remarkable 146 bushels per acre without irrigation – OF CORN where it was thought no corn would grow. The trick was soil carbon which holds moisture. California agriculture since its start binged on plows and irrigation. The result was a general depletion of soil carbon, a condition repaired by adding moisture through irrigation. Irrigation meant reservoirs, a system largely built in California's western slopes. Climate change is pushing rains toward the dry eastern slopes. Climate change will make our reservoir system obsolete – how do you shore it up? Do we build more reservoirs? Drier west-side streams mean less flow, less water volume, less dilution, higher concentrations and more exceedances of basin standards. Had California agriculture relied on feeding soil manure and human wastes instead of irrigation, dry-farming might be the mainstream agriculture that we have. Irrigation made water a scarce economic resource, and California either props up this ill-conceived infrastructure, makes it more efficient or switches over to rain-fed agriculture and dry-farming. The California Water Plan Update 2009 promotes dry-farming and rain-fed agriculture. The WDR regulations do somewhat. If the WDR allowed irrigation for immature trees before harvesting maturity and first- and second-year transplants, with a phase-out of irrigation to dry-farming, the incentives would be better.

Example: irrigation of first-year and second-year perennial transplants are exempt from the order.

For the order to be effective in protecting water quality, other incentives must be added to turn agriculture away from the use of contaminating chemicals. I offered one example of one incentive. Farmers who irrigate perennial fruit crops often can grow them without irrigation, except for the first year or two after transplanting. Getting them started requires irrigation. The Board's staff says that a bucket of water thrown on almond tree from which future almonds may be harvested constitutes irrigation and mandates WDR coverage. A regulation so strict simply entices farmers to put in expensive irrigation from the start rather than work with soil's water-holding capacity for rain water and switch to dry-farming. If transplants were watered the first and the second year, and for the next 10 or 20 years, existed only on rainwater, less contamination of water results. In the berry world, some farmers grow raspberries which have lifetimes in the decades; others replant their berries each year with new, first-year-fruiting canes. Raspberries often fruit the second year after the root system has a chance to fan out father and collect more water. The varieties that fruit yearly must be irrigated every year. For the first year, all transplants need a judicious watering to survive. Dry-farming cane abd pit fruits favors water quality, and the WDR regulations should incentive-ize dry-farming.

The WDR order should target no-use practices and incentiv-ize their agriculture. As it stands, the WDR order encumbers big polluters and lean polluters with the same burden of regulation. The way that the WDR is set up, it makes sense to diversify the contaminants rather than reduce the contamination. In its first newsletter to members, the East San Joaquin Water Quality Coalition suggested using a commercial oxonase for sheep dips to reduce the risk of OP exceedances. Farmers are probably doing this already because their use is not an input and doesn't need to be reported. OP's are chemically in a thion form, and the enzyme oxonase breaks them down into the oxon form, which scoots them under the basin standard. However, the use of genetically engineered oxonase results in a mixture of thion, oxon and oxonase where only thion had been before. The water is dirtier but – but cleaner in terms of passing the toxicity test and any exceedance of the thion standard (malathion, parathion and diazinon are thion forms of OP.) The WDR order encourages mixture-loading and does not curb volumetric mixtures.

Some kinds of agriculture are cleaner than others in terms of water quality. The WDR needs a design that rewards farms that don't pollute, or minimize their pollution. These farms fall into two categories: no-use of irrigation water and no-use of discharge chemicals.

The WDR order contains a partial incentive for dry-farming or rain-fed agriculture, which avoid irrigation to an extent.

Certified organic, certified natural, and certified biodynamic agricultures avoid synthetic contaminants. Organic rules, for example, are designed to protect water quality, and the organic mission, as stated in 7 CFR 205, is to maintain and improve water quality ("base resources"). Cover crops, a BMP, are mandatory. No-use of synthetics is mandatory. Substances are allowed, disallowed or restricted. Restricted means the use is restricted in volume and in application. In theory, the NOP rules and regulations require the certifier to check for soil and water quality; in practice, certifiers check only the lab reports on soil quality and check the paperwork to see that no synthetic inputs were used. ANSI, for several years, has been working ona standard for sustainable agriculture – a standard that would set standards for water quality. Were this standard to be promulgated, were farms to be certified as sustainable, those certified farms would be lean polluters.

I spent $150 dollars on cover crop seed this year; a cover crop or perennial conservation cover assures cleaner runoff. My burden of monitoring and reporting for my cleaner runoff is the same as for a farm with dirtier runoff. There's no incentive for cleaner runoff built into the WDR order.

So I will suggest an incentive regulation to be added to the order.

Farms which are inspected by CDFA or certified organic, biodynamic, sustainable or natural and meet these two criteria are required to submit only Extension's FWQP to the Water Board and annual MRP's are not required.

1. No use of uncertified synthetics, no use of manufactured fertilizers.
2. No bare ground – mulch, conservation cover, cover crops okay [road gravel is a conservation cover, isn't it?]
   Or
3. Each aspect of the farm – i.e. roads, equipment yards, fields, field accesses, orchards – must exhibit a suite of at least two water quality BMP's, one of which must be an NRCS conservation practice standard with an NRCS or Extension recommendation for it.

This regulation is an inducement to a cleaner agriculture. The regulation prescribes a cleaner farming and rewards it with reduced regulatory burdens.

Clean water is the management measure. That can be achieved in part by not irrigating or not discharging. Minimal-discharge farms like organic, biodynamic or sustainable should not share the same regulatory burden as unfettered maximal-discharge farms.

What is important? No exceedance or clean water?

Nature discharges, a natural watercourse will have trace pollution of NPK type. Temperature, and natural disturbances like wildland fire, increase or decrease the natural threshold of natural pollutants. The plow is a manmade disturbance, and the disturbance regime of a farm multiplies the impacts on water quality. The idea of regulation is incentives to court the kinds and types of farming so that discharges are no different for the farm than for wildland. This is the direction that agriculture needs to go – to mimic the discharges inherent in a natural ecosystem.

Sustainable agriculture is defined by its three components: ecology, economy and equity.

Ecology: Sheffield, an American biologist in the 1890's, coined the word ecology to mean "communities of plants and animals." The concept evolved and in the 1940's British ecologist Arthur Tansley coined the word ecosystem to describe energy flow through a community of plants and animals. Aldous Huxley called it "how plants and animals make a living." "Structure and function" are the watchwords of ecology today – Eugene Odum comes to mind – and the NRCS defines the health of the soil as "the capacity to function." Some agronomists take it a step farther: "the capacity to function without interventions [rock phosphate fertilizer and irrigation water].

Economy: The dream, as professed in the 1948 USDA YEARBOOK OF AGRICULTURE, is "Our goal is permanency in agriculture – an agriculture that is stable and secure for farms and farmers, consistent in prices and earnings, and an agriculture that can satisfy indefinitely all our needs of food, fiber and shelter in keeping with the living standards we set."

Equity (also dubbed community) Familiar phrases remind us of what is equitable. "All men are created equal." "Love thy neighbor as thyself." "Do unto others as you would have them do unto you." Or the basis of our economic system: "Willing seller, willing buyer." In California, law courts have equity powers. In some states, I believe Maryland is one, two judicial systems exist side by side: equity and law. Equity and ethics go hand in hand – a profession is a group of people who espouse a code of conduct that supersedes all money considerations. The difference between right and wrong is a dollar in pure business. In a professional, a dollar is secondary to a code of conduct. The National Organic Program, or NOP, is a code of conduct that turns a blue-collar worker into a professional. The water Board, unawares, is turning farming into a profession.

The state of U.S. agriculture in terms of water quality has drawn many criticisms:

1992: "Our failure to adequately feed the world's population is as appalling as the environmental compromises we make in that effort." Randy Moore, former editor THE AMERICAN BIOLOGY TEACHER (54#3:132)

1948: "To build a better motor we tap the uppermost powers of the human brain, to build a better countryside we throw dice." Aldo Leopold, Arthur THE SAND COUNTY ALMANAC

1909: "One hundred years from now, as people look back on our continent ... we shall be heartily damned for the reckless uses we have made of our soil, the loss of our forests [and] the weakening of watershed values ..." Ray Lyman Wilbur, U.S. Secretary of Interior

The only enterprise on earth which claims to manage land in perpetuity is a cemetery. All U.S. farms need some degree of restoration, both of soil and of water. Bringing about these long-term changes has to be part of our ethics and our laws [regulations].

Submitted by Bud Hoekstra, BerryBlest Organic Farm

Bud Hoekstra

From:	bud Hoekstra
To:	Laputz, Adam@Waterboards
Subject:	Re: deadline
Date:	Friday, December 14, 2012 11:53:28 AM

thank you. I am forwarding the first installment to you by snail mail today. You should get it Monday. please acknowledge by email that you received it - my comments on Attachment E DEFINITIONS, ACRONYMS & ABBREVIATIONS. If I need to send it elsewhere, please let me know.

From: "Laputz, Adam@Waterboards" <Adam.Laputz@waterboards.ca.gov>
To: "budhoek@yahoo.com" <budhoek@yahoo.com>
Sent: Friday, December 14, 2012 7:40 AM
Subject: RE: deadline

Bud:
Comments are due on the individual order by 5 pm on 10 January 2013.

From: bud Hoekstra [mailto:budhoek@yahoo.com]
Sent: Friday, December 07, 2012 12:40 PM
To: Laputz, Adam@Waterboards
Subject: deadline

I have a few pages of input on the individual WDR's. please advice on the last opportunity to send those in.

For example, I want to make the case that "agricultural supply." one of the 21 beneficial uses listed, a term used in Porter-Cologne, needs to be specific "agricultural supply, inluding dry-farming."
Dry-farming appears in the California Water Plan Update, Water Code 10004, but in the rest of the Water Code (WC 106 & 1254) "irrigation" is the term. These are conflicting.

dry-farming uses no irrigation, but it uses infiltration, increases and promotes percolation. This is a better beneficial use than irrigation, or, you might call it a type of irrigation. Rain irrigates crops, so to speak. Clearly, the CA Water Plan Update aims at diminishing runoff and capitalizing recharge. Case law rules that reservoirs are storage, not a beneficial use per se. Groundwater, being a type of storage, is not a beneficial use, and code names irrigation as a beneficial use.

I am urging you to denote dry-farming (rain-fed agriculture) as agricultural supply, or name dry-farming as a beneficial use. If you double the % of soil organic carbon from 2% to 4%, you double the acre-feet of water that the topsoil will hold - something like that. Dry-farming can replace irrigation, whereas the one requires an investment in the soil, the other requires an investment in water. The Water Code which names irrigation as a second priority beneficial use coaxed the state downa path of reservoirs and soil depletions. Cornbelt prairie soil is 20% organic matter; tilled topsoil in the cornbelt, formerly prairie, hovers around 4-5%. That change represents a loss of many acre-feet of moisture in the soil's water retention capacity.

Because dry-farming is a direction spelled out in the water code's CALIFORNIA WATER PLAN UPDATE 2009, I would think you'd want to include it as a beneficial use of water, preferred to irrigation.   Irrigation applies surface water to crops, dry-farming applies soil water to crops.

SUCCESSFUL FARMING just ran a story on eastern Washington state where dry-farmers reached a 146-bushel yield of corn without irrigation. I can send the article, if you want it.

RSVP that you received this

Comments of Bud Hoekstra regarding Attachment E , DEFINITIONS, ACRONYMS & ABBREVIATIONS for non-participants in third-party groups.

Acronym BMP is missing. Best Management Practices cover both point and nonpoint source pollutants., the term is referenced in the EPA's NATIONAL MANAGEMENT MEASURES FROM THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE which is on the web.

Missing: definition of "commercial" CVRWQCB staff has gone on record saying that a pail of water poured on an almond tree from which almonds will be harvested someday is commercial irrigation. Other CVRWQCB staff has gainsaid that. Furthermore, the WDR General Order in foot note #1, page 2, states that a definition of "commercial" can be found in Attachment E.

Discharger needs to be defined. You don't have to irrigate to be a discharger.

Farm Operator: This definition is fuzzy and inadequate. For example, the California Subdivision Map Act empowers subdividers to create easement areas for roads that counties can claim when they need it. Farms can have ten acres of land that aren't used for roads but can be used when the county claims them for roads. Scruby V Vintage Grapevine declares that the owner can use the land (farm it) in the meantime. But counties can decide the BMP's on the land. Operator must be defined as the person or entity that farms the land or controls the BMP's. In some cases, conservation easements specify BMP's that must be used. I could devise a "floating easement" that crosses a 40-acre field and a floating easement means that the easement-holder can use any part of the field to get across and easement law puts the easement-holder is charge of BMP's to maintain ingress and egress – meaning that I could farm and the easement-holder would be responsible for BMP's.

A typical easement might be a 100-foot-wide swath of land for ingress and egress. The user, or easement-holder, called dominant tenement in the law, can use only what's necessary for ingress and egress – an 8-foot-wide swath. I use the remainder of the 92-foot-wide swath for farming. If the easement is for an irrigation ditch instead of ingress and egress, the ditch itself, even though it is irrigation, is not covered by the General order, by definition.

Some easement land will have two operators, the operator who farms and the operator who decides the BMP's. The operator who decides the BMP's should be made responsible for testing to see that the BMP's work. This is particularly true for an operator who contract-farms the land he owns for a university or for a corporation that decides the GMO's to be planted and the farming methods to be used to raise the GMO crop.

"Field" is mis-defined. A field in the common usage refers to a tract of land with recognized boundaries that is farmed. A field can include an accessway, often a perimeter accessway that encircles the entire field where tractors and tractor-drawn equipment make their turns for row crops. These accessways may be seeded. Wheat-growers seed the accessways with wheat;

corn growers typically do not. Organic farmers may plant an alternate crop as a perimeter trap crop to protect the commercial crop – the perimeter trap crop is a BMP for insect control. Sometimes "hedge rows are used on the perimeter, required by CCOF, and which can be a swath of irrigated flowers that attract a species of beneficial insect. Fields can be polycropped, and often are – by farmers who using a matrix arrangement to control insects. Alternating blueberries and raspberries, for example. Or blueberries and grapes. Or conservation strips of grass striping a soybean field. The grass may be irrigated, the crop dry-farmed. "Field" may include "perimeter access, drainage ditches, irrigation flumes, hedge rows, conservation strips, wellheads or piping, easement right-of-ways [powerlines], perimeter fences or pesticide storage sheds." Fields can be polycropped and only one crop irrigated. Fields can be dry-farmed in season and cover-cropped in winter, ands only the cover crop [BMP] is irrigated. [Cover crops are required by 7 CFR 205, the NOP rules.] Sometimes, a field may contain an in-holder and an access lane to the inholder's residence either by renting or leasing, or by fee title ownership or by easement. For example, BLM owns the land along Electra Road by the Mokelumne River. A private in-holding at the intersection of the Highway and between the river and Electra Road is based on indeterminant easement language – the house is ransacked and vacant, the barn and implement garage falling down.

Definition of acronym used, GWEP, not included

13. Irrigated lands? Is a fish farm a privately managed wetland? Is a constructed wetland [BMP] a wetland. The Rodale Institute constructed a wetland to handle human wastes at their research farm – for water quality reasons. As the director of the student farm at UC-Davis has said, "We plumbed our society wrong." Septic systems, designed for black water (feces & urine), receive considerable household "red" water – harsh chemicals that stop the anaerobic decay in the tank and stop the aerobic decay in the leachate field? Is a leachate field a constructed wetlands or a point-source?

#14 Irrigatin return flow/runoff. Does the definition include leachate and tailwater?

15. management practices: nonpoint & **point** pollution sources – add "point. Beet farms which process their own sugar often treat their waste water by recrystalizing the sugar. Recrystalization is a management practice but the waste water is probably a point-source pollution. Synonyms like stewardship practices and BMP's should be noted, with the others listed in NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPINT POLLUTION FROM AGRICULTURE.

"Monitoring report" is not defined.

Operator is not defined. Operators (1) tend the crops and/or (2) tend the BMP's.

Receiving waters: does not include an open wallow that does not empty or drain from a field. Does not include a sediment trap or a water harvest catchment, both are BMP's that may drain beyond the field

24. Rubbish, refuse … What does crop vegetative waste mean? Corn stover, compost, mulch? Does the definition include crop residues? What about the biodegradable plastic sheet mulch used to grow strawberries?

31. Surface water does surface water include gray water disposed of as irrigation? What about gray water not used for irrigation that drains into an orchard? What about rainwater that captured in a cistern or rain barrel for irrigation?

The acronym SWEP is not defined.

"technical report" is not defined. Chris Jimmerson gave me heck on this. My NOA listed the technical reports that I was required to write. I wrote them. The CVRWQB staffer two years after the fact required a QAPP. The staffer directed me to use the electronic SWAMP protocols and get the QAPP in in 30 days. The SWAMP protocols were temporarily removed from the Web for 30 days. The QAPP was not listed in the NOA which listed specific reports that I had to do.

Toxicity is ill-defined. Wastes in water affect riparian species too – and 80% of the wildlife in the West, according to EPA, uses the 2% of the land comprising watercourses. What is an "ambient water quality sample." This isn't defined.

#35 & 36. Does vadose zone = unsaturated zone?

39. waters of the state – early on in the Water Code, waters of the state are used and defined in reference to the Water Board's authority to regulate. Boundaries of the state go 10 miles, I think, into the ocean, as defined by international law.

40. I thought it was "303(d)", not c.

41. EPA language uses "management measure" For example, Extension has a bulletin out for bankers who loan money to dairy operations that tells bankers what a good management measure looks like. The basic difference between a goal and objective, is that objectives are measurable and are used to reach goals. The quoted definition uses a technical term "beneficial use" which appears in the state's constitution and in the water code and is defined therein. "beneficial use" should probably be defined.

42. Water quality problem – rephrase "water quality problem/exceedance." Exceedance is a fuzzy term by itself. A party can "meet and exceed" an objective, meaning the exceedance is good; or a party can "exceed a limit", meaning the exceedance is bad. The usage is jargon – an exceedance is something to avoid. Examples; if water exceeds the limit 5 mg/L dissolved

oxygen, fish die at 4 mg/L. the mcl for nitrates in 10mg/L and 11 mg/L is an exceedance. However, in cleaning up nitrogen-contaminated well water, 5 mg/L exceeds the standard.

The acronym WDR is not defined

43. Water Quality Standards. Antidegradation standards are not in section 303. Also, drinking water standards exist, called mcl. And the Us Public Health Service has taste standards for drinking water. Well water is often drinking water, and CVRWQB should know this. The Hillmar Cheese company of Fresno escaped CVRWQCB regulation for ten years until the foul-smelling water (like curdle dmilk) in local wells was exposed in the Sacramento Bee. It is appropriate to note that all these standards exist and the Water board is obliged to enforce them, but maybe not in this order. This looks like CVRWQCB is delibratelty creating a loophole.

It is appropriate also to note the variation in standards. Both federal and state standards apply, WHO do not. Example, atrazine stabndard. The federal standard is 10 micrograms per liter in water, california's is less, but the European Union's standard was 300 times less, until they banned atrazine altogether. The patent for Atrazine was owned by a European firm; 40% of U.S. wells tested by the EPA contained traces of Atrazine.

This is the most nebulous and misleading definition and explanation of "water quality standards" that I have ever read!!

It could be noted that a clarifying agent like alum makes water appear clearer than distilled water (pure water). An iron-based clarifying agent will make drinking water appear slightly more cloudy than distilled water.

It must be noted that all standards are single-parameter standards, this chemical or that, and that no standard for complex mixtures or for mixture-loading exists, even though mixtures are known to combine effects. The EPA estimates that 70,000 chemicals may be estrogenically active, for instance.

Other definitions needed: page 6 of the General Order uses the term "agricultural supply." The water code uses this term in contrast to "domestic supply" but in the early enactments in the water code, "irrigation" is used in contrast to "domestic use." Doctors irrigate eyes, and horse breeders irrigate a mud wallow ina corral so that hooves stay moist and do not crack.

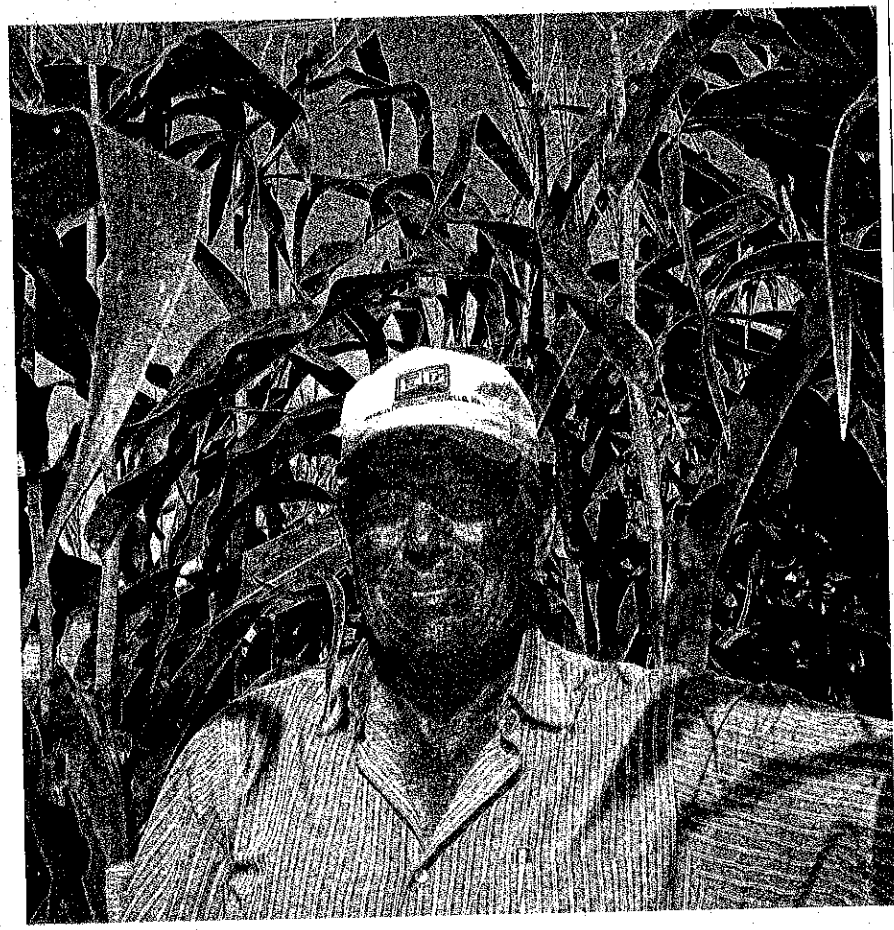
NPS is not defined.

~~CEQA is not de-acronym-ized [but PIER is in the text of the order]~~ yes, it is – sorry

FWQP is not defined, a URL to the Extension's FWQP blank forms is not given.

Corn Where You Least Expect it

Growing dryland corn in eastern Washington has always been difficult. Now, someone's got it right.



If you asked any knowledgeable agronomist if dryland corn could successfully grow in eastern Washington, the answer would have been an emphatic no.

"The main school of thought was that because we don't get a lot of summer precipitation, we don't have the sort of environment that is naturally conducive for growing corn," says Bill Pan, Washington State University (WSU) soils agronomist.

That said, Pan adds, "If you have a system that can store more soil water, the corn may be able to survive better under those conditions, even without a lot of supporting summer precipitation."

Pan notes that 80% of the area's precipitation occurs in the winter. Conventional tillage systems – the kind used in eastern Washington for much of the last century – are notorious for poor water infiltration and winter and spring runoffs. Studies comparing the water infiltration rates of conventionally farmed ground with no-till ground show no-till's infiltration rates are three to four times higher in some cases.

Normally, farmers in eastern Washington aren't surrounded by 10-foot-high corn in August. John Aeschliman, though, has found a way to grow corn in this area.

NEW SYSTEM, MORE OPTIONS

For John Aeschliman, a Colfax, Washington, no-tiller, this research only confirms what he has witnessed on his farm. "No-till changes the whole ball game," he says. "What couldn't be done with conventional tillage isn't necessarily the rule for no-till."

Aeschliman first considered the possibility of growing grain corn in his area in 1995 when he and several farmers and researchers from Washington and Idaho made a pilgrimage to no-till's holiest of sites – the Dakota Lakes Research Facility managed by Dwayne Beck near Pierre, South Dakota. "They were doing things we didn't think possible," he recalls. "It really opened our eyes to no-till's potential in our region."

At the same time, short-season corn hybrids developed for northern Minnesota were stirring up interest in the Northwest, particularly as a crop to be grown in rotation with cereal grains.

"We needed something to break the disease cycles," says Aeschliman. "It was different enough from wheat and barley to be really useful."

After over 20 years of continuous no-till in 1995, Aeschliman was noticing some major changes in his farm's hydrology. In locations where his father and grandfather had to crop every other year (grain after summer fallow system) in order to conserve moisture, he now grew wheat and barley continuously, with moisture to spare.

For Aeschliman, the real question after his visit to South Dakota was would there be enough soil moisture to sustain a stand of water hungry corn plants?

PLEASANT SURPRISE

By 1998, Aeschliman had his answer. As one of several no-till farmers in his area to plant corn,

Photography: Ed Haag

no-till = year-around cover crop that converts to mulch.

ıliman was pleasantly surprised by
ꞩsults.
'e got 80 bushels to the acre with planted in the beginning of May," he "Since then it's just been going up." schliman attributes his early success e fact that he had already been di- seeding (no-tilling) for two decades. everyone did as well," he says. se who had only been no-tilling for a ears got 40 bushels to the acre."
: points out that, as with any new ıction system, it takes time for re to respond.
schliman's dryland yields recently ve between 120 to 160 bushels per on both continuously corn-cropped ıd and in rotation with small grains. e have been high enough for him to ıis state's National Corn Growers ciation's yield contest several years ing. In spite of an exceptionally cold damp spring, he won again in 2011 a 146-bushel-per-acre yield.

ING WHAT WORKS

While Aeschliman has stuck to the strict tenets of zero tillage old off the last of his conventional ements three decades ago), he firmly ves in innovation to improve an ıdy successful production system. The -growing system Aeschliman cur- ly uses is the result of over a decade ı-farm research and development.
ıe corn-growing season for chliman begins near the end of ch; March 20 is the earliest, and 's when he starts planting. Using ın Deere 12-row corn planter, chliman has found that his no-till sys- works best using single rows spaced ıches apart.
eschliman uses a planting depth of 1 for his short-day-length, 75- to 78-day ı. His seed count runs around 28,000 ts per acre. Due to his increased soil sture, though, he plans to step it up this to 34,000 plants per acre.
eschliman places 70 pounds per acre quid nitrogen (N) 3 inches deep 3 inches to the side of each seed row. When the corn is 12 inches tall, he sidebands another 100 pounds per acre of N between the rows. He also applies 25 pounds per acre of phosphate and 20 pounds per acre of sulfur split between planting and the banding pass.

When Aeschliman does have to deal with weed infestations that could have a negative impact on his yield, applications of licensed herbicides usually take care of the problem.

A GOOD FIT FOR THE REGION

Aeschliman's success with corn has not gone unnoticed.

"John does a great job," says Brian Lewis, regional account manager for DuPont Pioneer. "He is definitely on the right track."

Lewis sees real value in developing a commercially viable dryland corn-production system in eastern Washington. He points out that corn does not host Take-all, Rhizoctonia root rot, and Cephalosporium stripe (three of the area's most prevalent and costly cereal diseases). This makes it an excellent disease-cycle breaker when rotated with small grains.

As a warm-season grass, corn offers expanded weed-control options, especially on winter annual grasses that host soilborne pathogens.

In addition to corn's rotational benefits, Lewis sees two other factors potentially influencing production in his region: higher corn prices and a new generation of drought-tolerant corn hybrids.

"These are a vast improvement over what used to be considered drought tolerant," he says. "They might just be what are needed to get more wheat ranchers thinking corn. •

LEARN MORE

John Aeschliman | 509/397-3118

The Upside Of Composting

Nitrogen-stable compost cuts energy inputs for manure management.

While composting does add time and labor to the process of manure management, the investment pays off in the long run.

"From a demonstration project, we developed an energy-use comparison of composting manure vs. handling it fresh," says Ron Wiederholt, nutrient management specialist at the North Dakota State University Carrington Research Extension Center.

"We looked at labor and energy – including time, equipment use, and fuel use – and found the ratio of energy use to be 1.56-to-1 for handling manure fresh vs. composted," he says. Composting reduces the volume of uncomposted material by 60%, which saves on hauling and field application costs.

The Wells County (North Dakota) Soil Conservation District (SCD) is conducting the multiyear demonstration with funds from the James River Headwaters Watershed Project and two Natural Resources Conservation Service Conservation Innovation Grants. The initial group of four participating farmers has grown to 15.

"They like the end product," says Anne Ehni, Wells County SCD manager. "The compost is easy to handle and flows easily through a manure spreader. It's perfect for a no-till farming operation because the composting process minimizes the viability of weed seeds and livestock disease pathogens."

The nitrogen in composted manure is stable; 20% is released in the first year of field application, and the balance is spread over the next four years. However, 70% to 80% of the phosphorus and potash in the compost are available in the first year.

At farms participating in the demonstration, previous manure management involved piling of winter manure packs and spreading the uncomposted, or raw, manure on fields in fall.

Current composting methods for farmers participating in the demonstration project are managed by the Wells County SCD, which provides custom composting services using one of two machines: an aerator or a windrower.

Use of the aerator, or compost turner, requires that manure be first piled into windrows about 10 feet wide and 6 feet high. Afterward, as the PTO-powered aerator moves down a windrow, its beaters break up manure chunks and aerate the compost. It requires a tractor with 75 hp. to 100 hp.

> **The compost is easy to handle and flows easily through a manure spreader.**
>
> – Anne Ehni

The SCD's second option is a machine called a windrower. Functioning much like a tractor-powered snowblower, this machine is also powered by the PTO and can eat into existing manure packs, mounding the material into windrows of 6 to 8 feet in width and 3 to 4 feet in height. The tractor running this machine needs to be at least 145 hp.

"The windrower offers the benefit of drying out the ground beneath the windrows because we move the pile each time we process the windrow," says Ehni. "The windrower also works better in larger pens. In smaller pens, especially those with a softer base, the aerator works better. There are benefits to both machines, and both do a good job of composting."

The aerator, or compost turner, requires manure to be piled into windrows about 10 feet wide and 6 feet high.

Photography: Wells County Soil Conservation District

From: bud Hoekstra
To: Laputz, Adam@Waterboards
Subject: next installment
Date: Tuesday, December 18, 2012 4:22:15 AM

You received my comments on attachment E yesterday, or should have, by snail mail.

FYI: Only our laptop has internet capabilities; our mainframe isn't connected to the Web. I either send snail mail, or I use a memory stick and transfer files to the laptop.

Today, or tomorrow, the second installment will arrive. Please RSVP so that I know that you received it and have entered these comments. The page is marked "general comments" in black felt-tip ink at the top, and I praise the individual WDR's for their encouragement of dry-farming or rain-fed agriculture, both which appear in the California Water Plan Update 2009. Let me know you have received these comments.

Today I will mail a hard-copy clipping of a SUCCESSFUL FARMING article on dry-farming, an alternative irrigation. Two paths diverged in ... agriculture built an infrastructure for irrigation and not for dry-farming, but dry-farming has been an astounding success where it was deemed impossible.

I will have specific comments in yet another installment, and following thta, comments on the MRP.

From:	bud Hoekstra
To:	Laputz, Adam@Waterboards
Subject:	receipt
Date:	Friday, December 21, 2012 12:14:20 PM

1 - I sent you comments hard copy. Did you receive them and enter them on individual farm WDR so that they will be considered.

RSVP'ing tells me they weren't lost in the mail. Also, in RSVP'sing you can tell me if you are the right person to send them to. If some else receoves the comments, then send me their name & mailing address. If you prefer the comments in one lump, say so. Snail mail uncertified saves me the tracking and certified mail costs, I substitute your RSVP.

I will have questions to ask on Jan 3, and I'd like to forward the questions that I will ask to the facilitator who may want to modify them; also you may want a copy ahead of timer.

For example, owners & operators are responsible for BMP's, according to the WDR order. Before, when I had an individual farm waiver, I used NRCS code 500 "Obstruction removal" on the farm and the NOI instructions were not to identify and name the the BMP's but to describe their use. I described the use, and the water board staff sent me a letter threatening to fine me for the BMP. We were supposed to deploy BMP's then as now.
Also, I had an stormwater issue on my farm. A neighbor has a driveway across the south end. He gets 12 feet for ingress & egress (Scruby v Vintage Grapevine), his realtor asked for 20 feet and I granted 20 feet for ingress and egress. However, he changed his mind and wanted more - suing me for a mining road that never existed. he did not get a mining road - he got a driveway less than 20 feet by court judgment. He also had to pay for the driveway himself and get a grading permit from Public Works, unless he pured the gravel on.
Grading permits are issued by Public Works only. the Bldg Dept issued a grading permit. [In 2006 Calaveras Cty was designated a phase II community by the EPA. As a consequence, the cty adopted a design manual for grading, drainage and erosion control, and the design manual was incorporated in the grading ordinance. Appendix A of the Design Manual contains the definitions: [quote] "he following definitions shall apply to the terms used in the Grading Ordinance and this Manual." the term grading was defined.]
The Bldg dept didn't notice the definition and they adopted their own definition of grading which applicants could use to get around the law. In my case, both the law and the judgment.
The judgment named the BMP's to be used, and bldg dept changed the BMP's to be used to help the Calfire neighbor save money.
So what happened, is the neighbor built a road, went beyond the easement and destroyed my BMP's and substituted the county's BMP's for mine, both on and off the easement. I had a Frank Walters PE and Steve McGinty architect both look over the work done, and both say that a state permit was needed from you guys. I talked to Rich Muhl who was going to inspect and then, dissuaded by the bldg, didn't show - he told me the next time they built a road he get them.
I am the landowner, I am the operator, but the BMP's I chose were destroyed and other BMP's used in their place. The cty bldg dept which issued the illegal grading permit approved the BMP's; CVRWQB [thru Muhl] declined to exercise compliance and enforce a state permit, whitewashing the BMP's. I have a court order for BMP's that are not there on the ground. The BMP's which are there are BMP's I rejected. The WDR makes me the owner and operator responsible for the BMP's and for testing water to see that they work. I

am not going to be responsible for BMP's that I didn't choose or want.   It appears that the county was intending to set up a test case to sue the regional water board under your auspices.
You have written that the farmers choose their BMP's and that the CVRWQCB won't get involved in BMP's. But twice now you are involved, de facto, in the choice of BMP's. This is one of a dozen issues that I want you to face up to on Jan 3.

P.S. In an email, I asked you to restate what you said in another email, that farmers choose BMP's and the CVRWQB won't be involved in the choice of BMP's.   An obvious contradiction exists here.   Please send the facilitator's name and address - I need to mail these questions right away so that he receives them before Jan 3.

- For advice and assistance with emergency spills that involve agrichemicals, the local emergency telephone number should be provided. The national 24-hour CHEMTREC telephone number is:

1-800-424-9300

Contact the dealer or manufacturer for materials not covered by CHEMTREC.

- Follow label requirements for mixing/loading setbacks from wells, intermittent streams and rivers, natural or impounded ponds and lakes, or reservoirs. Install and utilize backflow prevention equipment. Check with your County Agricultural Commissioner for regulations that may be more restrictive.
- Post signs according to label directions and/or Federal, State, and local laws around sites that have been treated. Follow restricted entry intervals.
- Dispose of pesticides and pesticide containers in accordance with the most restrictive label directions. Federal regulations, local regulations and the California Code of Regulations Title 3, Division 6 may require varying disposal techniques.
- Read and follow label directions and maintain appropriate Material Safety Data Sheets (MSDS).
- Be aware of legal requirements for pesticide application. The following website contains DPR regulations.

http://www.cdpr.ca.gov/docs/inhouse/calcode/subchpte.htm#0302

- Calibrate application equipment according to Extension and/or manufacturer recommendations before each seasonal use and with each major chemical change.
- Replace worn nozzle tips, cracked hoses, and faulty gauges.
- Maintain records of all pest management actions for at least two years. Pesticide application records shall be in accordance with California Code of Regulations Title 3, Division 6. A list of federally registered Restricted Use Pesticides is available at http://entweb.clemson.edu/pesticid/document/fedrup.htm. California amendments are found at http://www.cdpr.ca.gov/docs/inhouse/calcode/020401.html#6400.0
- Maintain records of all pest monitoring for at least five years. There is no required format for these records.

See tables on nextpages

Conservation Practice standard (BMP)

TABLE I – Mitigation and Prevention Effectiveness Guide for Reducing Pesticide Impacts on Water Quality‡

Note: Tables I and II identify management techniques and conservation techniques that have the potential to mitigate or prevent pesticide impacts. Table I considers water quality impacts. Table II considers air quality impacts. Not all techniques will be applicable to a given situation. Relative effectiveness ratings by pesticide loss pathway are "no effect" (blank), "slight effect" (+/-), "moderate effect" (++/--), and "significant effect" (+++/---)‡. The tables also identify how the techniques function. Effectiveness of any technique can be highly variable based on site-specific conditions and how it is designed and installed. This is especially important with the widely variable soils, climate, and topography that are present in California. **Field Office employees should consult with appropriate local specialists for guidance as needed to evaluate the effectiveness of alternative mitigation and prevention techniques.** Note that techniques designed to protect one resource could have detrimental effects on another. For example, chiseling and subsoiling can reduce runoff (protection of surface water resources) but increase leaching (adversely affect groundwater resources). All resources should be taken into account when evaluating mitigation and prevention alternatives.

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Management Techniques [1/]				
Application Placement	+++	+++	+++	Spot treatments, band treatments, alternate row treatments, border treatments, trunk treatments etc. limit the amount of pesticide used and can selectively place the pesticide where it will be most effective and/or least damaging to nontarget organisms.
Application Timing	+++	+++	+++	Reduces exposure potential and improves efficacy – applying chemical at the appropriate time in the pest lifecycle will achieve better control, delaying application when significant rainfall events are forecast can reduce pesticide transport to ground and surface water, application when conditions are optimal can reduce the amount of pesticide applied. Delaying application when wind speed is not in accordance with label requirements can reduce pesticide drift to surface water. Using computer models to time pesticide spraying can reduce the number of sprays required for adequate control. Only models considered to be adequately validated by the University of California – after review of available scientific research – should be considered acceptable

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Behavioral Controls	+++	+++	+++	Use of semiochemicals (such as insect mating pheromones) to decrease reproductive success or feeding damage caused by pests. When properly managed, behavioral controls reduce the need to apply pesticides. Reduces hazard potential and improves long-term efficacy.
Biological Control	+++	+++	+++	Reduces hazard potential. The release, conservation, or enhancement of native or naturalized organisms for biocontrol of pests through disease, predation, or other means. These agents are usually not compatible with the use of broad-spectrum, high-toxicity pesticides.
Cultural Controls	+++	+++	+++	Reduces hazard potential. Includes modified planting dates, pruning techniques, field design, variety selection, and many other cultural techniques aimed at preventing or treating pest problems.
Formulations/Adjuvants	++	++	+	Reduces exposure potential – formulations and/or adjuvants that increase efficacy allow lower application rates
Lower Application Rates	+++	+++	+++	Reduces exposure potential - use lowest effective or legal rate
Mechanical/Physical Controls	+++	+++	+++	Reduces hazard potential by eliminating pesticide use. Examples include mulches, solarization, traps, cultivation, mowing, flaming and many other techniques. Each must be considered separately since they may have unintended impacts. For example, cultivation may lead to air emissions or increased loss of soil or residues.
Pesticide Label Environmental Hazard Warnings and BMPs	Required 2/	Required 2/	Required 2/	Reduces exposure potential - label guidance must be carefully followed for pesticide applications near water bodies and on soils that are intrinsically vulnerable to erosion, runoff, or leaching
Scouting and Integrated Pest Management Thresholds	+++	+++	+++	Reduces exposure and other risk potential - reduces the amount of pesticide applied and determines location of application.
Set-backs	+	++	+	Reduces exposure potential - reduced application area reduces amount of pesticide applied, can also reduce inadvertent pesticide application and drift to surface water
Soil Incorporation –	/---	+++	+++	Reduces exposure potential for surface losses, but may

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Mechanical or Irrigation				increase exposure potential for leaching losses
Substitution – Alternative lower risk pesticides	+++	+++	+++	Reduces hazard potential. Use of pesticides such as biopesticides, or those deemed "minimum risk" by the U.S. EPA, or deemed "reduced-risk" by DPR, or EPA. http://www.pesticideinfo.org/Alternatives.html
Conservation Techniques [3/]				
Agrichemical Mixing Center (596)	+++	+++	+++	Reduces the potential for point source pesticide contamination
Alley Cropping (311)	+	+	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, can provide habitat for beneficial insects which can reduce the need for pesticides, also can reduce pesticide drift to surface water
Anionic Polyacrylamide (PAM) Erosion Control (450)	/-	+	+++	Reduces irrigation induced soil erosion and may increase leaching losses if higher infiltration rates result from PAM use
Bedding (310)	+	+	+	Increases surface infiltration and aerobic pesticide degradation in the root zone
Brush Management (314)	+++	+++	+++	Using non-chemical brush control often reduces the need for pesticides, pesticide use requires environmental risk analysis and appropriate mitigation and prevention - see Pest Management (595)
Conservation Cover (327)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Constructed Wetland (656)	+	+	++	Captures pesticide residues and facilitates their degradation
Conservation Crop Rotation (328)	++	++	++	Reduces the need for pesticides by breaking pest lifecycles
Contour Buffer Strips (332)		++	++	Increases infiltration, reduces soil erosion, creates local soil environment that accelerates pesticide degradation.
Contour Farming (330)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Contour Orchard and Other Fruit Area (Ac.) (331)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Contour Stripcropping (585)	-	++	++	Increases infiltration, reduces soil erosion
Cover Crop (340)	+	+	++	Increases infiltration, reduces soil erosion, builds soil organic matter, creates soil environment that

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
				accelerates pesticide degradation.
Cross Wind Ridges (589A)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Cross Wind Stripcropping (589B)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Cross Wind Trap Strips (589C)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Deep Tillage (324)	-	+	+	Increases infiltration and deep percolation, encourages root exploration and more rapid development in cotton (reduces impact of rook-knot nematode)
Dike (356)	++/--	++	++	Reduces exposure potential - excludes outside water (++ leaching) or captures pesticide residues and facilitates their degradation (-- leaching)
Diversion (362)	+	+	+	Reduces exposure potential - water is diverted
Drainage Water Management (554)	++/--	++	++	Seasonal saturation may reduce the need for pesticides, drainage reduces storm water runoff, drainage increases infiltration and aerobic pesticide degradation in the root zone during the growing season (++ leaching), seasonal saturation may bring the water table in contact with pesticide residues from the previous growing season (-- leaching)
Field Border (386)		+	++	Increases infiltration and traps adsorbed pesticides, often reduces application area resulting in less pesticide applied, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce inadvertent pesticide application and drift to surface water
Filter Strip (393)		++	+++	Increases infiltration and traps adsorbed pesticides, creates local soil environment that accelerates pesticide degradation, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce inadvertent pesticide application and drift to surface water
Floodwater Diversion (400)	+	+	+	Reduces exposure potential - floodwater is diverted
Forage Harvest	++	++	++	Reduces exposure potential - timely harvesting reduces

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Management (511)				the need for pesticides
Forest Stand Improvement (666)	++	++	++	Reduces the potential for pest damage and the need for pesticides
Grade Stabilization Structure (410)			++	Traps adsorbed pesticides
Grassed Waterway (412)		+	++	Increases infiltration, creates local soil environment that accelerates pesticide degradation, and traps adsorbed pesticides (should be applied with Filter Strips at the outlet and on each side of the waterway)
Grazing Land Mechanical Treatment (548)	-	+	+	Increases infiltration and deep percolation
Hedgerow Planting (442)			(+) 4/	Reduces adsorbed pesticide deposition in surface water, also can reduce inadvertent pesticide application and drift to surface water
Herbaceous Wind Barriers (603)			(+) 4/	Reduces wind erosion, traps adsorbed pesticides, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce pesticide drift to surface water
Hillside Ditch (423)	+	+	+	Reduces exposure potential - water is diverted
Irrigation Land Leveling (464)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Irrigation System, Microirrigation (441)	++	+++	+++	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System, Sprinkler (442)	++	++	++	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System, Surface and Subsurface (443)	+	+	+	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System Tail Water Recovery (447)		+++	+++	Captures pesticide residues and facilitates their degradation
Irrigation Water Management (449)	+++	+++	+++	Water is applied at rates that minimize pesticide transport to ground and surface water, promotes healthy plants which can better tolerate pests
Land Smoothing (466)	+	+	+	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Mole Drain (482)	+	+	+	Increases infiltration and aerobic pesticide degradation

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
				in the root zone *Note – avoid direct outlets to surface water
Mulching (484)	+	+/-	+/-	Often reduces the need for pesticides, natural mulches increase infiltration and reduce soil erosion (+ solution and adsorbed runoff), artificial mulches may increase runoff and erosion (- solution and adsorbed runoff)
Nutrient Management (590)	++	++	++	Promotes healthy plants which can better tolerate pests
Pasture and Hay Planting (512)	++	++	++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Precision Land Forming (462)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Prescribed Burning (338)	++	++	++	Often reduces the need for pesticides
Prescribed Grazing (528A)	++	++	++	Improves plant health and reduces the need for pesticides
Range Planting (550)	++	++	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, builds soil organic matter
Recreation Area Improvement (562)	++	++	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, builds soil organic matter
Residue Management, No-till and Strip-Till (329A)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Mulch-Till (329B)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Ridge Till (329C)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Seasonal (344)	+	+	+	Increases infiltration, reduces soil erosion, builds soil organic matter
Riparian Forest Buffer (391)	+	+++	+++	Increases infiltration and uptake of subsurface water, traps sediment, builds soil organic matter
Riparian Herbaceous Cover (390)	+	++	++	Increases infiltration, traps sediment, builds soil organic matter
Row Arrangement (557)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Sediment Basin (350)			++	Captures and facilitates pesticide residue degradation
Stripcropping, Field (586)	-	+	+	Increases infiltration, reduces soil erosion
Structure For Water Control (587)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration and deep percolation

Pest Management Mitigation and Prevention Techniques	Pesticide Loss Pathways Addressed			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Subsurface Drainage (606)	+	++	++	Increases infiltration and aerobic pesticide degradation in the root zone *Note – avoid direct outlets to surface water
Surface Drainage, Field Ditch (607)	+	+	+	Increases infiltration and aerobic pesticide degradation in the root zone
Surface Roughening (609)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Terrace (600)	--	++	+++	Increases infiltration and deep percolation, reduces soil erosion
Tree and Shrub Establishment (612)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, increases infiltration and uptake of subsurface water, builds soil organic matter
Vegetative Barriers (601)			++	Reduces soil erosion, traps sediment, increases infiltration
Waste Storage Facility (313)	+	++	++	Captures pesticide residues
Waste Treatment Lagoon (359)		+++	+++	Captures pesticide residues and facilitates their degradation
Waste Utilization (633)	++	++	++	Increases soil organic matter
Water and Sediment Control Basin (638)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration and deep percolation
Waterspreading (640)	-	+	+	Increases infiltration and deep percolation
Well Decommissioning (351)	+++			Eliminates point source contamination
Wetland Creation (Ac.) (658)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Enhancement (Ac.) (659)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Restoration (Ac.) (657)	+	+	+	Captures pesticide residues and facilitates their degradation
Windbreak/Shelterbelt Establishment (380)			(++) 4/	Reduces wind erosion, reduces adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also can reduce pesticide drift
Windbreak/Shelterbelt Renovation (650)			(++) 4/	Reduces wind erosion, reduces adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also can reduce pesticide drift

[1/] Additional information on pest management mitigation and prevention techniques can be obtained from Extension pest management publications, pest management consultants and pesticide labels.

[2/] The pesticide label is the law - all pesticide label specifications must be carefully followed, including required mitigation. Additional mitigation and prevention may be needed to meet NRCS pest management requirements for identified resource concerns.

[3/] Details regarding the effects of Conservation Techniques on ground and surface water contamination by pesticides are contained in the Conservation Practice Physical Effects matrix found in the National Handbook of Conservation Techniques.

[4/] Mitigation and prevention applies to adsorbed pesticide losses being carried to surface water by wind.

‡ *TABLE I Mitigation and prevention Effectiveness Guide - Reducing Pesticide Impacts on Water Quality* is based on available research, and the NWCC Pest Management Team's best professional judgment. It is prepared to assist with planning a response to risk identified using WIN-PST or other similar tool. The ratings are relative index values as opposed to absolute values, much like the Conservation Practice Physical Effects (CPPE) matrix. They are intended to help producers choose the best combination of techniques for their identified resource concerns. The *potential* for a technique to provide mitigation and prevention is rated. The technique has to be specifically designed, implemented and maintained for the mitigation and prevention potential to be realized. Varying site conditions impact mitigation and prevention effectiveness. . Our general rule of thumb is that +'s generally have the potential to reduces losses by 10 - 15%., ++'s have the potential to reduce losses by about 25% and +++'s have the potential to reduce losses by about 50%.

The original matrix was developed by the EPA-sanctioned Aquatic Dialogue Group and published by SETAC. The original reference is: *Aquatic Dialogue Group: Pesticide Risk Assessment and Mitigation, Baker JL, Barefoot AC, Beasley LE, Burns LA, Caulkins PP, Clark JE, Feulner RL, Giesy JP, Graney RL, Griggs RH, Jacoby HM, Laskowski DA, Maciorowski AF, Mihaich EM, Nelson Jr HP, Parrish PR, Siefert RE, Solomon KR, van der Schalie WH, editors. 1994. Society of Environmental Toxicology and Chemistry, Pensacola, FL., pages 99-111 and Table 4-2.* They provided ranges of effectiveness for various mitigation and prevention techniques. With their permission, we expanded their work for the NEDC *Nutrient and Pest Management Considerations in Conservation Planning* course materials. Richard Aycock from Louisiana was the first to put a mitigation matrix into an NRCS Pest Management (595) standard, based in large part on Table 6.2 (pages 67 - 68), and Table, 6.4 (pages 71 - 72) in *Module 6, Part C-Integrating Nutrient and Pest Management with Other Conservation Techniques* in our *Nutrient and Pest Management Considerations in Conservation Planning* course materials. Table 1 was built from the Louisiana matrix by adding additional management techniques and conservation techniques. If you have any questions, please contact the NWCC Pest Management Team.

TABLE II – Effectiveness Guide for Reducing Pesticide Impacts on Air Quality

Management Technique	Effectiveness	Function
Application Date Change	++	Poor air quality due to ozone occurs between May and October. Pesticide applications and resulting VOC emissions that can be shifted outside this time period will cause less ozone formation. This is practical only for certain pesticides, such as fumigants.
Formulations/Adjuvants	++	Many emulsifiable concentrates contain a high percentage of VOCs. Switching to a different type of liquid formulation will usually decrease VOC emissions. Switching to a solid formulation is even more effective.
Lower Application Rates	++	Application rates are usually proportional to the VOC emission rate. Decreasing the application rate will likely cause a proportional decrease in VOC emissions.
Alternative Controls	+++	Replace use of high VOC materials with alternative low VOC chemicals or non-chemical control techniques

Further comments of Bud Hoekstra regarding the Individual WDR's for farmers not participating in a third-party group.

The stated goal of the WDR = reduction of discharge & preservation of beneficial uses

The stated objective = incentive-ize the reduction

BENEFICIAL USE: The December 2012 draft water quality control plan names wildlife and fish as a beneficial use. To protect fish, the WDR needs to assure

A) Receiving water (where the fish live)
   (1) Dissolved oxygen higher than 5mg/L
   (2) Temperature range of water adequate for reproduction
   (3) Minimal toxicity of the water in the environment where fish live & reproduce
B) Runoff – transport system to receiving waters
   (1) pH is a composite of soil mineral, air contaminant, pesticide, and fertilizer factors
   (2) toxicity is a measure of contaminants in the microgram/L range, mostly pesticidal components
   (3) input load from farming practices cloud and/or contaminate the stormwater with sediment, fertilizer, pesticide & drug residues including nitrogen and phosphorus which cause algal growth.

The mission puts the Central Valley Region into the remote position of (1) clarifying farm chemical standards (like DPR) and supervising their applications on the farm.

THE ORDER'S CONTENT:

The order does two things: (1) gathers data, and (2) monitors NPS

*pH – Order TESTS FOR pH. The field runoff pH is a composite of (1) rain pH, normally low-acidic, in 2-4 pH range, and (2) buffered soil pH. These are baselines against which the runoff pH will be measured.

Scenario #1: farm irrigates Douglas fir Xmas trees. Ideal pH for Douglas fir is 3.7-6.5 (Rocky Mountain 5.5-7.5) and the insecticide used is the neonicotinoid Imidacloprid whose working pH range is 5-7. The pH of the rainfall is 4.1-5.6. The soil is unbuffered; the receiving water is a pH of 6.5.

Scenario #2: Apple farm has soil with pH of 8 and uses Bifenazate as an insecticide, whose working pH range is 7-9. The pH of the rainfall is 3.2-3.4 normally. The soil is buffered; the receiving water sports a pH of 6.5.

Assuming no other amendments, what is the most likely pH of the field runoff? Make a guess.

*Toxicity: toxicity is a complex mixture, wherever there is mixture-loading, The analytical methods include (1) cocktail measure and (2) fractionation. [a pH below 5 generally signals aluminum toxicity for plants.]

Cocktail parameters include a toxicity test using Daphnia or Americamysis or Hyllelia [hopefully I've spelled these correctly]. These water-borne organisms staff the base of the fishes' food web, and the toxicity of individual pesticides varies from one organism to another quite dramatically. Or, the toxicity can be measured using an estrogenic reporter gene assay, because 10,000's of chemical pollutants are weak, moderate or strong estrogens.

The Order tests no toxicity parameter. But the Order does fractionate through specified input analyses.

The order mandates the testing for about 5-10% of the pesticides listed in the California Agricultural Code's "Groundwater Protection List," shortchanging the list.

The tests chosen are inadequate to measure a pesticide discharge.

With pyrethroid pesticides, generally a sediment sample is better than a water sample. These chemicals adhere to colloid particles in suspension or organic/mineral silt/sediments.

With chlorotriazine herbicides, the breakdown or conversion products are measured for accurate pictures of discharge. The tests prescribed in the Order measure pure substances, excluding the needed breakdown products of the pure and unadulterated substance.

Whole categories are not measured – neonicotinoid pesticides, for example, are omitted from testing.

Whole categories of inputs are ignored, like "drugs" – hog sludge contains antibiotics that migrate to water and that plants up-take. Growth accelerator drugs also contaminate water so that plants up-take them too. The estrogenic activity of most "inert ingredients" in pesticide formulations accelerate growth and are de-facto drugs except by definition.

Mineral discharges from soil disturbances and fertilizers are monitored reasonably well in the Order for surface water but not for groundwater. It is my understanding that Simazine is more likely to be found in groundwater when the water table is 10 feet down but the conversion product DES is more likely in groundwater whose water table lies at a depth of 30 feet. The Order prescribes tests for pure Simazine (EPA 519), not for joint Simazine and its breakdown products (EPA 523, etc.)

<u>IRRIGATION:</u>

3

The Order regulates irrigation and associated stormwater runoff from irrigated fields, thereby penalizing irrigators with a regulatory cost burden. Consequently, the Order itself is an incentive for the BMP's of dry-farming or rain-fed agriculture. Both the CDC and The California Water Plan Update 2009 push dry-farming, but for different reasons. The CDC recognizes a compromise of food quality from irrigation water; the California Water Plan is concerned with future water quantity rather than quality. Someday food may be labeled "organic" or "dry-farmed" to indicate food quality for consumers. Meanwhile, California faces a challenge from climate change. California has built an unrivaled agriculture based on an irrigation infrastructure. The irrigation relies on Sierra-Nevada snowpack (our largest reservoir) and a system of artificial reservoirs behind dams. The impact of climate change will push the natural rains from the wetter West side of the mountains to the drier, reservoir-free East side, thereby threatening Valley agriculture. In anticipation of more expensive infrastructure to shore up the Valley's agriculture [which evolved historically around farming methods that irrigate], other states are building their infrastructures of dry-farming. Iowa State released a film THE SYMPHONY OF SOIL which touches on dry-farming. The cornbelt's SUCCESSFUL FARMING magazine examined Washington State's 146-bushel yields from the unirrigated high desert in eastern Washington. Youtube sports a documentary on Hopi dry-farming. And of course, the Central Valley's WDR Order exempts dry-farming's BMP's from regulation, thereby incentivize-ing them. This is a good plan. California needs to transmute its infrastructure from irrigation to dry-farming. The California Water Plan Update sets that policy for the State.

ORGANIC AGRICULTURE:

Not unlike the water-saving BMP's of dry-farming are the water quality BMP's of certified Organic agriculture. The National Organic Program [NOP] rules are found in 7 CFR 205, and 7 CFR 205.200 defines Organic BMP's: "Production practices [that] maintain or improve ... water quality." One raison d'etre of Organic agriculture is to reduce discharges. Had not CWC 13360 prohibited it, the Water Board could have required Organic agriculture to preserve water quality – NOP certification includes a reduction of discharge, water quality incentives and inspections – everything the Water Board wants from its Order. As it stands, the Order cannot design or prescribe an "Organic" Valley with or without irrigation. But the Order itself must incentive-ize the BMP's of Organic production [along with other BMP's] because those BMP's protect water quality that ultimately preserves and perpetuates beneficial uses.

INCENTIVES:

The question becomes: how can the Order incentive-ize water quality BMP's (certified Organic is a suite of water quality BMP's) without prescribing Organic agriculture for the Valley?

The Order as it stands defies logic. The Order is soft on pesticide discharge and doesn't monitor it correctly or sufficiently. The Order mandates turbidity tests and not the appropriate toxicity tests. Turbidity is not an adequate measure of toxicity. Also, turbidity is better measured in the field than the laboratory, the laboratory results being compromised with lag time – note the EBMUD data which I submitted in a previous technical report for field and laboratory turbidity. The two measures of the same thing differ considerably. Also, distilled water and alummed drinking water rate a difference in clarity (turbidity) and the water with dissolved aluminum sulfate is less cloudy or clearer than pure water with no minerals in it on these tests. [Some European cities use iron instead of aluminum as a clarifying agent in their drinking water.]

To compare the Order's regulatory burden on farmers, I compared a conventional farmer who uses nitrate fertigation and pesticides (chemigation, collectively) with a certified Organic farmer who applies manures but no synthetics. Ironically, the regulatory hammer falls twice as hard on the Organic farmer whose runoff is cleaner. This is a disincentive for water quality BMP's.

The Order, as it stands, incentive-izes dry-farming [which protects water quantity but may, or may not, compromise water quality] and disincentive-izes Organic production [which protects water quality by definition.]

PROPOSAL FOR INCENTIVES:

I am going to propose a way for the Order to incentive-ize water quality BMP's.

I propose that the Order adopt a no-monitoring, flat-fee, FWQP-only rule to incentive-ize water quality BMP's.

The rule would read something like this:

Farmers are required to file FWQP only for a flat fee of $100 if their farm meets two criteria [no monitoring is required if:]:

(1) No use of synthetics except on an authorized emergency basis occurs on the farm.
(2) No bare ground is exhibited on the farm.

The logic here is bonafide science. Toxicity stems from the use of synthetics. Dissolved ions includes N – nitrates and nitrites from concentrated animal urine, stubble/stover decomposition, synthetic fertilizers and manure. Manure lagoons are point sources. Stubble/stover/crop residues equate with natural decomposition from forests, prairies and savannahs. 100% of synthetic fertilizer is both bioavailable and readily transportable to groundwater. [which why farmers inject, top-dress and side-dress corn in three operations] Roughly 20% of manure's nitrate is available for transport in a given year five years after application. Manure is partially decomposed stubble, stover, crop residue. The no-synthetics criterion eliminates spikes of pesticides and fertilizers to groundwater but allows manure whose N is held in the root zone for years after application.

The no-bare-ground rule incentive -izes BMP's like conservation cover, cover crop, filter strip, hedgerow, gravel surface, perimeter trap crop, etc. These BMP's promote filtration ***and*** infiltration. Research at UC-Davis agronomy and Iowa State Leopold Center indicate that as little as a 2-yard-wide perimeter filter strip filters out 90% of the sediments and nitrates from runoff.

From the farmer's standpoint, the farmer looks at this opportunity and thinks, "well, what BMP's can I use to meet these criteria." Thus, you have incentives in the Order.

OTHER CONSIDERATIONS:

To protect water quality and perpetuate beneficial uses, the Order has to do one or both of two things: (1) it must monitor water quality, and/or (2) it must monitor water quality BMP's.

The Order tries to monitor water quality, but the Order doesn't succeed to the extent that it should on the merit of its technical protocols.

The Order does not attempt to monitor BMP's. The Water Board may have to do this – monitor BMP's - to really monitor groundwater quality. A lag time and a plume factor mask the pollution, thus monitoring, of groundwater.

The Order omits dry-farming which ought to be defined and exempted: Irrigation is a set of BMP's. Organic farming is a suite of water quality BMP's. Dry-farming is a suite of BMP's that exclude irrigation. The Order promotes dry-farming, punishes Organic production and fails to adequately address discharges from irrigated fields and farms. The above proposal is a partial remedy for the Order's shortcomings.

A spinach crop can be grown on a 45-day cycle; an almond orchard can have a 45-year cycle. The Order may exempt dry-farming from regulatory coverage. Dry-farming could be defined as (1) no artificial watering of annual crops, and (2) no artificial watering of perennial transplants during the second or succeeding years, except during a declared drought. Driscoll replants raspberry canes each year with first-year-fruiting species. Many small organic farms have perennial pruned raspberry fields and the canes are decades old.

Commercial irrigation needs clarity. Does irrigation include a pail of water to establish a transplanted almond bareroot? Does it include a wet wallow to moisten horse's hooves? Does it include irrigated pasturage? Does it include irrigated cover crops as a BMP to control erosion? Does it include a watering hole for hives of bees whose honey may be sold?

No less an omission is the zero-runoff farm where BMP's are used to achieve 100% infiltration. No samples can be gleaned; there's no flow. One BMP used can be a water harvest catchment to measure the downgrade runoff. No flow can be photographed during a rain. The Order exempts water that settles or puddles on a field or that resides in the soil pores, so that zero-runoff (not zero-discharge, perhaps) farms have no samples for analysis, except during a 100-year storm event. Zero-runoff farming invites thoughts about the past, about what a natural environment was like in pristine times. Was there runoff before fires? If not, streams flowed from filtered seepage, and streams were pure enough for our pioneer ancestors to bend down, cup their hands and drink without a pervasive threat of contamination. The built environment may have tilted the flow from zero runoff to runoff and contamination. Though this speculation is a fascinating thought for establishing a threshold set by nature, it does underscore the farm's role in the biological disturbance regime. The plow especially is a disturbance, and the history of agriculture may on the brink of revolution toward Organic no-till operations that stay within nature's thresholds of natural pollutants and close the loops of waste recycling in functioning ecosystems. Ideally, nature is not discharge-free, but waste-free – nature recycles, every waste is a resource for something else. In our built environment, we take the by-products of a manufacturing chemical process and convert those toxic by-products to pesticides which we bury on food-producing fields. Unless farms keep their soil medium in lined pits, watercourses may transport the toxic waste discharges from the fields to the larger, surrounding environment [waters of the State]. In what might have been an epitaph for planet Earth, Dr Saddler, former medical director of NASA, remarked, "space is our last hope for a clean environment." The mission of the Water Board and the WDR's gainsays that ghastly prediction.

Comments of Bud Hoekstra, stakeholder member, BerryBlest Farm

Bud Hoekstra

7

Fields of watermelon burst in China farm fiasco

by Alexa Olesen, Associated Press

BEIJING, CHINA (AP) — Watermelons have been bursting by the score in eastern China after farmers gave them overdoses of growth chemicals during wet weather, creating fields of "land mines" instead of the bounty of fruit they wanted.

About 20 farmers around Danyang city in Jiangsu province were affected, losing up to 115 acres (45 hectares) of melon, China Central Television said in an investigative report.

Prices over the past year prompted many farmers to jump into the watermelon market. All of those with exploding melons apparently were first-time users of the growth accelerator forchlorfenuron, though it has been widely available for some time, CCTV said.

The farmers used it during an overly rainy period and put it on too late in the season, causing the melons to burst open, CCTV said, citing agricultural experts.

Chinese regulations don't forbid the drug, and it is allowed in the U.S. on kiwi fruit and grapes. But the report underscores how farmers in China are abusing both legal and illegal chemicals, with many farms misusing pesticides and fertilizers.

Farmer Liu Mingsuo ended up with eight acres (three hectares) of ruined fruit and told CCTV that seeing his crop splitting open was like a knife cutting his heart.

"On May 7, I came out and counted 80 (burst watermelons) but by the afternoon it was 100," Liu said. "Two days later I didn't bother to count anymore."

Intact watermelons were being sold at a wholesale market in nearby Shanghai, the report said, but even those showed telltale signs of forchlorfenuron use: fibrous, misshapen fruit with mostly white instead of black seeds.

The government has voiced alarm over the widespread overuse of food additives like dyes and sweeteners that retailers hope will make food more attractive and boost sales.

Though Chinese media remain under strict government control, domestic coverage of food safety scandals has become more aggressive in recent months, an apparent sign that the government has realized it needs help policing the troubled food industry.

The CCTV report quoted Feng Shuangqing, a professor at the China Agricultural University, as saying the watermelon problem showed that China needs to clarify its farm chemical standards and supervision to protect consumer health.

The broadcaster described the watermelons as "land mines" and said they were exploding by the acre (hectare) in the Danyang area.

Many of farmers resorted to chopping up the fruit and feeding it to fish and pigs, the report said.

CHRISTMAS SECTION

What's in the Water? Alkalinity and growing conifers

by Elizabeth Lamb, NYS IPM Program

Most of us remember learning about pH in high school chemistry - acids and bases and what happens when you mix them together. That's right - pH is a measure of the concentration of positively charged hydrogen ions dissolved in the water. The higher the concentration, the more acid the water is. Alkalinity is also based on what is dissolved in the water, but in this case it is the concentration of alkalis - compounds like calcium carbonate - which when dissolved form negatively charged ions. So water with high alkalinity tends to neutralize acids and tends to have a basic pH.

Thanks for the chemistry lesson - why do I need to know this? Because the pH and alkalinity of your water can affect your conifers and any other plants you are growing.

All plant species have soil pH ranges that are optimal for growth. Often they match the conditions where the plants are native. Trying to grow a conifer out of its pH range can result in poor growth or yellowing of needles. Finding exact information on ranges can be difficult but the following should help.

Tree species - optimal pH range:

- Fraser fir - 5.3-5.7 (not above 6)
- Balsam fir - 4.5-6
- Canaan fir - 5.5-6.5? (higher than Fraser)
- Concolor fir - 4.5-7
- Douglas fir - 3.7-6.5 (Rocky Mountain 5.5-7.5)
- Blue spruce - 5.5-6
- White spruce - 4.8-6.5
- Scotch pine - 5-6
- E. white pine - 4.8-7.4

Soil pH can also affect soil fertility. Some nutrients get tied up in compounds that can't be taken up by the tree's roots at certain pH levels. For example, nitrogen, potassium, calcium and magnesium all become less available to plants at pH's below 6. If you are growing your trees in low pH soils, you might need to take that into consideration when planning a fertilizer program. Different fertilizers also have different effects on soil pH so you may be able to match your soil pH to your fertilizer for best results. Ammonium and urea forms of nitrogen are acidic and nitrate forms are basic. Fertilizers may have a mix of types so check the label.

The pH and alkalinity of your water source can also affect your production. For example, alkaline water will reduce soil pH over time. Few field grown conifers grown in New York are irrigated, so this may not be a concern but for those grown in pot production, irrigation water may need to be acidified to maintain the low soil pH desired.

The pH and alkalinity of your water can also affect how your pesticide applications work. In some cases, high alkalinity causes the active ingredient to break down. Water pH over 7 can affect the efficacy of glyphosate (Roundup), paraquat (Gramoxone), bentazon (Basagran), clethodim (Envoy), sethoxydim (Poast), and 2,4-D (many products). The following is a list of the optimum water pH of certain insecticides and miticides and comments from the Cornell Pest Management Guide for Commercial Production and Maintenance of Trees and Shrubs.

- Abamectin - 6-7
- Acephate - 5.5-6.5
- Acetamiprid - 5-9
- Azadirachtin - 5.5-6.5. Do not mix with alkaline materials, buffer water to pH 3-7.
- Bifenazate - 6.5-9. Do not mix with alkaline materials, buffer water to pH 7.
- Bifenthrin - 5-9
- Carbaryl - Buffer water to pH 7
- Chlorpyrifos - 5-9
- Dimethoate - Do not mix with alkaline materials
- Dinotefuran - 5-8
- Etoxazole - 6-8
- Fenpyroximate - 5.5-6.5
- Flonicamid - 4-6
- Fluvalinate - 5-7
- Imidacloprid - 5-7
- Insecticidal soap - 6.5-7.5
- Methidathion - Do not mix with alkaline materials
- Neem oil - 5-7
- Phosmet - Do not mix with alkaline materials, buffer water to below pH 6
- Pymetrozine - 7-9
- Spinosad - 6.5-7.5

How do you know what your soil or water pH and alkalinity are? There are many reasonably priced ($30 to $250) pH meters available. When selecting a pH meter, look for an accuracy of ± 0.1 pH unit and a range of 1 to 14. Be sure to purchase solutions for calibrating your pH meter and remember to calibrate it before use. Test kits are available for measuring water alkalinity. Look for one that measures in a range of 0 to 8 meq/L (0 to 400 ppm alkalinity expressed as CaCO3). If you don't want to do it yourself, most labs that do complete water and soil analysis include both pH and alkalinity in their reports, which cost between $30 and $60.

For more information visit http://oregonstate.edu/dept/nursery-weeds/feature_articles/spray_tank/spray_tank.htm

Source: Ornamental Crops IPM E-newsletter, Spring 2011

Types of Agricultural Water Use

Irrigation vs. Rain-Fed Agriculture

There are two main ways that farmers and ranchers use agricultural water to cultivate crops:

- Rain-fed farming
- Irrigation

Rain-fed farming is the natural application of water to the soil through direct rainfall. Relying on rainfall is less likely to result in contamination of food products but is open to water shortages when rainfall is reduced. On the other hand, artificial applications of water increase the risk of contamination.

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From: bud Hoekstra [mailto:budhoek@yahoo.com]
Sent: Wednesday, January 02, 2013 9:03 PM
To: Laputz, Adam@Waterboards
Subject: Re: Automatic reply: receipt

dry-farming - growing corn in eastern desert Washington State - monumwntal 146 bushels/acre
dry-farming excludes the bMP of irrigation
dry-farming promoted by CA Water Plan Update 2009, see Water Code 10004-31
dry-farming [rain-fed agriculture] on CDC website - less food contamination with rain
The ILRP regulates the BMP's of irrigation but not the BMP's of dry-farming, thereby favoring the BMP's of dry-fatming

Climate Change will push the rains on the West side of the mountains (where the reservoir system is) to the East side, depriving us of quantity. Washington State i sbuilding an infrastructure of dry-farming to take over CA's gifantic market share.

Compost Inoculants — **Allowed**
Class: CF — Nonsynthetic
May not be cultured on sewage sludge.
NOP Rule: *205.105*

Compost Tea – prohibited — **Prohibited**
Class: CF — Nonsynthetic
Compost tea or extract that uses sewage sludge, prohibited synthetic nutrient sources, or other prohibited materials is prohibited. See COMPOST – IN-VESSEL OR STATIC AERATED PILE (PLANT AND ANIMAL MATERIALS); COMPOST TEA – RESTRICTED; MANURE – RAW, UNCOMPOSTED and MANURE TEA. See also Appendix A: NOSB Recommendations. See Glossary for definition of "compost tea."
NOP Rule: *205.105(g) & 205.203(c)(e)*

Compost Tea – restricted — **Restricted**
Class: CF, CP — Nonsynthetic
Compost tea used as a fertilizer or soil amendment is subject to the same restrictions as raw, uncomposted manure. It may only be (i) applied to land used for a crop not intended for human consumption; (ii) incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or (iii) incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles. See also MANURE – RAW, UNCOMPOSTED; COMPOST – IN-VESSEL OR STATIC AERATED PILE (PLANT AND ANIMAL MATERIALS); COMPOST TEA – PROHIBITED; and MANURE TEA.
Compost tea made on the farm may be used to suppress the spread of disease organisms. Compost tea sold for disease suppression must comply with all pesticide regulations. See also Appendix A: NOSB Recommendations. See Glossary for definition of "compost tea."
NOP Rule: *205.203(c) & 205.206(d)(2)*

Copper – prohibited — **Prohibited**
Class: CF, CP — Synthetic
Copper products may not be used as an herbicide. See also COPPERS – FIXED. Copper micronutrient sources that are not explicitly allowed are prohibited. Copper ammonia base, copper ammonium carbonate, copper nitrate, and cuprous chloride are prohibited sources of copper used for plant nutrients. See also MICRONUTRIENTS – SYNTHETIC, PROHIBITED.
NOP Rule: *205.105(a), 205.601(i)(1) & 205.601(j)(6)(ii) As plant disease control... Coppers, fixed... Shall not be used as herbicides. Microunutrients—not to be used as a defoliant, herbicide, or desiccant... copper.*

Copper Chromium Arsenate (CCA) — **Prohibited**
Class: CT — Synthetic
See also PRESSURE-TREATED LUMBER – PROHIBITED and ARSENATE-TREATED LUMBER.
NOP Rule: *205.105(a) & 205.206(f) The producer must not use lumber treated with arsenate or other prohibited materials for new installations or replacement purposes in contact with soil or livestock.*

Copper Hydroxide — See COPPERS – FIXED.

Copper Salts — See COPPERS – FIXED.

Copper Sulfate — **Restricted**
Class: CF, CP — Synthetic
For use as an algicide in aquatic rice systems with documented need and for tadpole shrimp control in aquatic rice systems; use is not to exceed one application per field during any 24-month period. Application rates are limited to those which do not increase baseline soil test values for copper over a time frame agreed upon by the producer and accredited certifying agent. When used for plant disease control must be used in a manner that minimizes accumulation of copper in the soil. May only be used as an algicide, insecticide, or disease control if the requirements of 205.206(e) are met.
When used as a plant or soil amendment it may be used as a micronutrient fertilizer, but may not be used as a defoliant, herbicide, or desiccant. Soil deficiency of copper must be documented by testing. See also COPPERS – MICRONUTRIENT.
NOP Rule: *205.601(a)(3), 205.601(e)(3), 205.601(i)(2) & 205.601(j)(6)(ii)*

Coppers – fixed — **Restricted**
Class: CP — Synthetic
Copper products that are exempt from tolerance by the EPA [40 CFR 180.1001(b)(1)] may be used for plant disease control. These include: Bordeaux mixture, basic copper carbonate (malachite), copper-ethylenediamine complex, copper hydroxide, copper-lime mixtures, copper linoleate, copper oleate, copper oxychloride, copper octanoate, copper sulfate basic, copper sulfate pentahydrate, cupric oxide, cuprous oxide. Copper-based material must be used in a manner that minimizes accumulation in the soil and shall not be used as herbicides.
NOP Rule: *205.601(i)(1) & 205.601(i)(2)*

Coppers – micronutrient — **Restricted**
Class: CF — Synthetic
Includes basic copper sulfate, copper oxide, copper sulfate, and copper oxysulfate. May be used as a micronutrient. Soil copper deficiency must be documented by testing. Must not be used as a defoliant, herbicide, or desiccant.
NOP Rule: *205.203(d)(5) & 205.601(j)(6)(ii) Micronutrients —not to be used as a defoliant, herbicide, or desiccant. Those made from nitrates or chlorides are not allowed. Soil deficiency must be documented by testing... copper.*

Corn Gluten – pesticide — **Restricted**
Class: CP — Nonsynthetic
May be used as a pesticide if the requirements of 205.206(e) are met. Must not be derived from genetically modified corn. See also HERBICIDES – Nonsynthetic. See Glossary for definition of "pesticide."
NOP Rule: *205.206(e)*

Corn Gluten – soil amendment — **Allowed**
Class: CF — Nonsynthetic
Must not be derived from genetically modified corn.
NOP Rule: *205.203(c)(3) Uncomposted plant materials.*

Cotton Gin Trash — **Allowed**
Class: CF — Nonsynthetic
Must not be derived from genetically modified cotton. Must be free of residues of prohibited substances.
NOP Rule: *205.203(c)(3) Uncomposted plant materials.*

Class Codes
CF: Crop Fertilizers and Soil Amendments
CP: Crop Pest, Weed and Disease ...

CROP Production Materials

Class Coding

Crop production materials are classified by OMRI according to the following uses and applications:

CF: Crop Fertilizers and Soil Amendments
CP: Crop Pest, Weed, and Disease Control
CT: Crop Management Tools and Production Aids

Crop fertilizers (CF) contain one or more recognized plant nutrients. Used primarily for their plant nutrient content, they may be applied to the soil or to the foliage of plants. They include compost, animal manures, blended fertilizers, mined minerals, micronutrients, blood/bone meals, and plant extracts that make plant nutrient claims. Soil amendments include liming/acidification materials, worm castings, peat moss, mulch, and any other input that is applied as a soil conditioner. Use of fertilizers and soil amendments must meet the NOP Rule §205.203 management practice standards.

Crop pest, weed, and disease control (CP) substances are used as pesticides for plant disease control, invertebrate pest control, vertebrate pest control, weed control, or as plant growth regulators. They may be applied to either plants or soil unless restrictions specify otherwise. Substances that are allowed only for disease control may not be used for insect or weed control. Most products sold with pesticide or growth regulator claims in the United States must be registered with the US Environmental Protection Agency unless they are exempt from registration. See the INERTS entry in this list for restrictions on their use in formulated products. Use of crop pest, weed, and disease control materials must meet the NOP Rule §205.206 management practice standards.

Crop management tools and production aids (CT) include inputs that do not provide a recognized plant nutrient, soil conditioning, or crop protection function. This group includes adjuvants, equipment cleaners, insect traps, compost inoculants, and plant extracts without nutrient or pest control claims. Many of these products are nonsynthetic and, therefore, are not included on the National List. In cases where their use is not specifically addressed in the NOP Rule, the provisions of NOP Rule §205.105 apply a general allowance of nonsynthetic substances, except for those produced by excluded methods or with ionizing radiation or sewage sludge.

Status

Crop production materials have one of the following OMRI Status designations:

Allowed (A) substances include nonsynthetic materials that are not specifically prohibited by NOP Rule §205.602 and synthetic materials that are specifically allowed by NOP Rule §205.601. The OMRI Allowed status indicates that these materials are not subject to restrictions that limit their use.

Restricted (R) substances are allowed in organic production subject to NOP Rule use restrictions. Materials that are 'Allowed with Restrictions' include substances subject to the following regulations: (a) soil fertility and crop nutrient management practice standards (NOP Rule §205.203); (b) crop pest, weed, and disease management practice standards (NOP Rule §205.206); and (c) specific annotations detailed in the National List of allowed synthetic substances (NOP Rule §205.601). Otherwise prohibited nonsynthetic substances for which there are exceptions (NOP Rule §205.602) are also designated with a Restricted status to indicate their special use limitations.

Prohibited (P) substances in crop production are generally defined in NOP Rule §205.105. This group includes synthetic substances that are not specifically listed in NOP Rule §205.601 and nonsynthetic substances that are specifically prohibited in NOP Rule §205.602.

Class Codes
CF: Crop Fertilizers and Soil Amendments
CP: Crop Pest, Weed, and Disease Control
CT: Crop Management Tools and Production Aids

Waste Not, Want Not

by Melinda Hemmelgarn, M.S., R.D.

Several months ago we put our family dog "to sleep." Our veterinarian assured us that "Lucky" would not have another good day. She gave us 17 years of faithful love. We gave her daily sprints in the park, boundless affection, canoe trips, a cozy bed and ... table scraps. While I rarely took Lucky's love for granted, I failed to fully appreciate her enormous help in reducing our household waste stream.

Meat trimmings, bones, food our guests left on their plates ... whatever couldn't be put in the compost pile, went into Lucky's dish. She reminded us not to waste by patiently "standing by," tail wagging with anticipation.

I should tell you that my husband and I adhere vehemently to the Scottish Proverb that says: "willful waste makes woeful want." We both grew up in working class homes, with Depression-era parents and immigrant roots. Resourcefulness is in our blood.

Consequently, we do not throw away anything that might have a hint of future potential. We recycle, re-use or re-purpose. And, we take pride in generating little trash; it's almost a contest to see how many weeks we can go without putting a bag by the curb for collection.

I suspect Wendell Berry and his wife live much the same way. In *The Art of the Common-Place: The Agrarian Essays of Wendell Berry* (Counterpoint, 2002), the Kentucky farmer and philosopher says: "No matter how much one may love the world as a whole, one can live fully in it only by living responsibly in some small part of it."

For me, living responsibly means conserving Earth's natural resources for future generations and taking a close look at how we collectively manage our waste.

STAGGERING STATISTICS

Estimates of U.S. food waste are both disturbing and embarrassing. For example, according to the Environmental Protection Agency (EPA), the United States generates more than 34 million tons of food waste each year, accounting for almost 14 percent of the total municipal solid waste stream. Food waste represents the single largest component of municipal solid waste reaching landfills and incinerators.

Researchers at the National Institutes of Health (NIH) report that U.S. per capita food waste has progressively increased by approximately 50 percent since 1974, to 1,400 kcal wasted per person *per day*.

The NIH team took their investigation one step further to calculate the environmental impact of food waste in America. Assuming that agriculture utilizes about 70 percent of the freshwater supply, they figured food waste accounts for more than one-quarter of the total freshwater consumption. The researchers also assumed that the average farm requires 3 kcal of fossil fuel energy to produce 1 kcal of food (and that's before food processing and transportation), concluding that wasted food accounts for 300 million barrels of oil per year, or 4 percent of total U.S. oil consumption. In addition, methane emissions from decomposing food waste in landfills make a significant contribution to global climate change.

How on Earth did we get here? Jonathan Bloom, author of *American Wasteland: How America Throws Away Nearly Half of its Food (and what we can do about it)* (De Capo, 2010), believes that we waste food largely because it's cheap and abundant.

"We're not taught to value food, and there's little cultural emphasis on avoiding waste. We figure why bother, there's plenty more," Bloom explained at an American Dietetic Association meeting. Reinforced by expiration and sell-by dates, Americans expect their food to be fresh and cosmetically perfect; if it's not, it's discarded.

THE SCARCITY STORY: PRODUCE MORE OR WASTE LESS?

Rising food prices, along with local and global spikes in food insecurity, feed food scarcity fears. Perhaps you've seen the savvy ad campaigns in major airports and the national press asking "how will we feed our growing planet?" and warning that by 2050 we'll need to double our agricultural output to meet the needs of the world's growing population. One ad seemed to scream: "9 Billion People to Feed. A Changing Climate. NOW WHAT?"

Sponsored by Monsanto, the ads provide a simple answer to their own question: "agricultural innovation." An accompanying website explains how their brand of "sustainable" agriculture will feed and fuel our planet. (Read: not to worry.)

Despite the rush to produce more, there is little national attention given to reducing food waste. Yet the Stockholm International Water Institute, the U.N.'s Food and Agriculture Organization, and the International Water Institute all called on governments to reduce the amount of wasted food by one half by 2025.

Rather than accept the fear-mongering approach of scarcity, perhaps a better focus would be on increasing regional infrastructure, distribution and democracy to better distribute the disproportionate abundance of world calories.

The good news: Jean Buzby, Ph.D., an agricultural economist at the USDA's Economic Research Service, says she's witnessed an upswing in interest in re-

Water Quality Control Board

Central Valley Region

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Copy

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The WDR directive for individual dischargers is unsatisfactory, because (1) it discriminates against organic farmers, and (2) it condones contamination.

(1) I made a theoretical comparison of the cost burden (disincentive) between a farmer who chemigates with nitrates and neonicotinoid pesticides, and an organic farmer who irrigates and applies manure. Organic farming is defined in 7 CFR 205.200 as "Production practices [that] maintain or improve … water quality." The water quality BMP's of Organic agriculture carried a substantially higher cost-burden in the comparison.

(2) The Order prescribes monitoring BMP's and these monitoring practices condone bad chemistry, thereby condoning contamination.

The Basin plan names fish to be a beneficial use (per article 2 of the State Constitution). The Water Board is regionally empowered to protect water quality and perpetuate beneficial uses. A discharge degrades water quality and compromises beneficial uses.

Farms discharge toxic pesticide components through stormwater, tailwater or volatile and particulate emissions. The Water Board prohibits discharges that exceed Basin standards of contamination and requires farms to monitor for stormwater or tailwater discharges from commercially irrigated lands. Pesticide discharge can cause mortality or disrupt the reproduction of fish, a beneficial use.

Monitoring science provides two types of testing: cocktail-effect tests or single-parameter tests.

Cocktail tests: toxicity tests and estrogenicity tests measure the net or combined effect of multiple contaminants in complex mixtures. Toxicity measures lethality; estrogenicity measures the joint activity of estrogens and antiandrogens. Toxicity tests are 12/24/48-hour tests using Daphnia or another organism, before- and aftercounts of the Daphnia population in a petri culture dish give evidence to how fit the water environment is for fish to survive. Daphnia is *the* base of the fish food chain for fish.

Estrogenicity tests: Reporter-gene assays measure estrogenic, androgenic, antiestrogenic and antiandrogenic activity in complex mixtures. Phthalate esters used as surfactants and carriers can be both estrogenic and antiandrogenic at once. Peer-reviewed literature estimates that 60% of herbicides are estrogenic. [Pesticide Use in the U.S. and Policy Implications: a focus on herbicides, Toxicolog Ind Health, 1999, 12(1-2):240-275] Related research extends back to 1975 when methylmercury (some estrogenic activity) and inorganic mercury (no estrogenic activity) are compared. [e.g. Effects of PCB's, DDT and mercury compounds on egg production, hatchability and shell quality in chickens and Japanese quail, Poultry Science, 1975, 54(2):350-368] [e.g. Antiandrogenic pesticides disrupt sexual characteristics in adult male guppy Poecilla reticulate, Env Health Pers, 2001, 109(10):1063-1070.] These tests secondarily measure the potential of epigenetic change that impacts the survivability of fish.

Neither test, not toxicity, not estrogenicity, is prescribed in the Order.

What is, however, prescribed are single-parameter tests that open the door to *gerrymandering the use of pesticides*.

In theory, the Order regulates with this strategy. Pesticide A is sprayed in a subwatershed, the watershed is monitored for pesticide A, using EPA analytical method A-prime. A' measures the pure pesticide A. A' data determine an exceedance of pesticide A.

In practice, farmers apply pesticides A, B, C, D and E in the subwatershed. The Order regulates A and B, not pesticides C, D and E.

The Order regulates only active ingredients, though inert ingredients are as likely to harm reproduction.

The order regulated selected pesticides, not the entire Groundwater Protection List of pesticides.

The Order prescribes only single-parameter tests for pure substances. Peer-reviewed literature tends to recommend a single-parameter analytical method that includes breakdown products also.

A likely scenario in a 10,000-acre watershed is this: Pesticide A is applied to all 10,000 acres, causing a discharge that exceeds the Basin standard. The toxicity test with Daphnia shows 100% mortality in 12 hours with pesticide A discharge. Farmers switch, and pesticides B, C, D and E are applied in addition to A, 2000 acres each. There is no change in the pounds of active ingredient being applied, and no change in the sum-amount of contaminants in the discharge. The mortality rate stays the same for Daphnia. However, because only pure pesticide A & B are measured, the technical report finds no exceedance under the new spraying regime of A, B, C, D and E. No reduction of discharge was achieved.

To complicate matters, the peer-reviewed literature implies that EPA C* is a better analytical method than C', because C* measure pure C and C's conversion products. With organophosphates, oxon forms can be as deleterious as the original thion.

Thus, the Order contains a number of loopholes that defeat the reduction of discharge.

In summary, the Order manifests disincentives for Organic production practices [that reduce discharge] and offer bad science [that can result in the gerrymandering of pesticide use], and both taken into account together - the Order does not protect water quality and perpetuate the beneficial uses, as intended.

Sincerely,

Bud Hoekstra

Bud Hoekstra

BerryBlest Farm

POB 455

San Andreas, CA 95249

Adam:

I mailed you tables from the NRCS pesticide management BMP – it lists NRCS-rated effectiveness. Both the EPA and the NRCS rate the effectiveness of BMP's. You should have it in hand.

Enclosed is the OMRI directory of allowed/prohibited materials. On the page is copper. Copper compounds are restricted-use substances, otherwise prohibited. No copper compound is allowed in Organic farming. Hope this edifies things for you.

Best, Bud Hoekstra

I want to protest the fraud in the document. Farms discharge pesticides, and the Water Board regulates the discharges of pesticides. However, few pesticides are regulated.

The appropriate monitoring of pesticides includes toxicity or estrogenicity tests. The Water Board requires pH testing and turbidity tests, not toxicity or estrogenicity tests. Many pesticides are effective in a pH range, for example, Flonicamid has an optimal pH range of 4-6, inasmuch as pymetrozine has an optimal range of 7-9. pH is a pesticide management BMP. Knowing the pH allows a farmer to choose the more effective pesticide and thus reduce the amount of pesticide applied- more bang for the buck. While measuring pH is a good practice, section 13360 of the Water Code does not allow the Water Board to advocate or design BMP's (which it did).

Most soil is buffered so that pH is inconsequential in assessing contamination. In the main, pH is a pesticide management BMP, not a monitoring BMP. The design of the Order favors pesticide use and discriminates against non-users (who pollute less because of the no-use practice).

Attachment A does not delve into the factors that affect stream quality for fish – for example. Fish spawn at cool water temperatures, and warm stream water thwarts reproduction. To maintain the beneficial use, water temperature matters very much. However, the factors, or BMP's, that affect temperature are not what one expects. Riparian structure determines water temperature. Vertical banks with overhanging vegetation and serpentine courses that slow flow do the trick. Streams are channelized by financial banks, the intermediary that holds the farm or ranch taken out of production and sells it to developers who receive the land with the stream channelized for subdivision. Cattle, if not managed correctly, will break the stream banks down and expose water to sunshine. Turbidity is a solar collector and warms water if the riparian structure is already lost. Turbidity can be a measure of sheet erosion from a field, but Organic farms are required by law to use cover crops and minimal sheet erosion occurs on Organic farms. Rain is acidic and soil buffering capacity determines runoff pH. Organic farms are required by law to test soil pH and turbidity. The one-size-fits-all Order requires Organic farms to participate in the empty motions of pH and turbidity monitoring when other tests might be useful in monitoring the discharge.

Attachment A does not recognize a difference in the quality of discharge coming from an Organic farm and a conventional farm; thereby, the Order discriminates against Organic farmers who pay more to pollute less. [7 CFR 205.200 defines Organic operations as "Production practices [that] maintain or improve ... water quality."]

Disturbed by Order,

Bud Hoekstra

BerryBlest Organic Farm

POB 234

Comments of Bud Hoekstra protesting the disinformation in Attachment A of the WDR Order for Individual Dischargers not represented by a Third Party

Attachment A characterizes the agriculture and hydrology of the Central Valley.

Key information is left out of the descriptions.

- Fresno County has the highest agricultural revenue of any U.S. county.
- Fresno County's wells are polluted with agricultural chemicals [Pesticides – studies date back 50 years.]
- No enforcement history - example, Hillmar Cheese factory in Fresno County, largest in the world, escaped regulation for a decade while residential wells smelled of sour milk from cheese wastes used to fertigate pastures.
- No good characterization of water quality. EPA estimates 70,000 manmade chemicals pollute natural water, many in trace amounts,; 10,000 are found on farms.
- No good characterization of the types of agriculture's chemicals spreading in the environment. Examples, plant hormones, cattle steroids.
- No report on risks posed by classes of chemicals. Nitrates are toxic in milligrams per liter. Pesticides are a thousand times more toxic – micrograms/liter. Hormones like ehtinylestradiol from waste treatment plants or estradiol from feedlot lagoons have observed effects in fish at nanograms/liter – a million times more toxic. Estradiol was declared a carcinogen in 2004.
- The EPA states that watercourses take up 2% of the land in the West, and that 90% of the wildlife depends on this 2%.
- Attachment A fails to note breakdown products: e.g. MTBE is a breakdown product of chlorpyralid herbicides, I believe, and a former additive of gasoline.
- Attachment A fails to note that "inert" ingredients in pesticide formulations are not regulated by DPR but are biologically active in waters of the state and threaten the beneficial uses like fish.
- No description of legacy contaminants like DDT, dieldrin, toxaphene, cyhexatin and mercury, all of which are pesticides.
- Not noted in Attachment A or CEQA is that the fee structure is inequitable. According to the book METROFARM, 10-20 –acre urban farms near markets gross seven figures, whereas the same size farms in rural Calaveras County gross 4 or 5 figure incomes. Fees include per-farm fees and the cost burden is heavier on small farms than large farms.
- The cost burden is inequitable – the polluter doesn't pay. Cleaner farms can pay more percentage-wise of revenues than polluting farms. I sang this refrain at fee meetings and at stakeholder meetings, but the CEQA doesn't assess this aspect.
- Calaveras County is the poorest county in the Central Valley region. Farms along the divide between the Calaveras River and the Stanislaus River can choose between two coalitions – costs are not comparable between San Joaquin East & San Joaquin Delta.

I conclude that Attachment A communicates a false and fraudulent image of the Basin.