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Subject:	Sacramento River Source Water Protection Program Comments on Draft Sediment and Erosion Control Plan Template
Date:	Monday, November 16, 2015 3:54:43 PM

Dear Ms. Hartman:

On behalf of the Sacramento River Source Water Protection Program (SRSWPP), thank you for the opportunity to provide comments on the Irrigated Lands Regulatory Program (ILRP) Draft Sediment and Erosion Control Plan (SECP) Template under the Waste Discharge Requirements General Orders for Growers Within the Central Valley that are Members of a Third-Party Group. The SRSWPP is sponsored by the City of Sacramento, City of West Sacramento, and the Sacramento County Department of Water Resources; this program is coordinated with other agencies that draw their drinking water directly from the Sacramento River (or will be soon), including East Bay Municipal Utility District, and the Woodland-Davis Clean Water Agency. We serve drinking water to more than 600,000 people in Northern California.

Watershed management programs are essential for preserving the high quality of the Sacramento River watershed. The Central Valley Regional Board and other regulatory agencies, regulated communities, and educational organizations have made significant strides. Sediment transport to receiving waters is a high priority concern for drinking water utilities because in addition to overall solids loading in the water, it can increase levels of organic carbon, pesticides, nutrients, and metals in the water.

Our comments are based upon a review of the regulatory requirements defined in Order No. R5-2014-0030-R1, Waste Discharge Requirements General Order for Growers Within the Sacramento River Watershed That are Members of a Third-Party Group (Sacramento River Watershed Order). Specifically Order Section VII.C.1 and Attachment A Sections VII.D and E.

We understand that the Regional Board's Conditional Approval of the Sacramento River Watershed Order Sediment Discharge and Erosion Assessment Report (SDEAR) included a number of farms identified as high-vulnerability to sediment and erosion potential that are required to prepare a SECP. In addition, the Regional Board has required that a revised SDEAR must be submitted in January 2016 to account for proximity to waterbodies and may result in additional farms required to prepare a SECP.

Provided below are the SRSWPP comments on the SECP Template; including general

comments and specific comments on the instructions and the template itself.

If you have any questions regarding these comments, please feel free to contact me at 916-808-1424.

Sincerely,

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General Comments

1. This SECP Template only applies to farms choosing to complete an individual Plan and should be clearly labeled accordingly. We request that the title be revised to "Template for Individual Sediment and Erosion Control Plan".
2. It is unclear if there is any training or expertise required to prepare a SECP. The Plan requires an evaluation of sediment and erosion risk potential along with identification of best management practices (BMPs) to reduce risk. Using a qualified professional, who is either certified or registered, to prepare the SECP is one option for preparation of a SECP. The alternative options related to self-prepared or Executive Officer's Approved Method need to have more details provided regarding the training or expertise required to conduct the evaluation and management plan preparation. We request that the Regional Board clarify training or expertise requirements for preparation of the SECP and require documentation of the preparer's name and certification or training.
3. An important part of a SECP should be the site-specific map showing the locations of possible sediment and erosion risk, as well as the discharge points to receiving waters. This is not specifically required in the template and we request that it be added as a requirement in Section 1.
4. The On-Farm Sediment and Erosion Management Practices listed in Section 2 are the basis for the effectiveness of the program and need to have valid references cited. It is important to ensure that these practices are comprehensive of all farm activities and address both stormwater and irrigation water discharges. We request that the Regional Board consider a qualified expert in agricultural erosion and sediment control review this list to ensure all practical BMPs are included.
5. Section 3 is titled Sediment and Erosion Control Site Evaluation, but actually includes both the evaluation and the proposed management plan of action. We

request that the Regional Board consider splitting this section into two components; Evaluation and Plan.

a. The Evaluation section should include site-specific information and a process for evaluating vulnerabilities and existing management practices. Neither the Section Instructions nor the Template provides direction as to how the evaluation will be conducted so it is unclear how preparers who are not qualifying professionals will implement this task. Also, the section should include a place to provide justification for determination of No Action Required.

b. The Plan should include site-specific solutions for Erosion and Sediment Control, including a map showing features and locations of existing and new management practices, the list of management practices, timing of management activities, and implementation dates for new management practices. Also, the Regional Board should clarify what timelines are reasonable and appropriate for implementation of these management practices.

6. Section 4 provides a certification process for a SECP, but it is unclear how this certification process will be implemented. The certification process would seem to depend on the method of SECP preparation and should be coordinated closely with this task. Certification must be conducted in a manner that ensures that these plans have been reviewed by qualified professionals with expertise in agricultural sediment and erosion control. We request that the Regional Board evaluate the preparation/certification process to ensure that qualified professionals are involved in the process.

Specific Comments

Change title to "Template for Individual Sediment and Erosion Control Plan".

General Instructions

First Paragraph, First Sentence -
"Soil erosion and sediment deposition from farmlands ~~can~~ contributes to degraded surface water quality. Sediment delivery is known to be relatively high in areas where there are steep slopes, erodible soils, ~~and~~ or rainfall runoff activity."

Second Paragraph, Last Sentence -
"Upon request, the Plan must be made available to the Water Board or an authorized representative, should they ~~desire to~~ conduct an inspection of your farming operation."

Section Instructions

Section 1 – Include requirement for map, including showing discharge points to

receiving waters, as well as existing and new management practices. We request that this section include the name and expertise of the SECP preparer.

Section 2 – Item (b) revise text: "Insert the Management Practice Code into the table in Section 3."

Section 3 – We request that the Regional Board consider dividing into two sections: Evaluation and Plan. The Evaluation would include steps (a) through (e), but needs to be expanded to include procedures for the actual evaluation of sediment and erosion risk as well as justification for determination of sufficiency of existing management practices and therefore No Action Required. The Plan should identify any new management practices proposed, including details on location and operation, as well as the timeline for implementation. We also request that the Regional Board provide guidelines on reasonable and appropriate timelines to meet the sediment and erosion control requirements.

Section 4 – These instructions do not appear to match the template format in that the instructions imply that the certifying agencies are completing the SECP, but that is actually not required in the template. We request that the Regional Board clarify the preparation and certification process to ensure that qualified professionals are involved in the process. The Draft SECP Template does not provide any information on a training program for members (item 3) or an Executive Officer approved alternative method (item 4). If these alternatives are to be included, we request that the Regional Board provide their details for public review and comment.

Sediment and Erosion Control Template (SECP) Template

Change title to "Individual Sediment and Erosion Control Plan (SECP) Template".

Section 1 – Include requirement for map. Include name of person/agency/professional preparing the SECP and their training or expertise.

Section 2 – Include source(s) of these management practices. We request that the Regional Board ensure that a qualified professional reviews this list to include all reasonable BMPs are included.

Section 3 – We request that the Regional Board consider dividing this into two sections; Evaluation and Plan. If a table is used, it should be expanded to provide space for justification of sufficiency of current management practices and why no action is required. For the Plan, the proposed management practices should be presented, along with their operational characteristics and a timeline for implementation that is reasonable to protect water quality.

Section 4 – This section includes certification of the SECP. It is unclear how the Qualifying Agency Certification and Alternative Certification Methods would be implemented (i.e. how does the agency certifying the SECP assess validity of SECP preparer, are site visits conducted to verify evaluation, what is basis for validity of management practices proposed?). We request that the Regional Board clarify the certification process, including guidelines as appropriate. We request that the reference to a County Ordinance Applicable to Sediment and Erosion be clarified as required in the WDRs to be specific to erosion and sediment control in agricultural lands and operations in both stormwater and irrigation season practices.

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Draft Sediment & Erosion Control Plan Template

Comments of Bud Hoekstra, BerryBlest Farm

Soil is a glacier of erosion, agriculture disturbs soil, sediment is an artifact of each and every watershed. By design, a template should do this: transfer the planning on paper to constructive actions on the ground.

The US EPA in its regulatory textbook for farming, known by the title NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE, that aims at curbing the disturbances of agriculture, including the loss of soil by means of erosion. The textbook examines ***management measures*** and the application of ***BMPs***, or best practices, to meet the environmental goals of the so-called "management measures."

The US EPA deploys "adaptive management" that calls for monitoring to see if a suite of BMPs on the ground achieves the result of an environmental management measure. In theory, Farmer Braun uses five BMPs [A, B, C, D, & E] to achieve the same water-quality result as Farmer Greene who uses a suite of six BMPs for the same effect [A, D, E, F, G, H]

BMPs are a powerful expression of agriculture's ingenuity and can-do spirit, and a template indentifies BMPs and formulates the how-to plan of their application and use.

I think Adam Laputz made a clear point in his Notice of Public Comment Period for the template: The template provides for "the implementation of practices" in order to "minimize or eliminate the discharge of sediment ... *above background levels*." Erosion is a natural process and life on earth depends on it – all life depends on a few inches of topsoil and occasional rains. If we eliminated a stream's sediment budget so that the flow ran as pure as distilled water, aquatic life would die, just as it dies when we impregnate the water with a cocktail of toxic substances like pesticidal poisons, known as "economic poisons" in Bender's encyclopediac AGRICULTURAL LAW.

A stream functions best with a natural disturbance regime; and manmade disturbances can alter the stream's ecological function and services [beneficial uses] beyond the limit of its resilience – resilience being self-renewal without intervention (= stream health).

Disturbance biology teaches us that BMPs are interventions that can keep human disturbance within the parameters of ecological function so that systems remain resilient.

Adam's statement "... minimize or eliminate the discharge of sediment ... above background levels" hits the nail directly on its head. Natural watercourses have a sediment budget, and we don't want to increase it, decrease it or contaminate it – one role of BMPs in farming is to preserve the ecological function of streams, vulnerable to on-farm erosion. One ecological function or service is clean water. Clean water is our most important farm and forest product.

The US EPA says in its textbook for regulators "The first ... strategy is to minimize soil detachment, erosion, and transport of sediment from the field."

Hence, there are BMPs that

1. Minimize soil detachment;
2. Minimize soil erosion;
3. Minimize soil transport.

Some of these BMPs are in place on farms and the farmer doesn't yet know them. The first course in utilizing BMPs is recognizing them. Farmers are not always familiar with BMPs, and farmers are not trained to use them.

Here's an scenario of BMP science and decision-making.

A field access crosses a ditch where a culvert lays. The culvert is a confluence where two ditches meet and join, thus channelizing the flow, increasing its velocity, volume and erosive energy. The outfall of the

culvert is eroding, what BMPs can stem the erosion? The farmer can deploy riprap [dissipater, armoring] to secure the outfall area. If the flow has hollowed out a cavity below the outfall and the flow plunges into this erosion basin, a fixed plunge basin bridles the waterfall.

Here's scenario number two: A rutted lane runs down a slope beside a dry drainage. The lane is eroding, what can the farmer do to stop the wheel-track erosion? One, the lane can be vegetated, if the use is seasonal. Or the lane can be armored with gravel to prevent tires from powdering the surface. Three, water bars can be used to divert and spread the channelized flow of the ruts. The water bars can divert the flow toward the drainage on the right or toward the field on the left. Going right intensifies the flow when water is diverted into the stormwater drainage; surface-spreading into the field minimizes erosive energy and maximizes infiltration.

Obviously, this knowledge cannot be packed into a template, and the finer points of installation will remain a challenge.

On the scientific side, there are kinds of erosion:

I. Invisible erosion [dissolved contaminants]
II. Visible erosion
    a. Splash erosion
    b. Sheet erosion
    c. Rill erosion
    d. Gully erosion

Erosion can also be defined by particle size:

1. Clay
2. Silt
3. Sand
4. Gravel
5. Boulder

In the 100-year flood in Yosemite National Park before the turn of the millennium, boulders rolled down the Merced River in the crashing water. The sound that the tumbling boulders made was below the threshold of the

human ear, like the low-pitch rumblings of an adult elephant, and people heard nothing but felt only a cogent throbbing in their ears – rescuers found survivors curled up in their closets of their houses in fetal positions.

What also matters is the intensity of the storm event. Storms are natural disturbances, and nature rebounds over time from these events, but not all events are alike.

a. 3-5 year event – the standard for burned area response treatments,
b. 20-year events,
c. 50-year events,
d. 100-year storms.

Graduated disturbances translate into different suites of BMPs. Hurricane Katrina wiped out New Orleans, a city that was not fortified with 100-year BMPs for a 100-year hurricane.

The bottom line here is how we get what's on paper onto the ground. BMPs are how we do it. The idea is to use enough BMPs so that a farm doesn't puke sediment from its fields during a storm event. This brings into play more factors: soil erodibility and slope. High angles tend to potentiate the erosive force and energy of runoff. Good Organic soil resists detachment because of the humic aggregation in the soil inasmuch as SOM-depleted soils are friable and detach more freely.

A ***site evaluation*** for sedimentation and erosion could take into account all these varied factors and impacts. Farmers aren't trained or experienced in this sort of thinking, and as evidenced by the design of the template, regulators aren't trained or experienced either. Someday universities will offer four-year degrees in BMP science; meanwhile, a template substitutes for that training, education and experience.

I've told the NRCS and UCCE that a production company needs to film a farm make-over for a TV audience to show how BMPs are used and installed.

That's not likely to happen soon. In my community where the Butte Fire recently raged, homeowners are encouraged to mulch with straw to prevent sedimentation of EBMUD's Camanche and Pardee reservoirs downstream. The straw offered is weed-free straw. Weed-free straw will contain grass weeds like cheatgrass – cheatgrass intensifies wildland fires. Weed-free straw also has residues of herbicides that attack broad-leaved plants. The notable story of Waterpenny Farm, VA, is a reminder: the straw they used to mulch the CSA with hurt or killed their crop plants. Volunteers raked up 20 tons of hay/straw contaminated with a herbicide. The best choice for Butte residents to mulch their land with is rice straw – rice grows in wetlands, and wetland weeds do not flourish in the foothills. Weed-free straw with tis herbicide residues will likely retard or suppress the renewal of native broad-leaved plants – the potential is there.

The NRCS provides standards for the installation of BMPs on a farm, called ***conservation practice standards***, to assure that a BMP is properly installed. CalTrans also has standards for road construction BMPs. The template inventories the farm's BMPs and does nothing to investigate the installation. Presumably, the water board inspectors will inspect for proper installation; the template instructions promise inspections but the instructions don't say what is to be inspected. It appears from the design of the template that the only inspection practice is to examine if the BMP on paper actually exists on the ground, whether it is properly installed or not. Enforcement then would not object to a skimping on cover crop seed or using an under-sized culvert pipe, like a 2-inch ID galvanized pipe and calling it a culvert. It appears that the inspection process will look for a BMP on the ground to match what is on paper, and not concern itself with scrupling over genuine effort and false going-thru-the-motions. But the instructions don't say one way or the other.

The inventory template ***SCARES*** me. Government regulations can do a world of good, but government regulations can be weaponized against political enemies. The design of the inventory form lends itself to potential abuse. Let me explain why.

The US EPA, in applying the Clean Water Act to agriculture, distinguishes ***management measures*** from ***best management practices***, or ***BMPs.*** Farmers have full control of their BMPs on their land – except that third-party coalition groups can now dictate BMPs and do – but farmers may have no control over the management measures. The water board's basin-standards serve as management measures for watersheds, de facto.

Manament Practice Code I-1 is a BMP. "Drip/microspray irrigation installed or used" names BMPs. The NRCS codifies these BMPs as codes 441 & 442, and the US EPA lists them as BMPs in the appendix of NATIONAL MANAGEMENT MEASURES FOR THE CONTROL OF NONPOINT POLLUTION FROM AGRICULTURE.

But contrast those bonafide BMPs with the O-8, "Creek banks and stream banks have been stabilized." Stabilizing crrek and stream banks is a management measure. The BMPs deployed to meet this "measure" could include:

1. Riprap
2. Live-staking
3. Grassed waterway
4. Armoring, as with concrete walls
5. Check dams and diversions

Ranch allotments in national forests or on BLM land stabilize stream banks by willow recruitment and access control. Fencing out cows is access control, and a fence is a BMP – the NRCS formerly called this BMP "Use exclusion" and renamed it "Access control." Cattlemen recognize the placement of mineral blocks as a BMP – by placing the block away from streams, hooves trample or wear down stream-banks less. Dry arroyos or drainages which flow during storms can be stabilized with brush-pile dissipaters or filters.

So there is confusion built into the template. Microdrip irrigation is a BMP, listed in appendix A of the EPA's textbook, but streambank stabilization is a management measure, touched upon in chapter 4C, "Erosion and

Sediment Control," and in appendix B, which is about management measures.

So I read this template and I ask myself wat is meant by a stream bank. Does a stormwater drainage count as "seasonal flow?" Are drainages streams? Or, is navigable waters meant?

M-3 is another ringer of confusion: "Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen." The NRCS soil engineer Mike Grinstead reviewed my farm and recommended that I vegetate the ditches that flank my farm lane. I had used concrete block check dams and infiltration zones at culvert outfalls. [Brief note: Mike recommended that I contact Peaceful Valley Farm Supply or UC Extension for a seed recommendation – the ditches have a northern exposure. I called Peaceful Valley who recommended that I talk to Extension; I called Extension who recommended that I talk to Peaceful Valley. Neither Extension nor Peaceful Valley knew of UC-Davis SAREP that has an edition of their book on cover crops on line.] On the flip side, several university studies were done to measure how much sediment and nitrates were removed by perimeter buffers around fields. Dr Mel George, UC-Davis agronomy, did one study; another was sponsored by the Leopold Center for Sustainable Agriculture at Iowa State. We also grow prize-winning sweet corn in furrows that are irrigated and vegetated. So I sit here asking myself what is meant – is a corn furrow vegetated with a crimson clover a BMP? On the other hand, ditches are used to remove water from fields – or subsurface tiling. And I ask myself – what does "sediment … water soluble pesticides" imply? Does that mean that water insoluble pesticides are sorbed onto sediment particles? Since M-3 falls under "current irrigation practices," I wonder if this "management practice" means flood irrigation.

Confused, I have no idea what an M-3 practice is.

I mulch my berry rows with wood chips. Wood chips suppress weeds, enable me to hand-pull weeds, and prevent soil erosion. Since I irrigate the berries, I presume that mulch is an M-8 practice.

CCOF requires me to use hedgerows to husband beneficial insects. It is not a filter strip. The hedgerow is Manzanita, and the ground cover under Manzanita is nil. The I-14 practice is "Hedgerows or trees are used to help stabilize soils and trap sediment movement." I presume that though I have a hedge row, I wouldn't code it I-14. I don't use it to block the transport of sediment. And I'm not sure I understand how a hedgerow relates to irrigation.

I have no option O-9, which would be a blank for other "other practices." Yet, I have have a number of BMPs that I use to stem detachment, erosion and transport of soil. One, I mostly farm perennial crops, and perennial crops cause less disturbance of the soil. No-tillage is involved, except for initial tillage, and I use a "rough surface" BMP [codified by the NRCS] to reduce runoff when I till. Perennialized crops – blueberries last 30 years or more – controls sedimentation. Note: raspberries can be grown as annual or perennial crops. As an annual, significant erosion occurs; as a perennial, none occurs with mulching. Driscoll's of Florida maximizes yields by replanting their raspberries every year, and they select for land races that fruit heavily the first year. Some raspberry varieties fruit heavily after the first year. Some pruning techniques remove third-year canes in raspberry beds. The BMP has associated consequences for water quality.

Also, I contour-stripcrop. When I drive to Stockton, leaving Calaveras County and entering San Joaquin County, I see a new farm – traditional pasture is converted to row crops – almonds and grapes. The rows run up and down the slope, not along the contour, and this canot be modified once the crop is planted. Contouring dissipates and promotes infiltration; up-and-down rows channelize the flows between rows and accelerate the sedimentation and erosion. Neither contour-plowing nor contour strip-cropping appear as BMPs, and both are irrigation management BMPs.

The template is bedeviled by M-6. PAM is a BMP, but it is a BMP in conventional farming. In Organic farming, humates are used. In Italy, where PAM was once permitted in their lax Organic rules, PAM is now banned in Organic production and humates are sold in their place, both to conventional and Organic farms. NOP rules outlaw the use of PAM in

Organic production in the U.S., but composting organic matter produces humates, and humic substances and some organic matter do the same job as PAM. Manuring is the equivalent of PAM in Organic farming. Humates are not listed as a BMP; PAM is. This template clearly and unmistakably favors conventional farming.

The M-5 Practice – I'm being picayune – says "deep ripping" and not "subsoiling," as if there were a difference.

The O-3 Practice mystifies: Does "direct drainage off road into vegetated area" mean an infiltration zone? Does the term "ditches" mean water harvest catchments, like sediment basins, or watercourses. Water harvest catchments reduce sediment load; transport ditches channelize the flow and increase sedimentation.

O-1 "Grade access road to reduce on-road erosion" seems to be a contradiction. Grading augments on-road erosion – by grading, is leveling meant? Removing puddles and potholes stops splash erosion from occurring, but armoring or treating the surface of the road is an erosion control BMP; grading is not. Grading causes erosion.

Troubling is the panoply of BMPs among different agencies. Here are agencies that promote their own set of BMPs

1. USDA NRCS conservation practices
2. UC Cooperative Extension practices
3. CalTrans BMPs
4. BAERCAT BMPs for post-fire treatments
5. EPA BMPs

Calaveras County where I live was designated a Phase II Community by the US EPA in 2006, and as a consequence, regulations were adopted. The Grading Ordinance underwent revision, and a Design Manual for Grading, Drainage and Erosion Control was added – added to the Grading Ordinance by incorporation.

Section 15.05.080 O the County's Grading Ordinance emburdens farms in this manner: "...earthwork activities when carried out in conjunction with a

use associated with, related to or in support of an agricultural operation on agricultural land ... shall incorporate the use of "best management practices," as recognized by UC Extension and Natural Resources Conservation Service, to minimize erosion and to control sediment discharges to the maximum extent practicable. Title 15 is Building and Construction, but as you might have guessed, the County's Building Department hasn't read it yet and doesn't know UCCE or NRCS BMPs. The Building Department inspects for proper installation of CalTrans BMPs.

The Water Board further limits the BMPs to the set in the practice code of the template.

If I read NRCS literature – and I do love some of their white papers – I discover that fuel, fertilizer and pesticide staging areas are a significant contributor to water quality, and for nonfuel chemicals, perhaps lubricants are included in agrichemicals, an agrichemical handling facility is postulated. County law requires it; Water Board regulations do not. I intend to build a "fuel shed" and store all chemicals there – including paints, power steering fluids, grease, fuel stabilizers, fuel/oil mixes [1/16, 1/32, 1/40, 1/50 – Stihl regular & Stihl synthetic], penetrating oils, PVC solvents for irrigation pipe, etc. I don't want to include my Organic fertilizers like blood meal which will absorb these chemical vapors which wind up in the field when I amend with blood meal.

The cross purposes of regulation frustrate me, and I can't reconcile the required installation of the BMP with the installation best for water quality or quantity. More chafing is the inspection that I might get. I foresee hassles and abuse.

I'll give one example here. Once I worked as an investigative reporter spilling the truth about Fernald, the government's uranium processing center that contaminated the largest middle-West drinking aquifer with radioactive wastes and chemicals. Because I was effective, I came under fire, sometimes by government officials. We lived in Mt Healthy, a half-square-mile city and had one of the largest properties in the city, an acre behind the lake of Lake-of-the-Woods apartments.

Kids played in our big yard, and they left their toys scattered around. The Mt Healthy Planning Director, an architect and political activist, was enlisted to harass me. I received a notice declaring my yard a public nuisance because of the clutter – and the notice listed all 23 items. All 23 were toys: baseball glove, tricycle, badminton racket, soccer ball, etc. We have no children, and when I protested, the planning director skipped the appointment with me – twice. Then I got a notice that I violated water laws – by damming the creek that fed the lake. I had no dam. When I went outside and looked, there was a dam! The dam rose a foot high, and someone had made it of stones and mud, holding back a small pond of water, less than 100 square feet. While I stood aghast, Joe Price came along with his basset hounds, walking them as he normally did on our property. He asked me, "How do you like the goldfish pond I built for the kids?" Joe, a retired engineer, chaired the Planning Commission and was the Planning director's boss.

I laughed the notice off. Joe was in the habit of nettling his political colleague, the architect who was Planning Director, and he asked me if he could talk about my gun collection in front of the Director. I own no guns. I consented, told Joe to say whatever he wanted to say, and the Planning Director got up in front of the Council meeting and asked for a raise, explaining how he had to deal with dangerous gunslingers like me.

The water board has already claimed a long history of hassling me, from my bid under the waiver program, to test for complex mixtures of hormonally active substances like estrogenic substances. The water board staff laughed, and my conditional waiver set the condition that I test my fields for meth wastes. Blah, blah, blah. By the way, in march the European Union calculated the health cost of complex mixtures, set a 157 billion Euros – that's $175 billion in U.S. dollars.

Most recently, we became evacuees of the Butte Fire and relocated to an evacuation center in the Oak Knoll campground at New Hogan Lake. New Hogan Lake is Army Corps of Engineers. Title 36 of the CFR requires the abandoned property to be held for 120 days on Army Corps land, before disposition.

The Sheriff Department 's OES set up the evacuation center run by two Burson Churches, and deputy [redacted] directed the evacuation center staff to clean up site #10, my site, looting a $1000 worth of camping gear, clothing and medicine. The sheriff report on the looting claimed that "druggies" had looted the site, and abandoned tent shortly thereafter was stashed in the dumpster by evacuation staff, because it looked abandoned. It was a three-man brand-new Coleman tent, and the Army Corps had asked us to show occupancy with a tent.

All I see coming from the template is trouble, especially since I get two inspections, one from the Water Board staff and one from the County Ag Commissioner, although the commissioner Kevin Wright is decent as are his staff. But the Building Department could do the inspection and do it with a political twist, if not the Water Board staff.

I have a fervent thumbs-down response on this template.

Bud Hoekstra

Bud Hoekstra

BerryBlest Farm

POB 234

Glencoe, CA 95232

4C: Erosion and Sediment Control

Management Measure for Erosion and Sediment

Apply the erosion component of a Resource Management System (RMS) as defined in the Field Office Technical Guide of the U.S. Department of Agriculture–Natural Resources Conservation Service (see Appendix B) to minimize the delivery of sediment from agricultural lands to surface waters, *or*

Design and install a combination of management and physical practices to settle the settleable solids and associated pollutants in runoff delivered from the contributing area for storms of up to and including a 10-year, 24-hour frequency.

Management Measure for Erosion and Sediment: Description

Application of this management measure will preserve soil and reduce the mass of sediment reaching a water body, protecting both agricultural land and water quality.

This management measure can be implemented by using one of two general strategies, or a combination of both. The first, and most desirable, strategy is to implement practices on the field to minimize soil detachment, erosion, and transport of sediment from the field. Effective practices include those that maintain crop residue or vegetative cover on the soil; improve soil properties; reduce slope length, steepness, or unsheltered distance; and reduce effective water and/or wind velocities. The second strategy is to route field runoff through practices that filter, trap, or settle soil particles. Examples of effective management strategies include vegetated filter strips, field borders, sediment retention ponds, and terraces. Site conditions will dictate the appropriate combination of practices for any given situation. The United States Department of Agriculture (USDA)–Natural Resources Conservation Service (NRCS) or the local Soil and Water Conservation District (SWCD) can assist with planning and application of erosion control practices. Two useful references are the USDA–NRCS Field Office Technical Guide (FOTG) and the textbook "Soil and Water Conservation Engineering" by Schwab et al. (1993).

Sedimentation causes widespread damage to our waterways. Water supplies and wildlife resources can be lost, lakes and reservoirs can be filled in, and streambeds can be blanketed with soil lost from cropland.

Resource management systems (RMS) include any combination of conservation practices and management that achieves a level of treatment of the five natural resources (i.e., soil, water, air, plants, and animals) that satisfies criteria contained in the Natural Resources Conservation Service Field Office Technical Guide (FOTG). These criteria are developed at the State level. The criteria are then applied in the provision of field office technical assistance.

The erosion component of an RMS addresses sheet and rill erosion, wind erosion, concentrated flow, streambank erosion, soil mass movements, road bank erosion, construction site erosion, and irrigation-induced erosion. National (minimum) criteria pertaining to erosion and sediment control under an RMS will be applied to prevent long-term soil degradation and to resolve existing or potential off-site deposition problems. National criteria pertaining to the water

resource will be applied to control sediment movement to minimize contamination of receiving waters. The combined effects of these criteria will be to both reduce upland soil erosion and minimize sediment delivery to receiving waters.

The practical limits of resource protection under an RMS within any given area are determined through the application of national social, cultural, and economic criteria. With respect to economics, landowners should implement an RMS that is economically feasible to employ. In addition, landowner constraints may be such that an RMS cannot be implemented quickly. In these situations, a "progressive planning approach" may be used to ultimately achieve planning and application of an RMS. Progressive planning is the incremental process of building a plan on part or all of the planning unit over a period of time. For additional details regarding RMS, see Appendix B.

Sediment Movement into Surface and Ground Water

Sedimentation is the process of soil and rock detachment (erosion), transport, and deposition of soil and rock by the action of moving water or wind. Movement of soil and rock by water or wind occurs in three stages. First, particles or aggregates are eroded or detached from the soil or rock surface. Second, detached particles or aggregates are transported by moving water or wind. Third, when the water velocity slows or the wind velocity decreases, the soil and rock being transported are deposited as sediment at a new site.

Sheet, rill, and gully erosion can occur on cropland fields. Streambank and streambed erosion can occur in intermittent and perennial streams.

It is not possible to completely prevent all erosion, but erosion can be reduced to tolerable rates. In general terms, tolerable soil loss is the maximum rate of soil erosion that will permit indefinite maintenance of soil productivity, i.e., erosion less than or equal to the rate of soil development. The USDA–NRCS uses five levels of erosion tolerance ("T") based on factors such as soil depth and texture, parent material, productivity, and previous erosion rates. These T levels are expressed as annual losses and range from about 1–5 tons/acre/year (2–11 t/ha/year), with minimum rates for shallow soils with unfavorable subsoils and maximum rates for deep, well-drained productive soils.

Water Erosion

Water erosion is generally recognized in several different forms. *Sheet erosion* is a process in which detached soil is moved across the soil surface by sheet flow, often in the early stages of runoff. *Rill erosion* occurs as runoff water begins to concentrate in small channels or streamlets. Sheet and rill erosion carry mostly fine-textured, small particles and aggregates. These sediments will contain higher proportions of nutrients, pesticides, or other adsorbed pollutants than are contained in the surface soil as a whole. This process of preferential movement of fine particulates carrying high concentrations of adsorbed pollutants is called *sediment enrichment*.

Gully erosion results from water moving in rills which concentrate to form larger and more persistent erosion channels. Gullies are classified as either ephemeral or classic. Ephemeral gullies occur on crop land and are temporarily filled in by field operations, only to recur after concentrated flow runoff. This filling and recurrence of the ephemeral gully can happen numerous times throughout the year if untreated. Classic gullies may occur in agricultural fields but are so large they cannot be crossed by farming equipment, are not in production nor planted

currently the most widely used method for estimating average annual soil loss by wind for agricultural fields. The equation is expressed in the general form of:

Wind Erosion Equation (WEQ)

$$E = f(I,K,C,L,V)$$

where **E** is the potential average annual soil loss (tons/acre/year), a function of:

I, the soil erodibility index;

K, the soil ridge roughness factor;

C, the climate factor;

L, the unsheltered distance across the field; and

V, the vegetative cover.

Ground Water Protection

Although sediment movement into ground water is generally not an issue in most locations, there are places, such as areas of karst topography, where sediment and sediment-borne pollutants can enter ground water through direct links to the surface. More important from a national perspective, however, is the potential for increased movement of water and soluble pollutants through the soil profile to ground water as a result of implementing erosion and sediment control practices.

It is not the intent of this measure to correct a surface water problem at the expense of ground water. Erosion and sediment control systems can and should be designed to protect against the contamination of ground water. Ground water protection will also be provided through implementation of the nutrient and pesticide management measures.

Erosion and Sediment Control Practices and Their Effectiveness

The strategies for controlling erosion and sedimentation involve reducing soil detachment, reducing sediment transport, and trapping sediment before it reaches water. Combinations of the following practices can be used to satisfy the requirements of this management measure. The NRCS practice number and definition are provided for each management practice, where available. Additional information about the purpose and function of individual practices is provided in Appendix A.

Practices to Reduce Detachment

For both water and wind erosion, the first objective is to keep soil on the field. The easiest and often most effective strategy to accomplish this is to reduce soil detachment. Detachment occurs when water splashes onto the soil surface and dislodges soil particles, or when wind reaches sufficient velocity to dislodge soil particles on the surface.

Crop residues (e.g. straw) or living vegetative cover (e.g. grasses) on the soil surface protect against detachment by intercepting and/or dissipating the energy of falling raindrops. A layer of plant material also creates a thick layer of still air next to the soil to buffer against wind erosion. **Keeping sufficient cover on the soil is therefore a key erosion control practice.**

Source area stabilization is fundamental to erosion and sediment control.

The implementation of practices such as conservation tillage also preserves or increases organic matter and soil structure, resulting in improved water infiltration and surface stability. In addition, creation of a rough soil surface through practices such as surface roughening will break the force of raindrops and trap water, reducing runoff velocity and erosive forces. This benefit is short-lived, however, as rainfall rapidly decreases effectiveness of surface roughness. Reducing effective wind velocities through increased surface roughness or the use of barriers or changes in field topography will reduce the potential of wind to detach soil particles. Practices which increase the size of soil aggregates increase a soil's resistance to wind erosion.

The following practices can be used to reduce soil detachment:

- **Chiseling and subsoiling (324):** Loosening the soil without inverting and with a minimum of mixing of the surface soil to improve water and root penetration and aeration.
- **Conservation cover (327)**: Establishing and maintaining perennial vegetative cover to protect soil and water resources on land retired from agricultural production.
- **Conservation crop rotation (328)**: An adapted sequence of crops designed to provide adequate organic residue for maintenance or improvement of soil tilth.
- **Residue Management (329)**: Any tillage or planting system that maintains at least 30% of the soil surface covered by residue after planting to reduce soil erosion by water; or, where soil erosion by wind is the primary concern, maintains at least 1,000 pounds of flat, small-grain residue equivalent on the surface during the critical erosion period.
- **Contour orchard and other fruit area (331):** Planting orchards, vineyards, or small fruits so that all cultural operations are done on the contour.
- **Cover crop (340):** A crop of close-growing grasses, legumes, or small grain grown primarily for seasonal protection and soil improvement. It usually is grown for 1 year or less, except where there is permanent cover as in orchards.
- **Critical area planting (342):** Planting vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas (does not include tree planting mainly for wood products).
- **Seasonal Residue Management (344):** Using plant residues to protect cultivated fields during critical erosion periods.
- **Diversion (362):** A channel constructed across the slope with a supporting ridge on the lower side (Figure 4c-2).
- **Windbreak/shelterbelt establishment (380):** Linear plantings of single or multiple rows of trees or shrubs established next to farmstead, feedlots, and rural residences as a barrier to wind.

Figure 4c-2. Diversion (USDA-SCS, 1984).

- **Windbreak/shelterbelt renovation (650):** Restoration or preservation of an existing windbreak, including widening, replanting, or replacing trees.
- **Mulching (484):** Applying plant residue or other suitable material to the soil surface.
- **Irrigation water management (449):** Effective use of available irrigation water to manage soil moisture, reduce erosion, and protect water quality.
- **Prescribed Grazing (528A):** The controlled harvest of vegetation with grazing or browsing animals, managed with the intent to achieve a specified objective.
- **Cross wind ridges/stripcropping/trap strips (589):** Ridges formed by tillage or planting, crops grown in strips, or herbaceous cover aligned perpendicular to the prevailing wind direction.
- **Surface roughening (609)**: Roughening the soil surface by ridge or clod-forming tillage.
- **Tree planting (612):** Establishing woody plants by planting or seeding.
- **Waste utilization (633)**: Using agricultural or other wastes on land in an environmentally acceptable manner while maintaining or improving soil and plant resources.
- **Wildlife upland habitat management (645)**: Creating, maintaining, or enhancing upland habitat for desired wildlife species.

The following additional practices, although typically applied for a different primary purpose, may have significant secondary benefits in erosion control:

- **Brush management (314):** The management of undesirable brush species through use of living organisms, herbicides, prescribed burning, or mechanical methods.

- **Irrigation System, Microirrigation (441)**: A planned irrigation system in which all necessary facilities are installed for efficiently applying water directly to the root zone of plants by means of applicators (orifices, emitters, porous tubing, or perforated pipe) operated under low pressure (Figure 4f-19).
- **Irrigation system - sprinkler (442)**: Distribution of water by means of sprinklers or spray nozzles to efficiently and uniformly apply irrigation water to maintain adequate soil moisture.
- **Pasture and hayland planting (512):** Establishing and re-establishing long-term stands of adapted species of perennial, biannual, or reseeding forage plants.

Practices to Reduce Transport within the Field

Sediment transport can be reduced in several ways, including the use of crop residues and vegetative cover. Vegetation slows runoff, increases infiltration, reduces wind velocity, and traps sediment. Reductions in slope length and steepness reduce runoff velocity, thereby reducing sediment carrying capacity as well. Terraces and diversions are common techniques for reducing slope length. Runoff can be slowed or even stopped by placing furrows perpendicular to the slope, through practices such as contour farming that act as collection basins to slow runoff and settle sediment particles. By decreasing the distance across a field that is unsheltered from wind and by creating soil ridges or other barriers, sediment transport by wind will be reduced.

Where conditions and opportunities permit, install practices that prevent edge-of-field sediment loss.

- **Contour farming (330)**: Farming sloping land in such a way that preparing land, planting, and cultivating are done on the contour. This includes following established grades of terraces or diversions.
- **Field windbreak (392):** Establishment of trees in or adjacent to a field as a barrier to wind.
- **Grassed waterway (412):** A natural or constructed channel that is shaped or graded to required dimensions and established in suitable vegetation for the stable conveyance of runoff.
- **Contour stripcropping (585)**: Growing crops in a systematic arrangement of strips or bands on the contour to reduce water erosion. The crops are arranged so that a strip of grass or close-growing crop is alternated with a strip of clean-tilled crop or fallow or a strip of grass is alternated with a close-growing crop (Figure 4c-3).
- **Herbaceous Wind Barriers (442A)**: Herbaceous vegetation established in rows or narrow strips across the prevailing wind direction.
- **Field stripcropping (586)**: Growing crops in a systematic arrangement of strips or bands across the general slope (not on the contour) to reduce water erosion. The crops are arranged so that a strip of grass or a close-growing crop is alternated with a clean-tilled crop or fallow.
- **Terrace (600)**: An earthen embankment, a channel, or combination ridge and channel constructed across the slope (Figures 4c-4 and 4c-5).
- **Contour Buffer Strips (332)**: Narrow strips of permanent, herbaceous vegetative cover established across the slope and alternated down the slope with parallel, wider cropped strips.

Practices to Trap Sediment Below the Field or Critical Area

Trap sediment before it reaches riparian areas.

Practices are also typically needed to trap sediment leaving the field before it reaches a wetland or riparian area. Deposition of sediment is achieved by practices that slow water velocity or increase infiltration.

- ❒ **Sediment basins (350):** Basins constructed to collect and store debris or sediment.
- ❒ **Field border (386):** A strip of perennial vegetation established at the edge of a field by planting or by converting it from trees to herbaceous vegetation or shrubs.
- ❒ **Filter strip (393):** A strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and wastewater.
- ❒ **Water and sediment control basin (638)**: An earthen embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

Figure 4c-3. Stripcropping and rotations (USDA-ARS, 1987).

Contour strip cropping systems can involve up to 10 strips in a field. A strip cropping system could involve the following:

Corn (either for grain and/or silage)

Soybeans

1st year Meadow

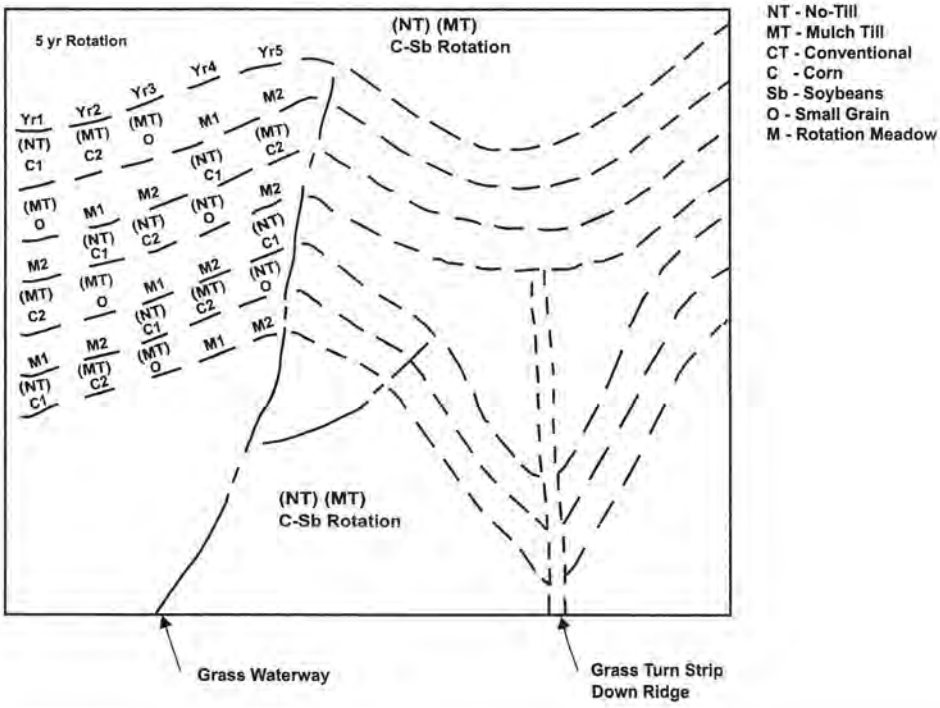
Established Meadow (2-4 years)

Oats

Grassed waterway or diversion

Tillage systems may include two kinds in the same year such as chisel plowing for the soybean crop and moldboard plowing for the oats.

See the following figure showing typical patterns of stripcropping.



- ❒ **Stream Channel Stabilization (584):** Stabilizing the channel of a stream with suitable structures.
- ❒ **Use exclusion (472):** Excluding animals, people, or vehicles from an area, primarily by means of fencing.
- ❒ **Riparian forest buffer/herbaceous cover (391A/390):** Establishing an area of trees, shrubs, grasses, or forbs adjacent to and up-gradient from water bodies.
- ❒ **Control of streambank erosion** on agricultural land requires techniques different from those used to treat upland sheet and rill erosion. The force of flowing water in a river or stream is a very important process causing streambank erosion. Protection of the slope faces on channel banks, especially those already undergoing active erosion, from the force of flowing water is the key control principle. Techniques may be divided into two general categories: bioengineering (vegetative) and structural. Vegetative methods are generally preferred, unless structural methods are more cost-effective.

  Soil bioengineering uses live or dead plant materials, in combination with natural and synthetic support materials, for slope stability, erosion reduction, and vegetative establishment. It should be noted that soil bioengineering measures depending on growth of living vegetation also require livestock exclusion to protect the growing plants from grazing and trampling.

Specific bioengineering practices include:

- ***Live staking***: insertion and tamping of live, rootable vegetative cuttings into the ground to create a living root mat that stabilizes the soil.
- ***Live fascines and brushlayering***: placement of bundles of branch cuttings (usually of willow) in shallow trenches or benches on bare streambanks to rapidly establish protective vegetation.
- ***Tree/shrub planting***: planting of rooted cuttings and tree or shrub seedlings on shaped streambanks and in the riparian zone.
- ***Trench packing***: filling of a gully with woody brush to provide a barrier to retard water flow and accumulate sediment.
- ***Brushrolls, brushmattresses, brush boxes***: bundles of brush of varying configurations staked against the base of an eroding streambank as a barrier to slow water flow and to settle and accumulate sediment.

Structural practices can protect streambank soils from the erosive force of streamflow, help retain eroding soil, or influence the direction or velocity of streamflow with durable nonliving materials. When using hardened structures like those below, care must be taken to avoid causing additional problems within the stream channel (e.g., channelization, incision):

- ***Riprap***: rock dumped or placed along a sloped streambank to armor the bank against the force of flowing water.
- ***Revetments***: structures such as timber cribbing backfilled with gravel, anchored trees, gabions, or bulkheads applied to the streambank to hold back eroding material as well as to protect from flowing water.

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Strategic Practices Recommendations:

9. Use a watershed approach to coordinate forest management; land use; agricultural land stewardship; integrated resources planning and other appropriate resource strategies and actions.

10. Design and select projects with ecological processes in mind and with a goal of making the projects as representative of the local ecology as possible.

11. Increase the ability for precipitation to infiltrate into the ground; reduce surface runoff to a point where it better reflects a natural pattern of runoff retention. This practice is often described as reducing impervious surfaces within a watershed. Retain floodplain and other wetlands intact to the extent possible, in order to maintain or increase residence time of water in the watershed.

12. Decrease the amount of irrigated landscaping in the watershed, and increase the use of native vegetation in landscaping and agricultural buffer lands.

13. Design appropriate wildlife migration corridors and biological diversity support patches by watershed when planning fire-safe vegetation alteration.

14. Support the installation and maintenance of stream flow gauges in major drainages.

15. Maintain and create habitat around stream and river corridors that is compatible with stream and river functions. Provide as much upslope compatibility with these corridors as possible.

16. Design drainage and storm water runoff controls to maximize infiltration into local aquifers, and minimize immediate downstream discharges during runoff.

17. Provide regionally appropriate, regular and dependable educational materials to encourage water conservation, water re-use, and water pollution prevention.

18. Restore and preserve stream channel morphology to allow access of flood waters to the floodplain and to provide for stable banks and channel form.

19. Work to restore the characteristics and functions of native grasslands, woodlands, forests and other wildlands.

20. Carryout invasive weed planning and removal when needed as a part of overall resource management efforts.

21. Protect soil resources and restore the functions of drastically disturbed soils, to slow run off and increase rainfall infiltration