

# Memorandum

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## Introduction and Purpose

On December 20, 2004, the Santa Ana Regional Water Quality Control Board (Regional Water Board) issued Order No. R8-2004-0021 (Order), which specifies waste discharge requirements for short-term (i.e., one year or less) groundwater-related and *de minimus* discharges within Newport Bay Watershed. The Order incorporates an alternative compliance approach to allow the stakeholders to participate in a Working Group to develop and implement a comprehensive Work Plan to address nitrogen and selenium groundwater-related discharges in the watershed.

Pursuant to the *Nitrogen and Selenium Management Program (NSMP) Work Plan and Compliance Strategy, June 2005 (Work Plan)*, the Working Group is evaluating offset, trading and mitigation programs (hereafter generally referred to as “water quality credit trading” or “trading”) to determine if these types of programs may be utilized within Newport Bay Watershed as a part of the overall management strategy for nitrogen and selenium.

Consistent with the Year 2 Work Plan, this memo provides findings from a review of offset and trading programs nationwide. This memo identifies some of the key issues and program background, and begins the dialogue within the Working Group regarding water quality credit trading programs. Developing a program will require a significant amount of additional discussion with the Working Group and will be dependent upon the results of other Work Plan tasks. Based on the information presented in this memo, an assessment of options for a water quality credit trading program will be conducted and presented by June 2007.

This memo is divided into the following sections:

- Trading and Offsets Policies
- Experience To Date with Water Quality Credit Trading
- Newport Bay Watershed Considerations
- Conclusions and Next Steps

References are provided at the end of this memorandum.

## Definitions and Uses of Terms

USEPA's Water Quality Trading Policy defines trading by what it entails, but does not explicitly define trading or offsets. For the purposes of this memo, the terms are defined as follows.

- Water Quality Credit Trading or Trading - A general term referring to any negotiated transaction of water quality credits between a buyer and a seller, or by a single discharger or multiple dischargers within a "bubble" (e.g., between or among multiple discharge points within a defined area). Trades can occur between or among regulated entities to achieve net reductions under a cap (e.g., TMDL allocation), among regulated and unregulated dischargers, or among dischargers and third-parties (non-dischargers).
- Offsets - Sometimes describes a trade (see above), and sometimes describes a situation where a single discharger implements a project to obtain credits in order to permit a new discharge, or to credit against a load above a cap.
- Mitigation - A project that alleviates the environmental impacts of an action by following a sequential process of avoiding the impacts, minimizing the impacts and then compensating for the impacts. Mitigation is a term that is generally used within the context of the California Environmental Quality Act (CEQA) associated with development projects and in lieu of cash settlements for violating the law. Mitigation does not generally apply to the ongoing load reductions that the Working Group is seeking.

The terms "trading" and "offsets" are sometimes used interchangeably to refer to a range of possible arrangements, from single-party, single transaction projects, to multi-party, multi-transaction programs. The chosen term in any given situation may simply reflect preference (some infer trading involves trading something away), syntax (trading is a verb and the trade is a transaction, while offset can be used as verb or noun to describe the creditable reductions), or convenience in consistency. Sometimes the terms are intentionally used to describe distinctly different types of credit-based markets.

The term trading or offset are used in this memo consistent with the policy or program described. However, the Working Group can determine later whether they have a preference or wish to make a distinction in this terminology.

# Trading and Offsets Policies

The federal water quality trading policy and several state policies regarding water quality credit trading that are potentially applicable to Newport Bay Watershed are summarized in this section. The state policies discussed include California, Colorado, and Oregon.

## Federal Policy

In January 2003, the United States Environmental Protection Agency (USEPA) issued a *Final Water Quality Trading Policy* (Trading Policy) to provide guidance regarding how trading can occur under the Clean Water Act (CWA) and its implementing regulations and to encourage states to develop and implement trading programs for nutrients, sediment and other pollutants where opportunities exist to achieve water quality improvements at reduced costs.

The stated purpose of the policy is to encourage states, interstate agencies and tribes to develop trading programs and to provide incentives for voluntary programs to meet Total Maximum Daily Loads (TMDLs) at reduced compliance costs. The policy states “[USEPA] believes that market-based approaches such as water quality trading provide greater flexibility and have potential to achieve water quality and environmental benefits greater than would otherwise be achieved under more traditional regulatory approaches”.

USEPA supports trading when it:

- Achieves early load reductions and progress towards TMDLs
- Reduces TMDL implementation costs
- Provides economic incentives for voluntary pollutant reductions
- Reduces water quality-based compliance costs
- Offsets new or increased discharges
- Achieves greater environmental benefits
- Secures long-term improvements (by purchase and retirement of credits)
- Combines ecological services to achieve multiple environmental and economic benefits, such as wetland restoration or the implementation of management practices that improve water quality and habitat

The policy generally covers the following ten major areas, which are summarized below:

- Authorization
- Trading Areas
- Tradable Pollutants
- Trading Baselines
- Credit Eligibility
- Credit Use
- Monitoring Specific to Credit Trading
- Compliance and Enforcement
- Public Participation and Information Access
- Reporting and Evaluation

### ***Authorization***

The CWA includes provisions for trading in water quality management plans, continuing planning processes, watershed plans, water quality standards, TMDLs, and NPDES permits. The following must be accounted for when developing trading programs:

- All NPDES, 404 and other permits secured before trade allowed
- Provisions for trade in permits
- Opportunity to comment on trading program for NPDES trading
- Consistency with standard methods for sampling methods and frequency
- Trading protects designated uses
- Trading is not precluded by antibacksliding regulations if a point source increases its pollutant load in a manner consistent with overall TMDL requirements or similar watershed plan provisions, or if it decides to discontinue generating credits
- Trading is not precluded by antidegradation regulations as long as trading is consistent with standards (in general, trading will not result in a “lowering of water quality” or result in impairment of designated uses); state policies should include provisions for trading without requiring antidegradation review for high quality waters

Trading may occur in the following situations:

- Trading to maintain water quality where standards attained
- Pre-TMDL trading in impaired waters that achieve net reduction of the pollutant traded or other direct environmental benefit
- Trades are consistent with TMDL assumptions
- Technology-based effluent trades only where supported by federal guidelines
- Pretreatment trading
- Intra-plant trading among multiple outfalls of a given Waste Water Treatment Plant (WWTP)

### ***Trading Areas***

Trading areas may be defined as:

- Within a watershed
- Within a defined area for which a TMDL has been approved

### ***Tradable Pollutants***

Pollutants and parameters that may be traded include:

- Nutrients
- Sediment
- Other pollutants if prior approval provided through NPDES permit, a TMDL, watershed plan, or pilot trading study
- Cross pollutants for oxygen-related pollutants

There may be no trading that leads to acute toxicity within mixing zones or chronic toxicity outside the mixing zone. The policy also does not unconditionally support trading of persistent bioaccumulative toxics (PBTs), with the exception of a limited number of pilot studies. The policy does state, however, that USEPA will consider revising this policy based on the findings of the pilot studies.

### ***Trading Baselines***

Trading baselines are derived from water quality standards. Credits are generated when pollutant load reductions are greater than those required by regulatory requirements such as those established by NPDES permits, TMDLs, or existing land use regulations. Baselines in waters with TMDLs must be consistent with the TMDL allocations. Baselines for point sources in pre-TMDL waters and unimpaired waters are based on permit limits, performance requirements, or management practices. Baselines for nonpoint sources in these waters are based on the pollutant load associated with current land use and management strategies that comply with state and local regulations.

### ***Credit Eligibility***

Units of trade must be clearly defined. Also, credits must be generated prior to or during the period they are used to comply. Credits may be generated as long as pollution controls are functioning as expected.

### ***Credit Use***

When trading involves nonpoint sources, the trade should account for uncertainty. This accounting may involve trading at greater than a 1:1 ratio, using conservative assumptions, or retiring a certain percentage of tradable credits.

### ***Monitoring Specific to Credit Trading***

The trading program must specify standard protocols to quantify loads. The Policy says that states should work with USDA agencies to develop procedures to estimate agricultural loads and that other nonpoint source loads should be estimated using monitoring or modeling.

### ***Compliance and Enforcement***

The trading program should include frequent compliance audits, establish appropriate and clear enforcement mechanisms consistent with NPDES regulations for failure to generate credits, consider compliance history in determining eligibility to participate in the trading program, and include provisions where credits fail due to weather or other unavoidable circumstances.

### ***Public Participation and Information Access***

The public should be involved while developing the trading program and be provided electronic access to trading records.

### ***Reporting and Evaluation***

There should be periodic assessment of environmental and economic effectiveness. USEPA has oversight of the following programs linked to trading:

- TMDLs;
- NPDES permits; and
- Water quality management plans.

## State Trading Policies

There are several states that have either established or ongoing efforts to establish trading policies, guidance or rules. The purpose of these state-specific trading policies, guidance or rules is to supplement USEPA's Trading Policy with requirements for trading specific to the state. These states include Colorado, Connecticut, Florida, Idaho, Maryland, Michigan, Minnesota, Ohio, Oregon, Pennsylvania, Virginia, West Virginia and Wisconsin.

- Adoption of Formal Trading Policies, Guidance or Rules - Colorado, Connecticut, Idaho, Oregon, Pennsylvania, Virginia and Wisconsin have adopted formal trading policies or guidance and Michigan has adopted formal trading rules.
- Draft Policy or Guidance Development - Florida, Maryland, Minnesota and West Virginia are all in various stages of drafting policy or guidance.

Some states, such as Connecticut, have approved trading for a specific case but do not have a statewide policy, guidance or rule. In addition to the state policies, there is at least one regional guidance document published by the Chesapeake Bay Program. Other western states' trading policy documents, such as those from Colorado and Oregon, provide additional insight into plausible trading programs; therefore, more detail is provided below. Since those policies were developed subsequent to USEPA's Trading Policy, they are generally consistent with federal policy while providing additional guidance. Each policy document is characterized as an initial policy statement, thereby providing flexibility for modified approaches and occasional revisions.

- Colorado - Colorado published its trading policy in 2004. The geographic scope of trading is generally determined on a case-by-case basis. Conventional pollutants (e.g., nutrients) are encouraged while toxics (e.g., selenium) are allowed if sources and potential load reductions are well characterized. The policy also encourages more innovative types of trading programs such as crediting habitat restoration, cross-pollutant reductions, product reformulation, early load reductions before a compliance date, and flow augmentation. The general condition limiting the use of credits is that trading should result in water quality conditions that are at least as protective of standards and classified uses as would be the case through the implementation of current requirements. A load-based credit unit is considered most appropriate, and should be based on a frequency consistent with applicable standards (e.g., annual load for bioaccumulative pollutants). Other aspects of a trading program such as trading ratios, duration of credits, public participation, and monitoring and tracking requirements are to be determined based on site-specific requirements.
- Oregon - The Oregon Department of Environmental Quality published an Internal Management Directive (Directive) on water quality trading for staff use in evaluating proposed water quality trades in 2005. The Directive is based on USEPA's Trading Policy. Most impairments in Oregon are for temperature (salmon runs), which does not apply to Newport Bay Watershed; however, the policy allows consideration for bioaccumulative pollutants on a case-by-base basis. According to the Directive, trading should be supported by modeling used to develop the TMDL (if done). Monitoring surrogates are allowed for inherently variable pollutants. For example, a program could monitor algae growth rather than nutrient concentrations.

## California State Policy

The State of California has not issued any formal policy or regulatory guidance on trading or offsets. However, the State Water Resources Control Board (State Water Board) has considered and addressed the possibility of offsets and trades in two meaningful ways.

First, the State Water Resources Control Board legal council wrote a memorandum in October 2001 (SWRCB, 2001) that outlines the existing legal authority to employ offsets, pollutant trading, and other market-based programs to supplement existing water quality regulation in impaired waters. The memorandum discusses some of the legal issues that may arise when considering the development and implementation of offsets and trading programs including the anti-backsliding rule and the extent to which the regulations authorize new or renewed permits for discharges into impaired waters. One of the conclusions of the memorandum is that the use of offsets, pollutant trading, or other market-based mechanisms to supplement water quality regulation in impaired waters is clearly appropriate when implemented within the context of a TMDL, in which case substantial flexibility exists to achieve water quality standards (SWRCB, 2001).

Secondly, in 2005, the State Water Board adopted a resolution “Remanding an Amendment to the Water Quality Control Plan for the San Francisco Bay Region to Incorporate a Total Maximum Daily Load (TMDL) for Mercury in San Francisco Bay” (Resolution No. 2005-0060, dated September 7, 2005). One of the provisions in the resolution directed State Water Board staff to do the following:

Directs State Water Board staff to develop a State policy for water quality control that establishes alternative methods to allow dischargers to meet mercury effluent limitations that are directed to preventing contributions to excursions above water quality standards. The policy shall allow dischargers to perform other activities aside from eliminating more mercury from their discharges than they would be required to remove by applicable technology-based effluent limitations. This policy shall require more rigorous activities for: (a) dischargers not in compliance with their wasteload allocations and/or other applicable criteria or objectives; and (b) dischargers seeking to increase their mercury load. The policy shall include provisions that recognize the efforts of those dischargers who are meeting or outperforming their wasteload allocations, and that recognize the expenditures made by dischargers who are employing higher treatment levels. The policy shall not include requirements that would leverage existing point source discharges as a means of forcing dischargers to bear more than their fair share of responsibility for causing or contributing to any violation of water quality standards. In this context “fair share” shall refer to the dischargers’ proportional contribution to the impairment. The policy shall also include provisions that prevent localized disparate impacts.

In January 2007, the State Board distributed a draft CEQA scoping document describing the issues that would be consider in developing a regional mercury offset policy. The intention was to comply specifically with the remand described above; however, there is the possibility that the discussion will be broadened to include other pollutants and to apply statewide. In February 2007, the State Board hosted a workshop to receive comment on the draft scoping document and is now revising that document.

## Santa Ana Regional Water Quality Control Board Policy

The Santa Ana Regional Water Quality Control Board (Santa Ana Regional Water Board) has incorporated language within their Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin as well as several permits that demonstrates that they are supportive of offsets and trading programs.

The Basin Plan was modified in 1998 to incorporate a nutrient TMDL for Newport Bay/San Diego Creek Watershed. The modification (attachment to Resolution No. 98-9, as amended by Resolution No. 98-100 Resolution) resulted in the following language modification in Chapter 5, Implementation Plan of the Basin Plan [emphasis added]:

### 2. Eutrophication (Page 5-41)

Nutrient loading to the Bay, particularly from San Diego Creek Watershed, contributes to seasonal algal blooms which create a recreational and aesthetic nuisance. These algal blooms may also adversely affect wildlife. The TMDL distributes the portions of the waterbody's assimilative capacity to various pollution sources so that the waterbody achieves its water quality standards. *The Regional Board supports the trading of pollutant allocations<sup>1</sup> among sources where appropriate. Trading can take place between point/point, point/nonpoint, and nonpoint/nonpoint pollutant sources. Optimizing alternative point and nonpoint control strategies through allocation tradeoffs may be a cost effective way to achieve pollution reduction benefits.*

In addition, several permits/resolutions that have been adopted by the Santa Ana Regional Water Board have language providing options for the development of offsets and/or trading programs for selenium and nitrogen. Examples include the following:

- Order No. R8-2004-0021 "General Waste Discharge Requirements for Short-Term Groundwater-Related Discharges and De Minimum Wastewater Discharges to Surface Waters Within the San Diego Creek/Newport Bay Watershed"
- Order No. R8-2005-0079 "Waste Discharge Requirements for City of Irvine Groundwater Dewatering Facilities"
- Order No. R8-2006-0017 "Waste Discharge Requirements for US Department of the Navy, Former Tustin Marine Corps Air Station, Tustin, Orange County"
- Resolution No. R8-2004-0037 "Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake"

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<sup>1</sup> Typically credits are traded to meet allocations; allocations themselves are not traded.



**Figure 1** shows states in which trading initiatives have been implemented or are being investigated for development. **Table 1** summarizes information gathered about trading experiences around the country. This information was compiled from a variety of sources (including Jones et al., 2005; Morgan and Wolverton, 2005; and USEPA’s Targeted Watershed Grant program), as well as from the consultant team’s own database of efforts. The table identifies which of four types of trading were/are being considered or offered: point source – point source; nonpoint source – nonpoint source; point source – nonpoint source; offsets.

From **Figure 1** and **Table 1** it is apparent that trading programs are occurring or at least being considered across the county, in multiple states and USEPA regions, in numerous watersheds, for many different pollutants and have been increasing over the past five years.

**Table 1. Summary of Trading Programs in the US**

Program Name	State	Year Started <sup>1</sup>	Program Status	Pollutant	Type of Trade			
					PS - PS	NPS-NPS	PS-NPS	Offsets
Alabama and Tallapoosa Rivers	AL	2001	Not yet implemented	Nutrients, Sediment	✓		✓	
East Bay MUD – San Francisco Bay	CA	2006	Not yet implemented	Multiple, including toxics	✓		✓	✓
Grassland Area Farmers Tradable Loads Program	CA	1998	Implemented and ongoing	Selenium		✓		
Lake Tahoe Basin	CA	2004	Not yet implemented	Nutrients, sediment			✓	
Sacramento River	CA	2002	Not yet implemented	Mercury			✓	✓
Bear Creek	CO	1992	Implemented, ongoing	Phosphorus	✓		✓	
Boulder Creek	CO	1991	One time offset	Nitrogen			✓	✓
Chatfield Reservoir	CO	1993	Implemented, ongoing	Phosphorus	✓		✓	
Cherry Creek	CO	1997	Implemented and ongoing	Phosphorus	✓		✓	
Clear Creek	CO	1998	Implemented, discontinued (pilot)	Heavy metals			✓	
Lake Dillon	CO	1984	Implemented, ongoing	Phosphorus		✓	✓	
South Platte Watershed	CO	2002	Implemented, ongoing	Selenium, Zinc	✓		✓	
Long Island Sound	CT	2002	Implemented, ongoing	Nitrogen	✓			
JEA – St. Johns River	FL	2005	Not yet implemented	Nutrients	✓		✓	
Rockdale County	GA	2005	Implemented, ongoing	Nutrients, Sediment	✓		✓	

Program Name	State	Year Started <sup>1</sup>	Program Status	Pollutant	Type of Trade			
					PS - PS	NPS-NPS	PS-NPS	Offsets
Lower Boise River	ID	2002	Implemented, ongoing (no trades yet)	Phosphorus	✓		✓	
Piasa Creek Watershed	IL	1995	One time offset	Sediment				✓
Louisville-Jefferson County Metropolitan Sewer District	KY	2003	Implemented, ongoing (pilot)	Multiple	✓		✓	
MD Association of Municipal Wastewater Agencies	MD	2004	Implemented, ongoing	Multiple	✓		✓	
Ipswich River	MA	2004	Not yet implemented	Flow	✓			
Wayland Business Center	MA	1998	One time offset	Phosphorus				✓
Kalamazoo River	MI	1996	Implemented, ongoing (pilot)	Phosphorus			✓	
Rouge River and Lake Huron	MI	2002	Implemented, ongoing	Pathogens, Mercury, Dissolved Oxygen	✓		✓	
Rahr Malting Co.	MN	1997	Implemented, ongoing	Phosphorus, Nitrogen, BOD			✓	✓
So. Minnesota Beet Sugar Co-op	MN	1999	One time offset	Phosphorus			✓	✓
Vermillion River Watershed Joint Powers Organization	MN	2005	Not yet implemented	Flow, Temperature		✓		
Yazoo Basin	MS	2002	Not yet implemented (pilot)	Multiple			✓	
Missouri River and Papillion Creek	NE	2005	Not yet implemented	Fecal Coliform, Ammonia, Nutrients	✓		✓	
Cape Fear River Assembly	NC	2005	Not yet implemented	Nutrients	✓		✓	
Truckee River Quality Settlement Agreement	NV	1996	Implemented, ongoing	Phosphorus, Nitrogen, TDS	✓		✓	
Passaic River	NJ	2004	Implemented, ongoing	Phosphorus	✓		✓	
Passaic Valley Sewerage Commission Pretreatment	NJ	1996	Implemented, ongoing (pilot)	Heavy metals	✓			
New York City Watershed Offsets Pilot Program	NY	1997	Implemented, ongoing (pilot)	Phosphorus	✓		✓	
Neuse River Basin	NC	2002	Implemented, ongoing	Nitrogen	✓		✓	
Tar-Pamlico Basin	NC	1990	Implemented, ongoing	Phosphorus, Nitrogen	✓		✓	

Program Name	State	Year Started <sup>1</sup>	Program Status	Pollutant	Type of Trade			
					PS - PS	NPS-NPS	PS-NPS	Offsets
Great Miami River Watershed Trading Pilot Program	OH	2004	Implemented, ongoing	Phosphorus, Nitrogen			✓	
Clean Water Services	OR	2002	Implemented, ongoing	Dissolved Oxygen, Temperature	✓		✓	
Willamette River	OR	2006	Not yet implemented	Multiple, including flow and temperature	✓	✓	✓	✓
Conestoga River	PA	2001	Implemented, ongoing	Nutrients	✓		✓	
Knox County - Beaver Creek	TN	2007	Not yet implemented	Sediment, Nutrients	✓	✓	✓	
Lake Lewisville/City of Denton	TX	2002	Not yet implemented	Sediment, Phosphorus		✓	✓	
Tri-State Bear River Commission	UT	2005	Not yet implemented	Multiple			✓	
Virginia Nutrient Credit Exchange Association	VA	2005	Not yet implemented	Nitrogen, Phosphorus	✓		✓	
WA State Depts. Of Ecology and Transportation	WA	2001	Implemented, discontinued (looking for another site)	Multiple	✓	✓	✓	
Fox-Wolf Basin	WI	1997	Implemented, discontinued (pilot)	Phosphorus	✓		✓	
Red Cedar River	WI	2000	Implemented, ongoing (pilot)	Phosphorus			✓	
Rock River	WI	2000	Implemented, ongoing (pilot)	Phosphorus	✓		✓	
CBP Nutrient Reduction Technology Cost Task Force, Chesapeake Bay		2002	Implemented, ongoing	Nutrients	✓		✓	

1 - A few programs are not currently active, but are not identified as such because they may be resurrected.

In some watershed programs and trading programs, there have been a few disincentives to trading identified. These usually fall into one of two categories; disincentives that prevent trading programs from being developed and implemented or trading programs that are in place but do not have any actual trades taking place. In the first case, reasons that some proposed programs have not been developed and implemented include a lack of interest on the part of stakeholders, a lack of state regulatory guidance or support, trading determined not to be cost effective or the lack of credit buyers and sellers. In the second case, reasons that some implemented programs have few or no trades include a lack of need for credits to be purchased, implementation of other projects that decreased or eliminated the need for credits, or high transaction or credit costs.

## California Experience

This section includes information regarding trading programs that have been undertaken or are being investigated within the State of California. The cases described are:

- Grassland Area Farmers Tradable Loads Program (Selenium)
- Sacramento Regional County Sanitation District's Mercury Offset Feasibility Study
- San Francisco Bay Mercury Offset Program
- Lake Tahoe 2004 Targeted Watershed Program (Nutrients and Sediments)
- Lake Elsinore and Canyon Lake Nutrient Trading Program

### *Grassland Area Farmers Tradable Loads Program (Selenium)*

The most notable example of a successful trading project in California is the Grassland Area Farmers Tradable Loads Program, which involves the Bureau of Reclamation and the San Luis & Delta-Mendota Water Authority<sup>2</sup>. The motivation for establishing the program occurred after the selenium load was found to cause wildlife death and deformity in the Kesterson Reservoir and the San Luis Drain was closed. The Grassland Area Farmers, a regional consortium of seven irrigation and drainage districts in the San Joaquin Valley, administers an internal cap-and-trade program for selenium.

The program, which was the nation's first water quality credit trading program among nonpoint sources exclusively, allows selected irrigation districts to collectively meet a cap on total loads of selenium to the federally-owned San Luis Drain. The irrigation districts encourage compliance through a tiered pricing system for water discharges.

This project is implemented through an agreement for the use of the San Luis Drain and Waste Discharge Requirements issued by the Central Valley Regional Water Board. The selenium TMDL for the Lower San Joaquin River was completed in 2001 and now forms the basis for the monthly and annual load limits. Parties to the agreement trade selenium reduction credits among themselves or otherwise collectively make decisions about BMP implementation and irrigation practices in order to stay below the effective cap. Actual discharge into the San Luis Drain began in 1997 and discharge into the San Joaquin River rather than into Kesterson Reservoir.

The tradable loads program was introduced in June 1998. In the first year (Water Year 1998), only one trade occurred because of the unusual weather and resultant uncertainty. Eight trade agreements were signed in Water Year 1999. Eventually, 39 trades occurred totaling 605 lbs of monthly selenium loads. Several more trades were planned in Water Year 2000, but there have been no trades since then. Project proponents did not respond to several requests for more insight.

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<sup>2</sup> For more information, see <http://www.epa.gov/owow/watershed/trading/tradingactivities.html>.

### ***Sacramento Regional County Sanitation District's Mercury Offset Feasibility Study***

The Sacramento Regional County Sanitation District (District) completed a three-year offset feasibility study in March 2005 (SRCSD, 2005), in compliance with an NPDES permit requirement. The current permit cap was imposed subsequent to significant source control efforts, thereby providing no credit for those historic activities. Nonetheless, current loads are below the cap and are banked (based on a 12-month total) until a discharger-specific offset program is adopted by the Central Valley Regional Water Board.

Major criteria used to prioritize candidate offset projects included distance from the District's discharge, relative bioavailability of the candidate source, and uncertainty regarding the benefits of candidate projects. These criteria are embodied in proposed credit factors. The District has proposed TMDL implementation language to establish the framework and protocols for the preferred offset project. As a presumed prerequisite to implementation of an offset project, the District has undertaken a localized mercury bioaccumulation study to quantify the localized effect of mercury at the point of discharge in the Sacramento River. Field work occurred in July-November 2006. Data analyses and reporting will occur in 2007.

### ***San Francisco Bay-Delta Mercury Offset Program (Proposed)***

Mercury is a predominant pollutant of concern in California's San Francisco Bay-Delta estuary. TMDLs are in various stages of development and approval throughout the watershed. The following points describe major activities associated with trading and their status.

- In 2005, the Central Valley Regional Water Board adopted a Basin Plan Amendment including a TMDL for mercury in Cache Creek Watershed. This TMDL includes fish tissue objectives, which are not directly linked to the load reduction program. The TMDL allocates methylmercury load reductions to subwatersheds, but requires total mercury load reductions from abandoned mercury mines and enhanced erosion control from areas with elevated soil mercury content. Offsets are noted as a future implementation option without specific allowances.
- On August 9, 2006, the San Francisco Bay Regional Water Board adopted a Basin Plan Amendment including a revised mercury TMDL for San Francisco Bay. This TMDL has a combined wasteload allocation for all municipal wastewater dischargers and indicates that NPDES dischargers may comply with their portion of the load cap by participating in an offset program to be developed later. The Regional Water Board had already drafted a watershed permit to address mercury allocations, with allowances for trading, but since early 2006 no progress has been made. Approval of the TMDL by the State Water Board is pending, after which it will be reviewed by the state Office of Administrative Law and USEPA.
- Currently, the Central Valley Regional Water Board is developing a mercury TMDL for the San Francisco Bay-Delta, which is downstream of Cache Creek and upstream of San Francisco Bay. The peer review draft version contains total mercury and methylmercury load allocations for specific subwatersheds outside of the Delta and wasteload allocations for individual NPDES permitted dischargers within and outside of the Delta. Phase 1 of the TMDL may require extensive characterization and control studies, which would guide application of allocations in phase 2. An offset program is being considered by allowing pilot projects during phase 1 and a comprehensive program under phase 2, which would provide credit for both total mercury and methylmercury.

### ***Lake Tahoe 2004 Targeted Watershed Program***

The California Regional Water Quality Control Board and the Nevada Division of Environmental Protection received a 2004 Targeted Watershed grant to develop a water quality credit trading strategy for Lake Tahoe. The funds will be used to:

- Create ground-rules for water quality credit trading between agencies and local jurisdictions responsible for mitigation, which includes developing a pollution control 'currency' and evaluating interstate trading options;
- Evaluate new approaches and technologies for pollution control; and
- Create a load reduction matrix or spreadsheet model to identify opportunities for load reduction projects and estimate a basin-wide load reduction potential.

The Targeted Watershed grant budget is \$1.7 million and includes reports on water quality credit trading feasibility, load quantification methodologies, pollutant reductions from innovative control measures, and load reduction opportunities, as well as a final manual on trading aimed at non-point sources and the final spreadsheet model for nutrient and sediment reductions. The contracted work is getting underway in early 2007.

### ***Lake Elsinore and Canyon Lake Nutrient Trading Program***

In late 2004 the Santa Ana Regional Water Quality Control Board adopted Resolution No. R8-2004-0037, "Resolution Amending the Water Quality Control Plan for the Santa Ana River basin to Incorporate Nutrient Total maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake". The resolution amended the Implementation Plan of the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) to incorporate the proposed TMDLs, which require actions to reduce nutrient discharges to Lake Elsinore and Canyon Lake. The TMDL implementation plan is multi-faceted and includes, among other items, a task to develop a Pollutant Trading Plan. The Pollutant Trading Plan will include a schedule, funding strategy and approach for tracking pollutant credits.

# Newport Bay Watershed Considerations

A water quality credit trading program for nitrogen and selenium may provide participants with the means to more efficiently allocate treatment costs and efforts among sources in the watershed. However, there are specific considerations that need to be taken into account for Newport Bay Watershed. Some of these considerations are common of trading programs while others are unique to the watershed.

This section highlights the preliminary watershed-specific issues, potential projects, and stakeholder considerations and describes a six-step decision process that the Working Group can use to explore and develop trading options. It should be noted that this section is preliminary and that a more fully developed Newport Bay Watershed-specific trading program strawman will be provided mid-2007.

## Six-step Decision Process

The purpose of the six-step decision process is to make key decisions involved in exploring, developing, and implementing trading opportunities. A step-wise decision process is helpful when decisions are costly, complex, controversial, or information/ data intensive. Most trading initiatives meet some or all of these criteria.

Groups that establish a clear process up front increase the likelihood of developing a trading program that successfully meets their environmental and economic objectives. This standard process will be tailored to readiness for trading and pre-existing relationships, and adapted for the decisions that need to be made. As groups move through this step-wise process they may find it necessary to revisit previous steps to reevaluate the decisions made in light of new information. For example, new state policy may cause a group to revisit Step 2 to reframe the problem and opportunities. In addition, the process needs to be integrated with other watershed management activities and endorsed by stakeholders.



The basics of this six-step decision process are presented and described below.

### ***Step 1. Leadership and Stakeholder Involvement***

This step focuses on the following questions:

- Why are we doing the project or program?
- Who are the decision-makers?
- Who are the key stakeholders?
- What roles will people play?
- What level of commitment is needed?
- How will that commitment be expressed?

This step is critical because leadership and commitment establish the foundation of a successful decision process.

### ***Step 2. Frame the Problem and the Opportunity***

Framing the problem and the opportunity involves answering these questions:

- What are the core issues to be addressed?
- What policies, strategies, and options are known?
- What general types of information are needed to evaluate the alternatives?
- What decisions, uncertainties and values must we understand and how do they relate to one another?
- How should we set boundaries for the problem and eliminate less important and irrelevant factors?

Identifying the problem and clarifying related issues establishes a common understanding. This involves doing the following:

- Defining the water quality/watershed objectives specifically achievable with trading
- Translating those objectives into a mission or vision statement
- Articulating the benefits of a solution with trading compared to one without trading

### ***Step 3. Identify Alternatives and Decision Criteria***

Identifying alternatives and decision criteria involves building an evaluation framework or model by answering the following questions:

- What are the primary drivers for the outcomes?
- What are our values?
- How can we measure the outcomes associated with each alternative?
- How will we know when our alternatives achieve our objectives?

It is important to articulate goals and objectives from Step 2 in terms of evaluating the feasible options to establish common understanding and agreement about how decisions will be made. This helps build consensus for the process and ultimately endorsement of the solution by translating values and goals into decision criteria. Typical objectives include:

- Cost-effectiveness
- Equity
- Speed
- Priority location/type of controls
- Technology innovation
- Incentives for non/slow actors

#### ***Step 4. Develop Technical Basis for Trading***

Developing a technical basis for trading primarily covers:

- Water quality basis
- Control technology capabilities
- Economic/financial costs and benefits
- Non-monetized benefits
- Priority locations, including localized application of objectives and related interpretations of attainment of designated uses
- Time to achieve results

This step generally involves:

- Collection, compilation, review of existing data/information
- Identification of gaps and needs
- Collection, development of new data/information
- Additional analysis and assessment

Key questions to answer in this step include:

- What data do we have, what does it tell us?
- What data do we need, in what format, what don't we know?
- Is our data and analysis credible to the decision-makers and stakeholders?
- Do we have enough data to proceed—can we go full speed, or do we need to follow a phased approach that will adapt the program to new data as it is developed and evaluated?

This step allows stakeholders to give input as well as understand other points of view.

#### ***Step 5. Evaluate Alternatives and Decide***

For this step, identify and describe the alternative approaches that have been considered for purposes of decision-making, such as:

- Trading framework
- Policies and rules
- Roles and responsibilities
- Regulatory mechanisms

Then, evaluate the alternatives using the previously established criteria. This will involve using the previously established decision criteria to evaluate the options through the following questions:

- How do they compare and contrast, advantages, disadvantages?
- What is the optimal strategy?
- What is/are the next best strategies?
- What uncertainties exist?
- What factors would need to change and by how much to indicate a different solution?

### ***Step 6. Develop Implementation Plan***

In this step, take the selected technical solution(s) from Step 5 and more fully develop the regulatory, administrative, and institutional implementation mechanisms. This step should conclude with a sufficiently consensus-based plan of action that can be implemented and address the *who, what, where, when, and how*. The plan should represent endorsement by those that will fulfill specific roles. The plan should specify how decisions regarding trading and the plan for implementation are communicated to partners and stakeholders.

In addition to identifying roles and responsibilities, functions, activities, etc. needed for the trading project or program, the plan should also address:

- What challenges exist?
- How can we meet these barriers?
- What contingencies are required?

The plan should specify any periodic and ongoing transactional, oversight, and evaluation procedures. If the plan is not final, or is expected to be periodically revised, the process by which updates will occur should be explained.

### **Watershed-specific Issues**

Issues specific to Newport Bay Watershed that should be considered as the feasibility of developing a water quality credit trading program is evaluated include, but are not limited to:

- The Regional Water Board supports the development of trading programs as is evidenced in the Basin Plan and Waste Discharge Requirements.
- A Working Group has already been formed, has participation from a wide variety of stakeholders, and has a market driver (an incentive) for developing a program.
- The Working Group should coordinate with the City of Irvine (a Working Group member) who also is currently developing an offset program for their long-term dewatering discharges.
- There may need to be two distinct programs for nitrogen and selenium (in addition, phosphorus may also need to be considered concurrently with nitrogen).
- Projects intended to reduce nitrogen loads could affect (reduce or exacerbate) the load or bioavailability of selenium.
- The Working Group is in the process of developing a BMP implementation plan for the watershed that will, among other things, identify recommended BMPs and optimal locations for implementation.
- The TMDL implementation plan for nitrogen has been completed and will undergo an evaluation; however, the selenium TMDL implementation plan has not yet been completed.
- The Working Group is in the process of developing selenium site-specific objectives for water, fish tissue, and bird eggs. How those selenium objectives are applied and interpreted throughout the watershed with respect to protection of designated uses and compliance with antidegradation policies will need to be considered. This consideration will have to account for spatial differences in the watershed related to: 1) the forms and bioaccumulation potential of selenium, 2) where bioaccumulation has occurred historically and is occurring today (where impairment is evident), and 3) priority locations for selenium load and/or concentration reductions. The Grasslands trading

program for selenium addressed a designated use impairment at the downstream end of the watershed (Kesterson Reservoir). The point(s) of compliance with respect to application of criteria and protection of designated uses must be determined for this watershed.

- EPA policy regarding trading of PBTs is cautionary for the selenium trading program. EPA policy allows for trading pilots for PBTs, and for policy revisions based on those pilots. The Grasslands trading program for selenium described above is considered one such “pilot project” that demonstrated the economic and ecological benefits of a PBT trading program

## **Newport Bay Watershed Projects/Studies**

The primary types of controls that will comprise a potential trading program will include source controls (including diversions) and treatment controls. Treatment controls would allow dischargers to meet explicit, quantified requirements that the project(s) result in “equivalent” or greater load reductions. There are several projects/studies that may be eligible for credit trading.

The projects include the following and are briefly summarized below:

- San Joaquin Marsh
- IRWD Natural Treatment System
- IRWD Cienega Filtration Project
- City of Irvine Offset Feasibility and Cost Analysis

### ***San Joaquin Marsh***

The Irvine Ranch Water District (IRWD) constructed the San Joaquin Marsh in 1997 for the dual purpose of removing nitrate from San Diego Creek as well as maximizing the amount of habitat for waterfowl, shorebirds and wading birds. Effluent concentrations of nitrogen (as total and total inorganic nitrogen) are typically 50% lower than influent concentrations. The average annual removal of total nitrogen is approximately 67% of influent loads, or 52,000 pounds. In fact, Order No. R8-2004-0021 states that “this Order finds that removal of nitrogen accomplished by IRWD’s operation of the San Joaquin Marsh natural treatment system ponds constitutes an offset for the total nitrogen loads resulting from the groundwater-related discharges regulated under this Order”.

Although the marsh was constructed for nitrate removal, preliminary data also indicate that the Marsh is reducing selenium concentrations. While selenium removal by constructed wetlands has been demonstrated, research is ongoing with regard to the fate of selenium in these systems. Because the presence of selenium in wildlife habitat is a concern, the marsh is actively managed to address this concern by monitoring (water quality, wildlife success) and not providing suitable habitat for nesting birds.

### ***IRWD Natural Treatment System***

IRWD has developed a plan for a Natural Treatment System (NTS) in San Diego Creek Watershed. The NTS would be comprised of treatment wetlands strategically placed throughout the watershed where low-flow runoff, as well as smaller storm flows, would be diverted into constructed wetlands. Estimates published in the Revised Draft Environmental Impact Report indicate that the NTS facilities would remove about 230,000 pounds of nitrogen annually. The NTS would also provide riparian habitat. The NTS plan identifies 31 potential sites for the

construction of treatment wetlands, which range in size from <1 acre to 55 acres. Although some of the sites are in design, many will not be online for years and thus, not available for a trading program.

### ***IRWD Cienega Filtration Project***

IRWD is developing and testing a field demonstration-scale anoxic biofilter system for removal of selenium from surface water, the Cienega Filtration Project. This proposed project consists of an underground chamber filled with crushed rock through which surface water from Peters Canyon Channel will be directed. A pre-design laboratory optimization study conducted by IRWD found that selenium concentrations of 35-60 ppb in the source water could be reduced to about 5 ppb with a one-day residence time. Nitrate influent concentrations of about 10-15 mg/L were reduced to 1 mg/L or less under selenium reducing conditions. The demonstration project is scheduled for construction in 2007 and will be operated for one year to test performance and to evaluate operational issues. IRWD plans to prepare a report in 2008 on the results of the demonstration project.

### ***City of Irvine Feasibility and Cost Analysis***

Order No. R8-2005-0079, *Waste Discharge Requirements for City of Irvine Groundwater Dewatering Facilities*, includes a maximum daily total nitrogen (TN) effluent limit (13 mg/L) for each of the discharges and requires a 50% load reduction when the TIN concentrations are greater than 1 mg/L. Whichever requirement is more stringent (either the TN effluent limit or the reduction in TN mass) is the limit that will apply. The limit applies after December 31, 2007 unless the City of Irvine develops an approved offset program.

As a result of these requirements, the City of Irvine evaluated potential options for compliance with their Waste Discharge Requirements. As a part of that evaluation the City developed evaluation criteria; developed conceptual designs, costs and timeframes for each option; provided an assessment of each option based on the evaluation criteria; and provided recommendations for further consideration.

The compliance options evaluated included:

- On-site treatment at each dewatering location;
- Partnering with IRWD for the Natural Treatment System (Cienega and Great Park);
- Offset at Warner Channel;
- Treatment and Offset at Culver Drive/Como Channel; and
- Discharging to the Sanitary Sewer

Based on the evaluation criteria the City selected three options for further consideration. The options, based in order of preference are:

- Treatment and Offset at Culver Drive/Como Channel - Construction of a subsurface flow wetland cell to treat dry weather flows in Como Channel;
- Partnering with IRWD for the Natural Treatment System - Cienega Filtration Project; and
- Discharging to the Sanitary Sewer - Construction of a diversion line to divert dry weather flows from Como Channel to the OCS D sanitary sewer.

## Stakeholder Considerations

Based on preliminary interviews with some of the watershed stakeholders, some initial issues and/or concerns were identified and are summarized in **Table 2**. These issues and concerns are, of course, preliminary and will be discussed in more detail during Year 2 of the Work Plan.

**Table 2. Preliminary Stakeholder Issues and Concerns**

Issue Category	Stakeholder Group		
	Regulators	Working Group Members	Environmental Community
Support Development of Trade Program	<ul style="list-style-type: none"> <li>• Generally</li> </ul>	<ul style="list-style-type: none"> <li>• Generally</li> <li>• Should be voluntary</li> <li>• Needs to be a net load reduction</li> </ul>	<ul style="list-style-type: none"> <li>• Cautious</li> <li>• Need water quality improvement</li> <li>• Needs to be clear to public</li> <li>• Need to evaluate</li> </ul>
Administrator	<ul style="list-style-type: none"> <li>• Not RWQCB</li> </ul>		
Possible Trade Locations	<ul style="list-style-type: none"> <li>• Within sub-watersheds</li> </ul>	<ul style="list-style-type: none"> <li>• San Joaquin Marsh</li> <li>• NTS</li> <li>• Locations identified in the NSMP BMP implementation plan</li> </ul>	
Tradable Credits	<ul style="list-style-type: none"> <li>• Standardize into BMP unit removal rate</li> </ul>	<ul style="list-style-type: none"> <li>• Need equitable distribution</li> <li>• Include orphan sources</li> <li>• Concerns re public perception</li> </ul>	<ul style="list-style-type: none"> <li>• Need agreements and accountability</li> <li>• Orphan sources may be addressed</li> <li>• Credits should be reduced as incentive and then sunset</li> </ul>
Trade Ratios	<ul style="list-style-type: none"> <li>• Prioritize by benefits to the Bay</li> </ul>		
Program and Project Costs	<ul style="list-style-type: none"> <li>• Need to consider</li> </ul>	<ul style="list-style-type: none"> <li>• Provide adequate economic incentives</li> </ul>	
Potential for Localized Impact	<ul style="list-style-type: none"> <li>• Need to consider</li> </ul>	<ul style="list-style-type: none"> <li>• Need to consider</li> </ul>	<ul style="list-style-type: none"> <li>• Need to consider</li> </ul>

# Conclusions and Next Steps

The main conclusions of this memo are the following.

- USEPA supports water quality credit trading in the manner expressed in its Trading Policy. Trading is expressly encouraged for nutrient while it is conditionally supported on a pilot basis for PBTs such as selenium.
- Several states are developing or have developed trading policies. Approximately 50 trading programs have been initiated nationwide. Market structures, trading ratios, and the other details of the programs vary widely among programs.
- Several trading programs are being explored in California and the state has initiated the development of a mercury offset policy for the San Francisco Bay-Delta regions.
- There are a number of potential trading/offset projects that have been identified as possibilities within Newport Bay Watershed. The Working Group should evaluate the feasibility of developing a trading program in a stepwise process and incorporate a number of decision points along the way.

Pursuant to the NSMP Work Plan, a trading program will be developed and implemented by 2009 if deemed to be a feasible alternative by the Working Group. The key areas of focus for Year 2 (July 2006 – June 2007) and associated next steps include the following:

- Review Past Experience – Make effective use of past experience with trading programs and obtain adequate input and guidance from relevant management and regulatory agencies. The tasks for this area of focus include the following:
  - Continue to review policy and guidance documents developed by USEPA and state agencies. This may include a review of policies from the following states: Colorado, Idaho, Oregon, Pennsylvania, and Florida.
  - Identify specific water quality credit trading programs that are most relevant to Newport Bay Watershed issues, evaluate the different management approaches used for pricing, impact assessment, resource valuation, etc., and provide recommendations.
  - Continue discussions with key Working Group members and/or a subcommittee to identify constraints, requirements, and performance expectations.
- Review Relevant Data and Findings – Ensure that the assessment of options for a trading program is based on watershed-specific data and processes and estimate the amount and distribution of source and/or reductions needed to meet the TMDL goals. The tasks for this area of focus include the following:
  - Evaluate the prerequisites for establishing a trading program for the watershed and begin to identify potential constraints and opportunities. Determine if a separate/combined trading program is appropriate for selenium and nitrogen.
  - Synthesize information from previous NSMP work products and review of past experience to initiate an evaluation of candidate projects.
    - Assess data from the San Joaquin Marsh and other local projects to better understand their utility in a trading program.
    - Address the potential for localized impacts within the watershed.

# References and Resources

Chesapeake Bay Program. 2001. Chesapeake Bay Program Nutrient Trading Fundamental Principles and Guidelines. EPA 903-B-01 CBP/TRS 254/01. See at [www.chesapeakebay.net/trading.htm](http://www.chesapeakebay.net/trading.htm).

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