Marine Environmental Update

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# EPA Issues Policy Statement on Permitting Strategy for Storm Water Discharges

On August 26, 1996, the Environmental Protection Agency published a policy in the Federal Register (61 FR 43761) outlining an interim approach for incorporating water quality-based effluent limitations into National Pollution Discharge Elimination System (NPDES) storm water permits (see *Marine Environmental Update*, Vol. FY96, No.4).

The EPA's policy addresses the variable nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass). The policy also addresses issues related to the type of effluent limitations that are most appropriate for NPDES storm water permits to provide for the attainment of water quality standards.

Depending on the specific facility, permitting authorities may specify exposure minimization practices, mitigation practices, or infiltration practices alone or in combination. For example, containing spills is one of the primary methods of minimizing exposure of contaminants to storm water runoff. Common spill containment best management practices (BMPs) may include containment diking, curbing, drip pans, catch basins, sumps, and coverings.

Based on numerous requests for additional information regarding the implementation of the policy, the EPA issued an interim policy statement on November 6, 1996 (61 FR 57425) and included a set of "questions" and answers as to the types of BMPs likely to

**ALSO IN THIS ISSUE:**



*Read me on-line at:* **http://environ.nosc.mil/Programs/MESO/Newsltr/newsltr.html** be required. A portion of the questions and answers published by the EPA are included later in this issue.

*Federal Register, Vol. 61, No. 216, November 6, 1996, pp. 57425-57429.*
*Environmental Compliance Bulletin, Vol. 3, No. 25, November 18, 1996, p.6.*
*Environment Reporter, Vol. 27, No. 28, November 15, 1996, p. 1480.*

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## EPA Proposes Revised PCB, Selenium Criteria for the Great Lakes

The Environmental Protection Agency is proposing revisions to the polychlorinated biphenyl (PCB) human health and wildlife ambient water quality criteria for the final *Water Quality Guidance for the Great Lakes System* (the Guidance, published on March 23, 1995). Following publication, several industries and trade associations challenged the human health and wildlife criteria for PCBs. Among the issues raised was the equation used to calculate the weighted geometric mean baseline bioaccumulation factor (BAF) for PCBs. The EPA re-examined the issue, and decided that a different approach for calculating a composite baseline BAF would be preferable because it would be more consistent with the definition of bioaccumulation factors since it more appropriately relates the concentrations of the PCB congeners in tissue to the concentrations of the PCB congeners in water.

The proposed revisions are limited to the method for deriving a composite BAF for PCBs and for deriving a composite octanol-water partition coefficient ($K_{ow}$) for PCBs. The human health cancer criteria for PCBs would change from $3.9 \times 10^{-6}$ micrograms per liter to $6.8 \times 10^{-6}$ micrograms per liter. The wildlife criteria for PCBs would change from $7.4 \times 10^{-5}$ micrograms per liter to $1.2 \times 10^{-4}$ micrograms per liter. The EPA is not proposing to revise any other aspect of the BAFs for PCBs or the PCB criteria for human health and wildlife.

The EPA is also proposing a new acute aquatic life criterion for selenium in the Great Lakes. The U.S. Court of Appeals for the D.C. Circuit ruled the 1995 acute selenium criterion null and void on September 19, 1996. The proposal takes into account data showing that selenium's two most prevalent oxidation states, selenite and selenate, present differing potentials for aquatic toxicity, as well as new data indicating that all forms of selenium are additive. Additivity increases the toxicity of mixtures of different forms of the pollutant. The new approach produces a different selenium acute criterion (also called the Criterion Maximum Concentration or CMC) dependent upon the relative proportions of selenite, selenate, and other forms of selenium that are present. The EPA is not proposing to revise any other aspect of the selenium criteria for aquatic life.

For more information, contact Mark Morris (4301), U.S. EPA, 401 M Street, SW, Washington, D.C. 20460; telephone (202) 260-0312.

*Federal Register, Vol. 61, No. 205, October 22, 1996, pp. 54748-54756.*
*Federal Register, Vol. 61, No. 221, November 14, 1996, pp. 58443-58449.*

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## Predicting Ammonia Toxicity from Pore Water Concentrations

Ammonia is commonly present at detectable concentrations in overlying and interstitial water (pore water) in solid phase sediment toxicity tests. It is often desirable to discern ammonia toxicity from that caused by other contaminants. The University of Wisconsin-Superior, in collaboration with ORD-Deluth, conducted a series of experiments to evaluate whether the bioavailability of ammonia in sediments could be predicted based on concentrations in the interstitial water. The study compared the toxicity of ammonia in water-only exposures and spiked sediment exposures with an oligochaete (*Lumbriculus variegatus*), a midge (*Chironomus tentans*) and an amphipod (*Hyalella azteca*). Exposures were conducted in a specialized test system that enabled the maintenance of target concentrations. To enable direct comparison of water-only and spiked-sediment exposures, the same test conditions (including pH) were used for each. There was good correspondence of $LC_{50}$ values between the water-only tests and spiked-sediment tests (based on interstitial water concentrations) for the oligochaete and the midge. *H. azteca* seemed to avoid the contaminated sediment and were frequently observed in the less contaminated overlying water, thus limiting evaluation of the pore-water exposure model for the amphipod. Overall, at least for some benthic species, ammonia bioavailability and toxicity can be accurately predicted from ammonia concentrations in the interstitial water; however, the model might be less robust for more epibenthic organisms, such as *H. azteca.* For more information contact Dave Mount at (218) 720-5616 or Gary Ankley at (218) 720-5603 at ORD-Deluth.

*Contaminated Sediment News, EPA-823-N-96-005, No. 17, September/October 1996, p. 3.*

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## Draft EPA Approach for Controlling Storm Water Sources Addresses Construction Runoff

Municipalities would have to develop programs that address runoff from construction, development, and redevelopment activities under a draft approach circulated by the Environmental Protection Agency

September 26, 1996. The draft EPA approach for controlling small storm water discharges also would clamp down on illicit connections, educate the public, and ensure proper operation and maintenance of storm sewer systems.

Storm water discharges are regulated under a two-phase approach. Phase I covers large discharges, including those associated with industrial activities, municipal separate storm sewer systems serving 100,000 people or more, and construction projects disturbing more than five acres. Smaller sources are covered by Phase II, and includes cities and towns with separate storm sewer systems serving 100,000 people or fewer, construction projects affecting less than five acres, and commercial operations.

The draft approach would require the issuance of permits to owners or operators of construction firms rather than to individual construction sites. Such an approach would eliminate the current distinction between construction sites disturbing more than five acres (Phase I) and those affecting less than five acres (Phase II). Construction companies would be required to seek coverage under a general permit. Coverage would be obtained in five-year increments by filing a notice of intent. The EPA, or an authorized state, would be required to issue a general permit detailing erosion and storm water control measures required at construction sites. The draft approach would eliminate the distinction between industrial and commercial activities covered under each phase of the storm water program.

Certain high-risk industrial facilities would be covered, or would continue to be covered, under the existing permitting scheme. Such facilities would include those with a high potential for exposure of raw materials or products to rainfall or those with high levels of site imperviousness. Some industrial facilities covered under the existing Phase I scheme would be exempted from permitting requirements if they can show that their materials or products are not exposed to rainwater. Industrial and commercial activities not covered by a permit would be encouraged to implement pollution-prevention plans.

*Environment Reporter, Vol. 27, No. 22, October 4, 1996, p. 1241-1242.*

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## EPA Answers Questions about Interim Permitting Approach to Storm Water Permits

**Question:** Must the EPA require that storm water dischargers, industrial or municipal, be subject to numeric water quality-based effluent limitations (expressed as concentration and mass) in order to attain water quality standards (WQS)?

**Answer:** No. Although National Pollutant Discharge Elimination System (NPDES) permits must contain conditions to ensure that water quality standards are met, this does not require the use of numeric water quality-based effluent limitations. Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (*e.g.*, monitoring benchmarks, toxicity reduction evaluation action levels), *etc*., as the necessary water quality-based limitations, where numeric water quality-based effluent limitations are determined to be unnecessary or infeasible.

The Clean Water Act does not require numeric effluent limitations. Section 301 of the CWA requires that discharger permits include effluent limitations necessary to meet State or Tribal WQS. Section 502 defines "effluent limitation" to mean any restriction on quantities, rates, and concentrations of constituents discharged from point sources. The CWA does not say that effluent limitations need be numeric. As a result, the EPA and States have flexibility in terms of how to express effluent limitations.

The EPA's regulations do not always require numeric effluent limitations. The EPA has, through regulation, interpreted the statute to allow for non-numeric limitations (*e.g.*, "best management practices" or BMPs, see 40 CFR 122.2) to supplement or replace numeric limitations in specific instances that meet the criteria specified at 40 CFR 122.44(k).

**Question:** Has the EPA provided guidance on a methodology for deriving numeric water quality-based effluent limitations?

**Answer:** Yes, but primarily for continuous wastewater discharges at low flow conditions in the receiving water, not intermittent wet weather discharges during high flow conditions. Regulations at 40 CFR 122.44(d) specify the requirements under which permitting authorities establish water quality-based effluent limitations when a facility has the "reasonable potential" to cause or contribute to an excursion of numeric or narrative water quality criteria. In addition, EPA guidance in the Technical Support Document for Water Quality-Based Toxics Control (TSD) and the NPDES Permit Writers Training Manual, supplemented with total maximum daily load (TMDL) and modeling guidance, supports issuing permits that include numeric water quality-based effluent limitations. This guidance was based on crafting numeric water quality-based effluent limitations using TMDLs, or calculations similar to those used in developing TMDLs, and wasteload allocations (WLAs) derived through modeling.

**Question:** Why can numeric water quality-based effluent limitations be difficult to derive for storm water permits?

**Answer:** Storm water discharges are highly variable both in terms of flow and pollutant concentrations, and the relationships between discharges and water quality can be complex. The water quality impacts of storm water discharges are related to the uses designated by States and Tribes in their WQS, the quality of the storm water discharge (*e.g.*, conventional or toxic pollutants conveyed to the receiving water) and quantity of the storm water (*e.g.*, erosion and loss of habitat caused by increased flows and velocity). Uses may be impacted by both water quality and water quantity. Depending on site-specific considerations, some of the water quality impacts of storm water discharges may be more related to the physical effects (*e.g.*, stream bank erosion, streambed scouring, extreme temperature variations, sediment smothering) than the type and amount of pollutants present in the discharge. For municipal storm water discharges in particular, the current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges that occur at predictable rates with predictable pollutant loadings under low flow conditions in receiving waters. Using these methodologies, limitations are typically derived for each specific outfall to be protective of low lows in the receiving water. Because of this, permit writers have not made widespread use of the existing methodologies and models for storm water discharge permits. In addition, wet weather modeling is technically more difficult and expensive than the simple dilution models generally used in the permitting process.

**Question:** What are the potential problems of using standard methodologies to derive numeric water quality-based effluent limitations for storm water permits?

**Answer:** Correctly derived numeric water quality-based effluent limitations provide a greater degree of confidence that a discharge will not cause or contribute to an exceedance of the WQS, because numeric water quality-based effluent limitations are derived directly from the numeric component of those standards. In addition, numeric water quality-based effluent limitations can avoid the expense associated with overly protective treatment technologies because numeric water quality-based effluent limitations provide a more precisely quantified target for permittees. Potential problems of incorporating inappropriate numeric water quality-based effluent limitations rather than BMPs in storm water permits at this time are significant in some cases. Deriving numeric water quality-based effluent limitations for any NPDES permit without an adequate effluent characterization, or an adequate receiving water exposure assessment (which could include the use of dynamic modeling or continuous simulations) may result in the imposition of inappropriate numeric limitations on a discharge.

**Question:** How are water quality-based effluent limitations developed for combined sewer overflow (CSO) discharges?

**Answer:** The CSO Control Policy issued by EPA on April 19, 1994 (59 FR 18688) provides direction on compliance with the technology-based and water quality-based requirements of the CWA for communities with combined sewer systems. The CSO Policy provides for implementation of technology-based requirements (expressed as "nine minimum controls") by January 1, 1997.

In addition, under the CSO Policy, communities are also expected to develop long-term control plans that will provide for attainment of WQS through either the “presumption approach” or the “demonstration approach.” Under the presumption approach, CSO controls would be presumed to attain WQS if certain performance criteria are met. A program that meets the criteria specified in the CSO policy is presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA, provided the permitting authority determines that such presumption is reasonable based on characterization, monitoring, and modeling of the system, including consideration of sensitive areas. Under the demonstration approach, the permittee would demonstrate that the selected CSO controls, when implemented, would be adequate to meet the water quality-based requirements of the CWA.

**Question:** If BMPs alone are demonstrated to provide adequate water quality protection, are additional controls necessary?

**Answer:** No. If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES storm water permit, the discharges have the necessary controls to provide for attainment of WQS and any technology-based requirements, additional controls need not be included in the permit. Conversely, if a discharger (municipal or industrial) fails or refuses to adopt and implement adequate BMPs, the permitting authority may have to consider other approaches to ensure water quality protection.

If the permitting authority has adequate information on which to base more specific conditions or limitations, such limitations are to be incorporated into storm water permits, as necessary and appropriate. Such conditions or limitations may include an integrated suite of BMPs, performance objectives, narrative standards, monitoring triggers, numeric water quality-based effluent limitations, action levels, *etc*. Storm water permits may also need to include additional requirements to receive State or Tribal 401 certifications.

**Question:** The interim permitting approach states that permits should include monitoring programs to generate necessary information to determine the extent to which permits are providing for the attainment of water quality standards. What types of monitoring should be included and how much monitoring is necessary?

**Answer:** The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. The EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: (1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and (2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Under the NPDES storm water program, large and medium municipal storm sewer system permittees are required to conduct monitoring. The EPA recommends that each such municipal permittee design the monitoring effort to be supportive of the goals and objectives of its storm water management program when developing such a program for the term of its NPDES permit. To accomplish this, a municipal permittee may use a variety of storm water monitoring tools including receiving water chemistry; receiving water biological assessments (benthic invertebrate surveys, fish surveys, habitat assessments, *etc*.); effluent monitoring; including chemical, whole effluent and visual examinations; illicit connections screening; and combinations thereof, or other methods. Techniques that assess receiving waters will help to identify the degree to which storm water discharges are contributing to any water quality problems. Techniques that assess storm water discharge characteristics will help to identify potential causes of any identified water quality problems. The municipal permittee, in conjunction with the applicable NPDES permitting authority, should determine which monitoring approaches would be most appropriate given the objectives of the storm water management program. If municipal permittees conduct ambient monitoring, it may be most cost-effective to pool resources with other organizations (including, for example, other municipalities, States, and Tribes) conducting monitoring within the same watershed. This could be best accomplished through a coordinated watershed monitoring strategy.

For industrial storm water dischargers, monitoring may be required under the terms of an NPDES permit for storm water discharges. For those industrial storm water permits that do require monitoring, this is typically done to characterize contaminants that might be found in the industrial runoff and/or to assess the effectiveness of the industrial storm water pollution prevention plan in reducing these contaminants. This typically involves end-of-pipe chemical-specific monitoring. End-of-pipe monitoring may be more appropriate for an industrial facility than for a municipal permittee, given the industrial facility's more discrete site characteristics, which make management strategies such as collection and treatment more feasible. Industries, for the most part, have readily defined storm water conveyances into which runoff flows from discrete drainage areas. Industries may more readily identify and control existing on-site sources of storm water contamination or provide collection and treatment within these discrete drainage areas to control pollutant concentrations in their storm water discharges.

**Question:** Does this interim permitting approach apply to both storm water discharges associated with industrial activity and storm water discharges from municipal separate storm sewer systems?

**Answer:** Yes. The interim permitting approach is applicable to both discharges from municipal separate storm sewer systems and storm water discharges associated with industrial activity (as defined by 40 CFR 122.26(b)(14)). The interim permitting approach would not affect, however, permits that already incorporate appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best professional judgment, that are incorporated into storm water permits. In addition, particularly for some industries, adequate information may already have been collected with which to assess the reasonable potential for a storm water discharge to cause or contribute to an excursion of a WQS, and from which a numeric water quality-based effluent limitation can be (or has been) appropriately derived. An adequate amount of storm water pollutant source information may also exist with which to assess the effectiveness of the industrial storm water control measures in complying with the limitations and in reducing storm water contaminants for protecting water quality.

Complete copies of the policy with the questions and answers are available by writing the U.S. Environmental Protection Agency, Water Resources Center, Mail Code 4101, 401 M Street, SW, Washington, D.C., 20460, or by calling (202) 260-7786. If you have additional questions about the policy, please contact, Bill Swietlik, Storm Water Phase I Matrix Manager, Office of Wastewater Management, at (202) 260-9529 or William Hall, Urban Wet Weather Flows Matrix Manager, Office of Wastewater Management, at (202) 260-1458, or by e-mail at hall.william@epamail.epa.gov.

*Federal Register, Vol. 61, No. 216, November 6, 1996, pp. 57425-57429.*

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## Costs of Cleaning Up Closed Bases Far Higher Than Amount Allocated by DOD

Cleaning up military bases that have been closed by the Department of Defense is expected to cost much more than the amount of funding allocated, according to the General Accounting Office. As of March 1996, the DOD had set aside about $3.4 billion for the cleanup of facilities under its base realignment and closure process, but GAO indicated the cost would probably be closer to $11 billion. The GAO's findings are contained in the report, *Military Base Closures: Reducing High Costs of Environmental Cleanup Requires Difficult Choices*, requested by Rep. William H. Zeliff (R-NH), chairman of the House Government Reform and Oversight Subcommittee on National Security, International Affairs, and Criminal Justice.

According to the report, the high cost of cleanup is due to the large number of contaminated sites at the bases, the cost of meeting federal, state, and regulatory requirements, the lack of cost-effective cleanup technology, and the intended use of property after the DOD turns it over. The list of hazardous wastes found at sites includes solvents, corrosives, heavy metals, paint strippers and thinners, and items unique to military bases such as nerve gas agents and unexploded ordnance.

The report cited a number of options to address the high cleanup costs. These include deferring or extending certain cleanup actions, modifying existing laws and regulations, adopting more cost-effective cleanup technologies, and sharing the cost with the ultimate user of the property. Copies of the report, GAO/NSIAD-96-172, can be obtained from the U.S. Accounting Office, P.O. Box 6015, Washington, D.C. 20548-0001; telephone (202) 512-6000.

*Environment Reporter, Vol. 27, No. 21, September 27, 1996, pp. 1197-1198.*

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## Federal Court Orders EPA to Set TMDLs for Georgia Waters Not Meeting Standards

A federal judge ordered the Environmental Protection Agency to set pollutant levels within five years for Georgia waters that do not meet applicable water quality standards, something state and federal environmental regulators have failed to accomplish (*Sierra Club v. Hankinson*, DC NGa, No. 1:94-CV-2501 MHS, 8/30/96). U.S. District Court Judge Marvin H. Shoob wrote that the EPA must establish total maximum daily loads for Water Quality Limited Segments (WQLS) and coordinate them with the state's river management plan. Georgia currently lists more than 500 segments of water bodies whose quality is impaired to some degree by pollutants that have not been eliminated through controls on point sources.

Under the Clean Water Act, states must identify lakes, rivers, and streams for which local effluent limits are not stringent enough to meet water quality standards. They must then assign a priority for them based on the severity of pollution and uses of the waters, and then develop a daily maximum discharge for each pollutant impairing a WQLS. Under section 303(d) of the Clean Water Act, the EPA is required to set TMDLs in states that fail to do so under the federal law. Georgia submitted its first list of water quality limited segments in 1992, 13 years late, and for those segments, only two TMDLs have been completed. At least 34 other states did not meet an April 1, 1996, deadline for submitting lists of impaired waters, and the EPA is the defendant in about 20 lawsuits similar to the one in Georgia.

Under the court order, the EPA must establish TMDLs for the Chattahoochee River and Flint River basins by June 30, 1997. Daily loads must be established for the state's other four major river systems by June 30, 2001, at the rate of one system per year. If the EPA does not follow the river management plan, it must submit 20 percent of the TMDLs per year. The EPA, or the state, will implement the TMDLs through National Pollution Discharge Elimination System (NPDES) permits, which could include modifying, reissuing, or revoking the NPDES permits, within one year of the establishment of the TMDL.  New dischargers would have to demonstrate that a given body of water will be able tolerate additional pollutants.

*Environment Reporter, Vol. 27, No. 19, September 13, 1996, p. 1060.*

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## Navy Cleaning Up after San Diego Bay Mercury Spill

On July 3, 1996, an accidental spill of about eight pounds (one cup) of mercury from the U.S. Navy Deep Submergence Rescue Vehicle, *USS Mystic* (DSRV-1), occurred alongside a NAS North Island pier. The mercury is normally contained within a "closed loop" system as ballast onboard the rescue vessel. The spill spread over a larger area as Navy vessels, away on weeklong operations, returned to port for the Fourth of July weekend. Vessels have subsequently been directed away from the area to prevent the further spread of the mercury, and to facilitate cleanup operations.

The Navy plans to continue dredging operations until sediment levels in the affected area reach less than 0.71 part per million. Mercury concentrations in San Diego Bay currently ranges from 0.23 to 1.0 parts per million. Contaminated sediment from the dredging operation is currently being removed by barge from North Island and transported by trucks to landfills. The high costs associated with this method of disposal has placed a strain on resources.

*Coronado Eagle, Vol. 7, No. 45, November 13-19, 1996, p. 1.*

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## Alaska Governor Vetoes Water Quality Bill

On October 4, 1996, Alaska Governor Tony Knowles vetoed a bill that would have reduced or eliminated federal criteria for state water-quality standards in Alaska. The bill (HB 342) would have barred state standards from being more stringent than federal standards, except for shellfish-growing operations and other special cases. The bill would have also required the Alaska Department of Environmental Conservation to produce a written economic and technological feasibility report when water-quality standards are adopted.

*Environment Reporter, Vol. 27, No. 24, October 18, 1996, p. 1368.*

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## New Hampshire Reestablishes Oil Discharge Notification, Investigation, and Reporting Procedures

A proposed rule issued on July 12, 1996, by the New Hampshire Department of Environmental Services would readopt, with amendments, regulations under Env-Ws 412 establishing notification, investigation, and reporting procedures and requirements for sites where oil discharges have occurred. The proposal would apply to all discharges of oil regardless of cause and establish procedures to be followed from the time of the initial spill report to the final site remediation. In addition, the proposal would clarify existing definitions and delete sections to avoid overlap with other existing rules.

*Environmental Compliance Bulletin, Vol. 3, No. 20, September 9, 1996, p. 7.*

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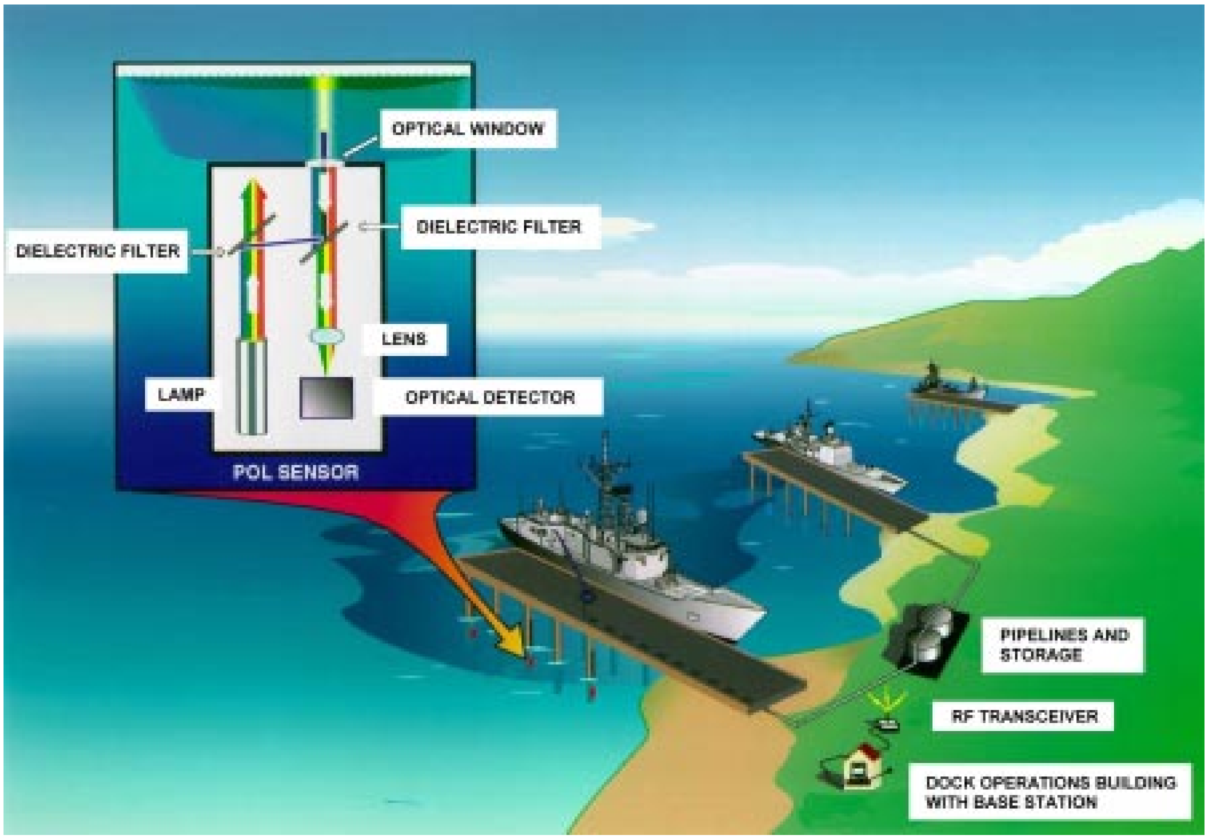
## Automated Marine Oil Spill Detection System Development Update

An automated marine oil spill detection system may soon be available for use at U.S. Navy facilities to assist spill response, help reduce annual spill volume, and assure compliance with future monitoring and reporting requirements. Such a system is currently being developed and tested by a team of scientists and engineers at the Environmental Sciences Division of the Naval Command, Control and Ocean Surveillance Center RDT&E Division (NRaD). The objective of this Naval Facilities Engineering Command sponsored effort is to provide Navy port facilities with an accurate, reliable tool for rapidly sensing the occurrence of a petroleum leak or spill in water.

Current Navy practices in providing for the detection of petroleum spills at marine facilities rely solely upon human visual observation to identify the surface sheen caused by oil floating on water. The problem with this practice is that visual observation provides only a limited and often unreliable means of detecting spilled fuel or oil. Many spills occur at places or times in which no one is present to discover the event. Even when an observer is present, visual spill sighting is very difficult during foul weather and is completely ineffective at night. The risk to commanders is that relatively small leaks will continue unobserved for hours or even days before being identified, thus causing what might otherwise have been an insignificant spill event to become a costly large-volume incident. The spill detection system being developed at NRaD is designed to eliminate the reliance on visual observation to detect spills. The system will provide spill responders with immediate notification of a spill occurrence, thereby enabling a timely response leading to the minimization of spilled volume, reduced environmental impact, and decreased clean up costs.




In its current configuration, the system employs an array of fluorescence-based optical sensors mounted underwater to provide continuous monitoring of both dissolved phase and floating surface oil (see figure above). Each of the optical sensors operates by illuminating the oil-water interface from below the surface with ultraviolet light, thereby causing oil and fuel products to fluoresce. The sensor continuously measures the intensity and spectral characteristics of the emitted fluorescence signal. The fluorescence emitted by different classes of fuel and oil products provides a unique spectral pattern that the sensor system uses to determine not only quantity but also type of spilled product. Data and alarm status is relayed to a base station control site via a hard-wired or wireless link. The sensor is able to detect petroleum in water to concentrations below 5 parts-per-million and petroleum on water to 0.2-micron thickness. Questions, comments or requests for additional information may be directed to John Andrews at NCCOSC RDTE DIV D361, 53475 Strothe Road, San Diego, CA, 92152-6310, telephone (619) 553-2794, fax (619) 553-6305 or e-mail d361@spawar.navy.mil

**ABOUT THE *MARINE ENVIRONMENTAL UPDATE***

This newsletter is produced quarterly by the Marine Environmental Support Office (MESO), and is dedicated specifically to inform the Navy about marine environmental issues that may influence how the Navy conducts its operations. MESO is located at the Naval Command, Control and Ocean Surveillance Center Research, Development, Test and Evaluation Division (NRaD) in San Diego, California. The mission of MESO is to provide Navy-wide technical and scientific support on marine environmental science, protection and compliance issues. This support covers a broad spectrum of activities, including routine requests for data and information, technical review and consultation, laboratory and field studies, comprehensive environmental assessments, and technology transfer. Significant developments in marine law, policy, and scientific advancements will be included in the newsletter, along with references and points of contact for further information. The Marine Environmental Support Office may be reached at:

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