## Aqua Spacecraft Launched to Study Earth's Water Cycle

On May 4, 2002, NASA successfully launched its latest Earth observing satellite, Aqua, which will be used to study global precipitation, evaporation, and the cycling of water. Aqua will collect data on evaporation from the oceans; water vapor in the atmosphere; clouds, precipitation, soil moisture, sea ice, land ice, and snow cover on the land and ice. Additional variables also being measured by Aqua include radiative energy fluxes, aerosols, vegetation cover on the land, phytoplankton and dissolved organic matter in the oceans, as well as air, land, and water temperatures. Aqua is a joint project among the United States, Japan and Brazil. The satellite is equipped with the following state-of-the-art instruments: a Moderate Resolution Imaging Spectroradiometer, an Advanced Microwave Sounding Unit, an Atmospheric Infrared Sounder, a Clouds and Earth's Radiant Energy System instrument, an Advanced Microwave Scanning Radiometer, and a humidity sensor. Information from the satellite will help scientists to better understand the Earth's water cycle and whether the water cycle is accelerating as a result of climate change.

*For more information, visit aqua.nasa.gov*

## Sandia Has a New VOC "Sniffer"

A real-time gas- and water-quality monitoring system that consists of a miniature sensor array packaged in a weatherproof housing developed by Sandia National Laboratories may become one more tool in the effort to protect groundwater supplies. The electronic sniffer can be put directly into groundwater or very moist soils and measure the concentrations of volatile organic compounds (VOCs) in place, without collecting a sample and sending it to a laboratory. The sensor can be connected to a datalogger (and a telemetry system if desired) and left in place to measure continuous, real-time concentrations. Sandia is currently testing the system at their Chemical Waste Landfill, where data will be recorded for several weeks to several months to test the longevity of the sensor and the importance of temperature variations, barometric pressure changes, and ground humidity; additional tests are being performed at Edwards Air Force Base and the Nevada Test Site.

In a situation where long-term, and frequent, monitoring is required, these sensors could save a considerable amount of money in laboratory analysis costs. The sensors are not yet commercially available, but Sandia is looking for a company that can produce them for public use.

*For more information, visit www.sandia.gov/media/NewsRel/NR2001/watinfr.html or contact Cliff Ho at ckho@sandia.gov*

## North American Monsoon Experiment (NAME) Planned

Recent improvements in the prediction of cold-season precipitation have not been matched by similar improvement for the warm season, particularly for the North American monsoon which primarily affects the Southwest. An internationally coordinated study, the North American Monsoon Experiment (NAME) is trying to change that situation. Among the objectives of NAME are to improve the understanding and promote more realistic simulation of: 1) the evolution of the North American monsoon system and its variability, 2) the response of warm season atmospheric

circulation and precipitation patterns to slowly varying, potentially predictable surface boundary conditions such as sea-surface temperature, soil moisture, and vegetation, 3) the diurnal heating cycle and its relationship to the seasonally varying mean climate, and 4) the intraseasonal variability of the monsoon.

A major field effort is being planned for the summer of 2004, which may include deployment of specialized meteorological radars, wind profilers, research aircraft, ships, and enhanced radiosonde networks over northwest Mexico and southwest United States.

One aspect contributing to the current lack of regional monsoon forecast capability is spatial and temporal limitations of observational data, particularly real-time data and particularly in Latin America. This investigation will provide an excellent opportunity for cross-border collaboration, as well as collaboration between hydrologists and meteorologists in the Southwest. The NAME is being directed in North America by the NOAA Climate Prediction Center.

*For more information, visit www.cpc.ncep.noaa.gov/products/precip/monsoon/NAME.html*

## Kerr-McGee Initiates State-of-the-Art System to Remove Perchlorate from Las Vegas Wash

A new perchlorate treatment process, designed by Calgon Carbon with support by Kerr-McGee Chemical LLC and the Nevada Division of Environmental Protection, is intended to prevent perchlorate from entering the Las Vegas Wash, and to lower existing perchlorate levels. Commissioning of the system began at the Kerr-McGee site near the Wash in March 2002. According to the Southern Nevada Water Authority, perchlorate was produced in southeastern Clark County until the late 1990s and entered the Las Vegas Wash when residue from unlined storage ponds that were constructed in the 1940s and 1950s gradually seeped through the shallow groundwater supply. The perchlorate was detected in 1997, when laboratory methods became refined enough to detect perchlorate at trace levels. Kerr-McGee began intercepting perchlorate and preventing its entry into the Wash with a temporary, 400-gallon per minute (gpm) ion-exchange system in 1999. The new, 825-gpm system consists of two parts: the proven ion-exchange component, and a state-of-the-art Perchlorate Destruction Module (PDM). After the ion exchange resin has pulled as much perchlorate as it can hold from the water, the perchlorate is stripped from the resin in a regeneration cycle. With the perchlorate stripped from the resin, the resin is now available for additional perchlorate removal. The regeneration brine containing the perchlorate is fed to the PDM unit for perchlorate destruction. The byproducts of the destruction are nitrogen gas, water and chloride. The destruction of perchlorate in the PDM eliminates the need to incinerate the perchlorate-loaded resin.

*For more information about Las Vegas Wash, visit www.lvwash.org/; to learn more about the perchlorate removal system, contact Pat Corbett at Kerr-McGee at (405) 270-1313.*

## 1,4-Dioxane: A New Contaminant of Concern

*—Mark Weiner, Vice President of Operations, Del Mar Analytical*

1,4-Dioxane is a relatively new concern to environmental regulators, consultants, and laboratories. Although 1,4-Dioxane has been widely used for many years, it is possible that the extent of contamination and human exposure may become of greater concern in the near future.

1,4-Dioxane is primarily used as a stabilizer to prevent the breakdown of chlorinated solvents. Most of the 1,4-Dioxane produced is used to stabilize 1,1,1-trichloroethane. 1,4-Dioxane is also present in household products such as shampoos, dishwashing soap, and other cosmetic products in concentrations as high as 100,000 ppb. Ingredients contaminated with 1,4-Dioxane include polyethylene, PEG, polyoxyethylene, sodium laureth sulfate, and nonoxynol. 1,4-Dioxane is a suspected carcinogen, but no Federal drinking water standard or maximum contaminant level has been established by the EPA. Due to a lack of scientific health studies on 1,4-Dioxane, no general agreement on the acceptable risk of 1,4-Dioxane in drinking water exists. Many states have set action levels well below the expected safety levels for 1,4-Dioxane. For example, California has an Action Level of 3 ppb.

1,4-Dioxane is a target analyte in EPA Method 8260B. However, either EPA Method 8260B or 8270C will detect 1,4-Dioxane. Both methods need modification to achieve the lower reporting limits required. The most significant modification to EPA 8260B is the conversion of the mass spectrometer to SIM mode. In this mode, the mass spectrometer looks exclusively for the ions present in 1,4-Dioxane. Concentrating on only a few ions allows for greater instrument sensitivity. SIM mode analysis, along with modifications to the purge procedure, allows for reproducible results down to 2.0 ppb in water.

EPA Method 8270C requires either SIM analysis and/or isotope dilution to successfully achieve the lower reporting limits needed for 1,4-Dioxane. Isotope dilution is the process of analyzing 1,4-Dioxane-d8 along with the 1,4-Dioxane in the samples and using the 1,4-Dioxane-d8 recovery in the calculation of the 1,4-Dioxane in the sample.

*For further information, contact Julie Slocum, Del Mar Analytical, at (480) 785-0043 or visit www.dmalabs.com*

## ARS using Vegetable Oil to Clean Up Groundwater

Microbiologist Jim Hunter, of the Agricultural Research Service (ARS) Soil-Plant-Nutrient Research Laboratory in Ft. Collins, Colorado, has discovered that vegetable oil can be used to clean up groundwater contaminated with TCE. Hunter has found the best way to get the oil into the water is by injecting it into the ground as an emulsion using high pressure to create a porous, oil-containing barrier

across the contaminated aquifer. The oil, used in low concentrations, stimulates microorganisms naturally present in the aquifer that grow and accumulate in the barrier. These microorganisms then degrade the TCE as contaminated groundwater flows through the barrier. Hunter recommends using soybean oil because it is inexpensive.

He has found that this method is also effective for cleaning up nitrogen fertilizer and the herbicide chlorate.

Parsons Corporation, an environmental consulting firm in Denver, Colorado, is using this ARS method to remediate TCE in groundwater on several Air Force and Navy bases. The company has already completed some pilot tests and is now working on full-scale evaluations.

*For more information, visit www.ars.usda.gov/is/pr/2002/020409.htm*

## UNR, Tech Group Work on Arsenic Removal Technology

*–from an article originally appearing on Water Tech ONLINE, May 30, 2002*

RENO, NV - Altair International Inc., doing business as Altair Nanotechnologies has entered into an agreement with the University of Nevada, Reno, to prepare advanced drinking water purification materials.

These materials will be made using Altair's patented nanoparticle technology in combination with university patents for removal of arsenic and selenium from drinking water, the company said in a news release.

Demand for methods for removal of arsenic and other heavy metals has been significantly increased because of recent Bush administration and U.S. Environmental Protection Agency initiatives that will lower the arsenic limit in drinking water from the current 50 parts per billion (ppb) to 10 ppb by 2006.

Altair said it has filed patents for its technology to make durable porous crystalline catalyst support structures from titanium dioxide nanoparticles, and has also filed for patents to incorporate additives on the surfaces of such materials with chemical modifiers.

The university has obtained patents on the use of lanthanum compounds for removing arsenic from drinking water, officials said.

"Arsenic content in drinking water is a significant problem worldwide and in most of the western United States, particularly in many Nevada communities," said Dr. Richard A. Bjur, director of the University of Nevada's Office of Technology Liaison.

"One of the objectives of the university is to bring technologies to commercialization, especially if the technology will help address a Nevada problem," he added.

*Visit www.watertechonline.com*

### *METHOD DETECTION LIMITS (MDL) VS. PRACTICAL QUANTITATION LIMITS (PQL)*

*Method detection limits (MDL) are statistical calculations based upon a minimum of 7 replicate samples that are analyzed in succession or over time. The difference in the results from one sample to another determines the method detection limit. When the difference among the 7 sample results is very small, the method detection limit will be very low. When the difference among the sample results varies, the method detection limit will be high. When the variance is low, the method detection limit will not reflect actual instrumentation capability, but simply a mathematical calculation. The method detection limit will be reflective of actual instrumentation capabilities in analyses where individual compounds vary greatly from sample to sample (especially those samples that require extractions/digestions).*

*Practical Quantitation Levels (PQL) are reporting limits that are based upon the method detection limits plus a multiplication factor that reflects instrument capability. A good example of PQL's are in volatile organic analyses. In the method 8260 (5ml sample volume), the MDL study for Benzene may reflect 0.2 ug/L due to the low variance of sample results in the 7 replicate study; however, the mass spectrometer is not capable of detecting analytes at concentrations lower than 1.0 ug/L for the 5.0 ml sample volume. The laboratory recognized that the MDL does not reflect actual instrumentation capability and added on a multiplication factor of 10 for Benzene. The PQL for Benzene is 2.0 ug/L to compensate for the instrument sensitivity and data reproducibility. The laboratory could have made the multiplication factor 5 for a PQL of 1.0 ug/L, but that would be placing the reporting limit (PQL) right at instrument sensitivity and that might not always be good laboratory practice or consistently reproducible day after day.*

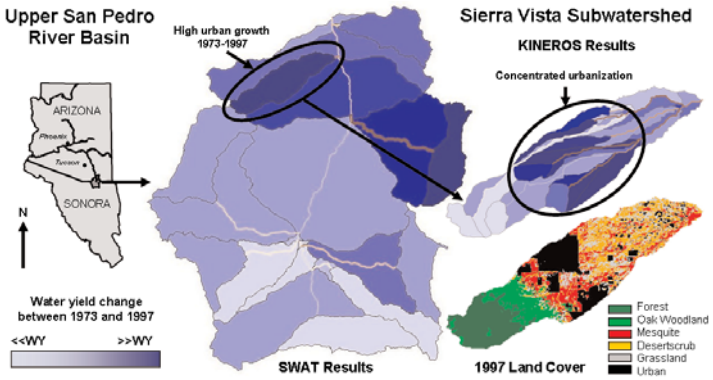
*In summary, when comparing laboratory reporting limits, practical quantitation limits and method detection limits ensure that the limits reflect the lowest calibration standard that is analyzed for the sample batch. If the laboratory reports out 1.0 ug/L on their report, then a 1.0 ug/L standard should have been incorporated into the calibration. If special reporting limits are needed, ensure that the laboratory instrumentation employed can actual identify compounds at the special reporting limit consistently. Data confidence and defensibility decreases when reporting limits are challenged.*

TECH TIP

*Disclaimer: This information is provided courtesy of Precision Analytical Laboratories. The information should be considered general in nature and is not a complete treatise on the subject. Please refer to peer-reviewed texts for additional information on this topic.*

*The preceding information appeared from Precision Analytical Laboratories' Environmental Tech Tip Program, a free program distributed by Precision Analytical Labroratories. To subscribe, please send email palinfo@aerotechlabs.com with subject "Add Environmental Tech Tips."*

## New Watershed Assessment Tool Available




The U.S. Department of Agriculture Agricultural Research Center (USDA-ARS) and the U.S. Environmental Protection Agency (USEPA) have teamed together to develop a new watershed assessment tool. The Automated Geospatial Watershed Assessment (AGWA) tool is a multipurpose hydrologic analysis system for use by watershed, water resource, land use, and biological resource managers and scientists in performing watershed- and basin-scale studies. It is an extension for ESRI's ArcView 3.2.

AGWA takes readily available digital data sources, creates input files, and runs two widely-used watershed runoff and erosion models (KINEROS and SWAT). Then, it displays the output results for a variety of parameters as dictated by the user. Input data types include digital elevation models (DEM), and land cover, vegetation, soils, and precipitation data: data that are relatively simple to obtain on-line from agencies. KINEROS is used to describe the processes of interception, infiltration, surface runoff, and erosion from small agricultural and urban watersheds, and can also evaluate the effects of urban developments such as small detention reservoirs or lined channels. SWAT is used to predict the long-term (greater than one year) impact of land management practices on water, sediment, and agricultural chemical yields in large watersheds with varying soils, land use, and management conditions. AGWA takes the output from these two models and allows the user to select a wide variety of parameters, such as runoff depth, runoff discharge, erosion rates, and infiltration rates, to be displayed. The graphic results (above) are particularly useful for assessing changes in a watershed over time, and for highlighting areas that require careful management.

*AGWA will be available after August 1 at www.tucson.ars.ag.gov/ Information on KINEROS is available at www.tucson.ars.ag.gov/kineros/*
*Information on SWAT can be found at www.brc.tamus.edu/swat/*