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PROJECT SUMMARY

Title: **Development of a Model Code for Reclaimed Water Distribution Systems, Arizona**

Applicant: Arizona Department of Environmental Quality (ADEQ)

Project Partner: Arizona Water Institute (AWI)

Project Manager: Joan Card, Director
Water Quality Division
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007
602-771-2306; 602-771-4834 FAX;
card.joan@azdeq.gov

Project Period: **October 1, 2008 - September 30, 2010**

Project Abstract: Treated wastewater from sewage treatment plants is increasingly being reused in Arizona and other states as an additional source of supply to meet water demand. In Arizona, the Department of Water Resources identifies this resource as a critical component of Arizona's water portfolio through 2025 and beyond. As important as reclaimed water is to water supply and conservation, its reuse, which in Arizona means the water nearly meets drinking water standards, creates appealing collateral environmental benefits. These include incentivizing the construction of modern, high-performance tertiary treatment facilities to serve reuse needs, which not only reduces pollutant concentrations and loading in the treated wastewater but reduces the overall volume of wastewater discharged to waters of the United States under NPDES permits. In Arizona and elsewhere, a significant obstacle to expansion of reclaimed water reuse is the lack of consistent technical standards governing the design, installation, operation, and maintenance of reclaimed water distribution systems. This project addresses this shortcoming by developing a model code of technical standards applicable to Arizona. A stakeholder approach will be used that relies on participation of private and public sector experts. It is anticipated that EPA, working with the States, could use the resulting document as a key element in developing a nationalmodel code to promote consistent engineering practice nationwide.

Statutory Authority: ADEQ regulates discharges from sewage treatment plants into waters of the U.S. through the Arizona Pollutant Discharge Elimination System (AZPDES) permits in accordance with NPDES program primacy authority granted by EPA. ADEQ administers the reuse of reclaimed water through state permits and regulatory provisions; however a significant gap is the lack of detailed technical criteria for reclaimed water distribution systems. No additional regulatory authority is needed to carry out this project.

Certification: Steve Owens, ADEQ Director, is aware of and endorses this proposal. If this proposal is selected, Mr. Owens will provide a letter of endorsement with the final work plan.

Summary Budget Information:

Financial information removed by EPA as confidential business information

PRE-PROPOSAL NARRATIVE

Problem Statement - Treated wastewater from sewage treatment plants is increasingly being reused in Arizona and other states as an additional source of supply to meet water demand. This water, termed "reclaimed water" in Arizona (and by EPA), is considered by the Arizona Department of Water Resources (ADWR) a critical component of Arizona's water portfolio through 2025 and beyond.

In Arizona, the Arizona Department of Environmental Quality (ADEQ) is the primary agency regulating reclaimed water, with ADWR maintaining narrower authorities over the recharge of reclaimed water. ADEQ has a broad regulatory program for reclaimed water encompassing water quality standards, allowable end uses, permitting and best available demonstrated control technology (BADCT) for sewage treatment plants. This regulatory framework ensures that most reclaimed water generated for reuse is of high quality, nearly meeting drinking water standards (although ADEQ rule prohibits direct reuse for drinking water purposes). The ADEQ regulatory program thus assists in meeting the State's water supply and conservation goals. As importantly, this regulatory approach creates appealing collateral environmental benefits. These include the incentivization of construction of modem, high-pertarmance tertiary facilities to serve reuse needs, with attendant reduction in pollutant loading in the treated wastewater and volume of wastewater discharged to waters of the United States under NPDES permits; improved odor control due to incorporation of high-performance unit treatment processes in the sewage treatment train; expansion and enhanced sustainability of natural or constructed wetlands through greater availability of high-quality treated wastewater; and reduced probability of activation of state- and federally-mandated contingency plans by public drinking water systems (PWS) burdened by inherently scarce supplies or during drought.

However, a significant obstacle to expansion of reclaimed water *reuse in* Arizona is the lack of technical standards for the design, installation, operation, and maintenance of reclaimed water distribution systems. Although ADEQ statutes and rules otherwise provide a comprehensive framework for the reuse of reclaimed water in Arizona, they are notably deficient in providing technical standards for the distribution systems conveying reclaimed water from treatment plant to point of use. A similar problem exists nationally. Because EPA only peripherally regulates reclaimed water, there is no national body of technical standards for reclaimed water distribution systems as there is for drinking water systems. Therefore, adoption by states of technical standards for reclaimed water distribution systems is scattered and inconsistent.

This project addresses the lack of technical standards in Arizona by developing a model code applicable to Arizona. A stakeholder approach will be used that relies on participation of private and public sector experts. Although not part of this project, it is anticipated that EPA, working with the states, can use the resulting document as a key element in developing a national model code to promote consistent engineering practice nationwide (and internationally, too, as more countries begin to address water supply problems through reuse of reclaimed water). Because the model code developed under *this* project would focus solely on the technical aspects of design, installation, operation and maintenance, it will not conflict with Arizona's or other states' reclaimed water regulations regarding permitting, standard setting, and compliance and enforcement. In summary, development of a model code of technical standards for Arizona would help overcome resistance to and promote the reuse of reclaimed water by providing clear, comprehensive, and technically appropriate standards to developers and private and municipal public works utilities considering the feasibility of reclaimed water reuse.

PRE-PROPOSAL NARRATIVE

Background - EPA states, in *Guidelines for Water Reuse,* published in September 2004 (EPAI525/R-041108):

> The world's population is expected to increase dramatically between now the year 2020 - and with this growth will come an increased need for water to meet various needs, as well as increased production of wastewater. Many communities throughout the world are approaching, or *have* already reached, *the* limits of their available water supplies; water reclamation and reuse have almost become necessary for conserving and extending available water supplies.

This is certainly the case in Arizona, where an extensive regulatory framework exists for the reuse of reclaimed water and where reuse already is a major component of Arizona's water portfolio and is projected to become only more vital in the future. ❑n a national basis, Arizona is one of several states, which include California, Washington, Nevada, Texas, and Florida, where there both exist both extensive regulatory programs and widespread on-the-ground reuse of reclaimed water. In *Guidelines for Water Reuse,* EPA states that as of November 2002, 25 states had adopted regulations governing the reuse of reclaimed water, 16 states had guidelines or design standards, and 9 states have adopted no regulations and guidelines.

Although *Guidelines for Water Reuse* encourages *reuse,* provides much information on uses and corresponding appropriate water quality standards, and describes specific state programs, it provides no guidance on technical standards for the design, installation, operation, and maintenance of reclaimed water distribution systems. When Arizona adopted its comprehensive reclaimed water rules in 2001, this was the one significant gap in the rules. With no such guidance published by EPA or national associations, there simply was not enough time or expertise available at ADEQ to develop the technical standards. Presently, therefore, private developers and public utilities in Arizona design and install reclaimed water distribution systems, presumably in an adequate way, by adapting technical criteria for potable water distribution systems and sewage collection systems, as well as guidance for reclaimed water distribution systems that may come from other states or countries (Australia, for example). Lack of technical standards in Arizona, and by extension other states, leads to inconsistency, and more importantly, may jeopardize public health and the environment through inadequate design, operation, and maintenance. Perhaps the biggest consequence, though, is the disincentive it presents to developers and utilities contemplating incorporation of reclaimed water into their water and wastewater management solutions. This is due both to the work needed by such an entity to determine appropriate standards to follow as well as the potential legal liability arising from the lack of published or adopted standards.

The deliverable for this project is a model code of technical criteria for the design, installation, operation, and maintenance of reclaimed water distribution systems. ADEQ anticipates adopting the code either as guidance for use in its reclaimed water program, or more likely, as official rule to dovetail with its existing reclaimed water rules for permitting and water quality standards.

This project primarily fits into EPA's Strategic Goal 2, Clean and Safe Water. The model code would ensure that reclaimed water distribution systems are designed and operated to protect public health, water quality, and more generally, the environment. A corollary benefit is the

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incentive the model code would provide to incorporating reclaimed water into the water distribution/sewage collection-treatment mix in new developments. In turn, this yields cleaner and safer water because of the required construction of or upgrade to modem, high-performance tertiary treatment works, with attendant reduction in pollutant loading in the treated wastewater and in volume of wastewater discharged to waters of the United States under NPDES permits. It also yields improved odor control due to incorporation of high-performance unit treatment processes in the sewage treatment train and reduced probability of activation of state- and federally-mandated contingency plans by public drinking water systems (PWS) burdened by inherently scarce supplies or during drought.

This project also fits *into* EPA's Strategic Goal 4, Healthy Communities and Ecosystems, for the same reason that it incentivizes the construction of modem, high-performance sewage treatment facilities needed for reuse in *Arizona*. Such facilities promote expansion and enhanced sustainability of natural or constructed wetlands through greater availability of high-quality treated wastewater. In addition, researchers have shown that these modern, high-performance tertiary plants greatly decrease the levels of endocrine disrupting chemicals in the treated wastewater compared to older, secondary treatment plants.

Less directly, increased use of reclaimed water has a positive effect on global climate change and greenhouse gas production, which is a consideration in EPA's Strategic Goal 1. Studies have shown that reuse of reclaimed water is usually a far more energy-efficient method of augmenting water supply compared to importation or desalination (see, for example, the presentation by Dr. Bahman Sheikh, one of the contributors to EPA's *Guidelines for Water Reuse, at the* Water Reuse & Desalination Conference, 2007, Tampa, FL).

The project members assembled for this proposal, combined with ADEQ's partnership with the Arizona Water Institute, form a superlative team that is highly capable of accomplishing the project's goals. The Arizona Water Institute is *a* consortium of Arizona's three state universities - University of Arizona, Arizona State University, and Northern Arizona University - focused on water sustainability through research, technical assistance, education, and technology (www,azwaterinstitute.org). The Arizona Water Institute has access to over 400 water researchers at the three universities for relevant water research.

Project Manager for ADEQ for this project is Joan Card, Director, Water Quality Division (resume attached). Ms. Card is responsible for managing all aspects of the federal NPDES permitting and Safe Drinking Water programs, as well as state programs for aquifer protection permitting and reclaimed water permitting.

Kwamc Agyare, Y.E., ADEQ Engineering Review Section Manager, will serve as ADEQ's key technical lead on this project (resume attached). Mr. Agyare has many years of experience in the design and oversight of drinking water, wastewater, and reclaimed *water* projects.

Chuck Graf, R.G., Associate Director, Arizona Water Institute, will work with Ms. Card to provide direction and oversight of the project (resume attached). Mr. Graf was Deputy Director of the ADEQ Water Quality Division from 1998-2006. In that role, he oversaw the rule development process which culminated in promulgation of ADEQ's reclaimed water rules in 2001, for which Mr. Graf developed many of the concepts in the rules,

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Michele Robertson, R,G., ADEQ Groundwater Section Manager, will serve as ADEQ's key regulatory lead contributing to this project. Ms. Robertson manages both the Department's Aquifer Protection Permit program and Reclaimed Water Permit program. She also was a critical contributor to ADEQ's reclaimed water rule package in 2001 and authored much of the rule text.

ADEQ is the state environmental department designated in Arizona statute and therefore is eligible to apply for this grant. As the attached budget shows, ADEQ also will be contributing in-kind services to this project.

In summary, this project meets the grant guidelines and threshold criteria in the RFP. Consistent with Threshold Criteria #1, this project has links to NPDES and other Clean Water Act authorities. Moreover, this project *is* an outgrowth of the vision expressed in EPA's *Guidelines for Water Reuse* publication and will directly augment the material contained in it. This project also meets Threshold Criteria #2, in that it is linked to EPA's Strategic Goals 1, 2, and 4.

Project Objectives -- The desired objective of this project is to publish a model code of technical standards for the design, installation, operation, and maintenance of reclaimed water distribution systems. Such a code will 1) ensure consistency in design and operation of reclaimed water systems across Arizona, 2) protect public health and the environment to a greater extent, and 3) promote the construction of or upgrade to modern, high-performance tertiary sewage treatment plants. Meeting these objectives, in turn, will help solve critical water supply problems now and in the future, and produce significant ancillary environmental benefits such as reduction in contaminant load and wastewater volume to waters of the U.S. The code text will be limited to technical criteria so as to minimize any conflict with provisions for permitting, reclaimed water quality standards, and allowed end uses in ADEQ rules and maximize potential use by regulatory agencies in other states and even other countries.

Methodology and Technical Approach - Ms. Joan Card, ADEQ Water Quality Division Director, will direct the project. She will coordinate closely with Mr. Chuck Graf. Arizona Water Institute, who will provide day-to-day oversight of the project in collaboration with Mr. Kwame Agyare and Ms. Michele Robertson. Mr. Agyare and Ms. Robertson will serve, respectively, as engineering and programmatic leads to the project.

Development of the model *code* will follow the stakeholder model that ADEQ successfully used for rules establishing technical standards for on-site wastewater systems, sewage collection systems, and BADCT for sewage treatment facilities. Because such stakeholder-dependent processes usually involve numerous time-consuming review cycles, ADEQ proposes a 2-year length for this project. The benefit, though, is that the final product reflects substantial consensus among stakeholders. To provide detailed management of project tasks, oversight of the stakeholder process, and development and compilation of the model code, ADEQ will hire a nationally respected engineering consulting firm. The RFP will be written to ensure that the consultant has significant and well-regarded expertise in reclaimed water systems both in Arizona and nationally, as well as considerable experience in managing stakeholder processes.

<u>Proposed timeline and tasks</u>

Month I : Initial project team meeting.

Complete Intergovernmental Agreement for Arizona Water Institute participation.

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Month 3: Complete and issue RFP for engineering consulting firm.
Month 5: RFP proposal review, consultant interviews, and contract award.
Month 6: Stakeholder steering *committee* formed and first meeting held.
Month 8: Contractor completes review of technical standards from other states/key countries. Steering committee finalizes outline for model, determines needed topic area subcommittees, and, with ADEQ and the contractor, recruits subcommittee members.
Month 9: First meeting of subcommittees to develop language for the specific topic areas, which will focus on aspects of design, installation, operation, and maintenance.
Month 18: Subcommittees complete drafts of their portion of model code. Contractor assembles into first draft of overall model code, which is sent to steering committee for review.
Month 20: Steering committee finalizes second draft of model code, which contractor sends to subcommittee members and other reviewers for final review.
Month 24: Contractor finalizes and arranges for publishing the model code. ADEQ submits model code **to** EPA for potential development as a model national code.

This project addresses the national evaluation criteria listed in V, Part B of the RFP as follows:

1. *Targeting national priority environmental issues:* **In** EPA's own words, as quoted in the first paragraph of the Background section, the increased use of reclaimed water is an urgent need, both nationally and internationally. One critical obstacle to meeting this need is the lack of standardized technical criteria for the design, installation, operation, and maintenance of reclaimed water distribution systems. This project is a first step in filling that gap.
2. *Building on existing knowledge of innovative approaches and expanding the testing of priority innovations:* This project relies on the stakeholder process, which is an effective method for developing consensus technical criteria. To ensure that the model code is as comprehensive as possible, one of the first steps in the proposed methodology is to survey other states for existing technical criteria. *Guidelines for Water Reuse* will help *in* that process.
3. *Producing environmental results or measurable and quantifiable outputs, outcomes:* The project will result in a published model code, which ADEQ intends to adopt as guidance or rule. By providing clear and consistent standards for reclaimed water distribution systems, it is expected that developers and utilities will increasingly incorporate such systems into their plans, producing the environmental benefits outlined earlier in this proposal.
4. *Transferring innovation:* ADEQ expects that EPA will be able to use the model code completed under this project as the basis for developing a national model code. In *any case,* regulatory agencies outside of Arizona will be able to use this model code to improve their reclaimed water programs.
5. *Project feasibility:* Two years is needed, but there should be no difficulty in completing the project in the proposed 2-year time frame.

This *project* addresses the regional evaluation criteria as follows:
1. *Addressing EPA regional-state priorities:* Of the six states noted earlier with substantial reuse programs, three are located in Region IX. No *where is* there more of a critical need for increased reclaimed water capacity than in the arid, southwest.
2. *Programmatic capability.:* ADEQ and the Arizona Water Institute are extraordinarily capable in this subject area. In fact, much of the success of Arizona's reclaimed water program is due to the individuals named above, who conceived, developed, and manage the program.

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PRE-PROPOSAL NARRATIVE

Regulatory/statutory environment for project implementation: Excellent regulatory environment. ADEQ already has a comprehensive reclaimed water permitting program. Private and public utilities have been clamoring for ADEQ to provide technical criteria for reclaimed water distribution systems and will be eager to participate in the stakeholder process.

4. *Budget reasonableness:* The largest portion of the budget is allocated to hiring an engineering consultant. It is critical to reserve adequate funding for this purpose to ensure that highly-respected firms with extensive reclaimed water experience will respond to the RFP.

5. *Environmental results past performance:* ADEQ's past performance with respect to EPA grants is highly satisfactory and well documented as part of the Integrated Workplan jointly developed by ADEQ and EPA Region IX. If this grant is awarded, it will be incorporated into the Integrated Workplan. Furthermore, ADEQ has received and successfully completed two past SIG grants. Of particular note, in 2002, ADEQ was awarded a grant to develop an electronic permit submittal system for construction stormwater permits termed the "Smart NOI" system This has been spectacularly successful. To date, 7054 Notice of Intent actions have been submitted electronically, comprising about 60% of the total NOl traffic. This system has greatly reduced the workload for ADEQ staff managing this program.

6. *Collaboration/partnerships: A* collaborative partnership with the Arizona Water Institute is a key part of this project. The Institute was founded in 2006 by Gov. Janet Napolitano to ensure, in part, that the world-class water expertise at Arizona's three state universities is applied to solving practical water problems in arid and semi-arid lands.

7. *Leveraged resources:* ADEQ is allocating $27,984 in staff salary and ERR in support of this project. In addition, the project will benefit from, and in fact depends on, the contributions of a large number of expert stakeholders.

8. *Public involvement: As* mentioned in the previous item and as evident in the timeline above, public and private sector **stakeholder** involvement is key to this project.

Outcomes and Measures - *Environmental Outputs:* To date, ADEQ has issued 247 end user permits and 34 "agent" permits for reuse of reclaimed water. Most of the agent permits represent several hundred end users each. It is expected that the availability of a model code, with established and consistent criteria for things such as pipe materials, cross-connection control, separation distances, trenching and bedding, construction testing and quality control, pumps, signage, and periodic maintenance requirements, will stimulate construction of new or expanded reclaimed water systems and substantially increase the number of issued permits. *Environmental Outcomes: The* outcomes from this project are really more important than the outputs. Some of the key ones were listed in the second paragraph of Problem Statement section. Additionally, we could add that this project is part of the solution that allows reclaimed water to supply sub-potable uses, thereby reserving potable water for higher level uses; improves public acceptance of reclaimed water; and reduces the overall energy and carbon footprint of supplying water. A last outcome, should EPA choose to use this document as a starting point to develop a national model code, would be better consistency across the U.S. and increased acceptance in integrating the reuse of reclaimed water into water supply and wastewater treatment infrastructure on a national basis.

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PRE-PROPOSAL BUDGET

Financial information removed by EPA as confidential business information

ENVIRONMENTAL RESULTS PAST PERFORMANCE

ADEQ employs strategic and outcome-based planning for all of our work activities. All grants have specific outputs and outcomes that are documented throughout the course of the grant. ADEQ and EPA, Region IX pursue a cooperative process for documenting, reporting and evaluating all of our water program activities. On each of the grants listed below, ADEQ has reported results on a quarterly basis to EPA through our exception reporting process. Midyear meetings are held to further discuss issues relative to grants. Annually, ADEQ prepares a more comprehensive report and conducts year-end meetings with all of the Region IX project officers to wrap-up the year's accomplishments for all grants.

Listed below are some of ADEQ's grants awarded by EPA that were performed during the last three years. The outputs for the monitoring and TMDL grants arc critical pieces of the state's monitoring strategy and are expected to provide environmental results in the future. ADEQ's monitoring and T'MDL data play a significant role in meeting the Region IX targets that are reported by Region IX to Headquarters.

- Water Protection Coordination II -- This grant was awarded in FY 07 and will continue through FY 09. At the end of FY 07, ADEQ reported that all deliverables were on target. EPA commented: "ADEQ has gone above and beyond the statutory requirements of the Bioterrorism Act by ensuring that new water systems complete vulnerability assessments and *emergency response* plans."
  (FY 2007 Report Card)

- 106 Monitoring -- This grant was awarded in FY 07 and continues through FY 10. As documented in the FY 2007 Report Card, ADEQ participated in the Lakes Survey by conducting the field sampling, and EPA contractors handled sample analyses as in kind services under the grant. Other monitoring initiative tasks were also reported during FY 07. This grant requires additional reporting, according to the EPA guidance, which ADEQ is following. The grant activities are on schedule, and ADEQ provides progress reports every 6 months.

- I04(b)(3) Queen Creek Copper TMDL -- This grant expires 6130108,
  In FY 07, ADEQ reported that the deliverables were not met due to lack of precipitation. and therefore lack of stormwater runoff. EPA noted the difficult issues involved in completing TMDL's in this arid climate. EPA is working closely with ADEQ to, "...meet the challenges of TMDL." (FY 2007 Report Card)

- REMAP -- This grant was awarded in FY 06 and will continue through FY 09. FY 07 report indicates that all activities were completed or are on target except for one. EPA, Region IX reported: "REMAP probabilistic monitoring in the Little Colorado River is on track", as ADEQ has now implemented the technical and statistical approach to site monitoring selection.

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ADEQ and EPA, Region IX operate under an agreement called the Arizona Accord. The Accord specifies our joint evaluation and reporting process, including quarterly and year-end reports, mid and year-end evaluation meetings and negotiations. All evaluations are documented in writing. The agreement promotes communications as a high priority for the success of our relationship. The following grants from EPA are examples of ADEQ's ability to successfully complete and manage grant agreements.

Performance Partnership Grant (PPG) - ADEQ received an award from EPA in March, 2006, as part of the FY 06 Performance Partnership Grant. This grant combines Water Pollution (Section 106), Public Water System Supervision (PWSS), and Nonpoint Source (Section 319) into one grant. While this grant is much larger in scope than the project being proposed, it is a good representation of ADEQ organizational capabilities in successfully completing and managing agreements with EPA. ADEQ has a long history of successfully managing its work activities under the PPG. The FY 2007 Report Card includes EPA's evaluation of ADEQ's Stormwater Program: "Overall, ADEQ continued to make good progress *in the* implementation of the Sormwater permit program. We are especially pleased that review of Phase II Sormwater management programs (SWMPs) has nearly been completed."

Innovative Stormwater Construction NOI Submittal and Processing System - (Smart NOI) In 2003, ADEQ received a State Innovation Grant for the development of a unique, online stonnwater permit application system under the NPDES program. The primary goal was to streamline the processing of NOIs through the use of an automated, Geographic Information System (GIS)-based review. ADEQ successfully completed the grant in October 2003, submitted the final report, and participated in several conference calls with EPA to evaluate the project. In FY 2007, major enhancements were completed for the Smart NOI system including addition of electronic signatures and e-farms to simplify and further expedite data entry for customers. EPA Region IX, in the FY 2007 Report Card, made the following comments regarding our program: "With regards to construction sites, ADEQ continued to successfully process a large number of construction NOIs (over 3,000 per year)". About 70% of the NOIs are processed using Smart NOI system.

Nonpoint Source Projects - ADEQ annually receives an award from the EPA in 2006. This grant provides funds for the Water Quality Improvement Grant program, which administers projects throughout the state to reduce nonpoint sources of pollution, restore impaired waters and protect surface and ground water. Our NPS project grants have been successfully managed for *over ten* years. EPA states in the FY 2007 Report Card, "Not only did the Grants Program manage new and current grants, they also provided EPA with a success story...EPA also acknowledges that the Grants Unit has modified their Grants Manual to place a greater emphasis on results, which is consistent with EPA's movement towards results driven grant programs."

Organizational Experience - ADEQ management supports this project and will assure that project management and staff support are assigned to the project to assure successful completion of the objectives within the proposed timeline. A core team of individuals has already been identified to oversee the project (details provided in *the* project narrative). If this grant is awarded, it will be added to the Water Quality Division's Integrated Workplan so that work activities, milestones, reporting to EPA, and funding become a part of the division's overall work.