Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: March 1, 2002
In Reply Refer To: ESH-18/WQ&H:02-095
Mail Stop: K497
Telephone: (505) 665-6085

Mr. Everett Spencer
Environmental Specialist
Water Enforcement Branch (6W-EN)
U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

SUBJECT: MEETING MINUTES FROM JANUARY 30, 2002 MEETING WITH EPA AND NMED REGARDING STORM WATER AND WATERSHED MANAGEMENT PROGRAMS AT LOS ALAMOS NATIONAL LABORATORY

Dear Mr. Spencer:

The Laboratory's Water Quality and Hydrology Group (ESH-18) would like to thank EPA Region 6 representatives for taking the time to meet with the New Mexico Environment Department, U. S. Department of Energy (DOE) and Laboratory representatives on January 30, 2002 to discuss the current Storm Water Permit Program and Watershed Management activities at Los Alamos National Laboratory. Enclosed please find a copy of the meeting minutes (Enclosure 1) pertaining to our meeting on January 30, 2002.

Representatives from the Laboratory, DOE and the New Mexico Environment Department's Surface Water Quality Bureau, and DOE-Oversite Bureau are currently reviewing the Laboratory's Storm Water Monitoring Program for the Multi-Sector General Permit in great detail. A Data Quality Objective (DQO) process is being used to determine the adequacy of the data collected by the Laboratory's monitoring network. The DQO Team will provide a review of Industrial Activities, SWMUs, station locations, analytical methods, benchmark parameters and approved monitoring waivers. The DQO Team will make recommendations on how to improve the overall approach. After completion of the DQO process, I recommend those representatives from EPA, NMED, DOE and the Laboratory get back together to discuss our findings and recommendations. The estimated completion date for this process is April 2002.

Please contact Steve Veenis at (505) 667-0013 or Ken Mullen at (505) 667-0818, if you have questions or need additional information regarding the Laboratory's Storm Water Multi-Sector General Permit Program or the Watershed Management Program, respectively.

Sincerely,

Mike Saladen
Regulatory Compliance and Line Service Team Leader
Water Quality and Hydrology Group

13610

Enclosures: a/s

Cy: J. Graham, U. S. EPA, Region 6, Dallas, TX, w/enc.
W. Strickley, U. S. EPA, Region 6, Dallas, TX, w/enc.
J. Davis, NMED, Santa Fe, NM, w/o enc.
J. Parker, NMED DOE/OB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/o enc., MS A316
G. Turner, DOE/OLASO, w/enc., MS A316
K. Agogino, DOE/AL, w/enc., Albuquerque, N. M.
J. Holt, ADO,w/o enc., MS A104
L. McAtee, ESH-DO, w/o enc., MS K491
P. Thullen, ESH-DO, w/o enc., MS K491
D. Stavert, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Alexander, ESH-18, w/enc., MS K497
K. Mullen, ESH-18, w/enc., MS K497
S. Veenis, ESH-18, w/o enc., MS K497
R. Reynolds, ESH-18, w/enc., MS K497
T. Sandoval, ESH-18, w/enc., MS K497
D. Woitte, LC-GEN, w/enc., MS A187
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

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ENCLOSURE 1

Los Alamos National Laboratory
EPA/NMED/LANL Meeting Minutes
January 30, 2002

Mike Saladen, Steve Veenis, Robin Reynolds, Ken Mullen, Mike Alexander and Steven Rae from Los Alamos National Laboratory, Gene Turner, Department of Energy Office of Los Alamos Site Operations, and Karen Agogino, DOE's Albuquerque Operations Office (herein after referred to as the "Laboratory") provided an over-view of the Laboratory's Storm Water, Cerro Grande Fire Rehab and Environmental Surveillance Programs. Representatives from the U. S. Environmental Protection Agency included Linda Kissinger, Taylor Sharpe, Everett Spencer, and James Graham. The New Mexico Environment Department representatives included Barbara Hoditschek, Glenn Saums, Ralph Ford-Schmid, Rich Powell and Bret Lucas. A summary of each presentation is provided below.

(1) **Re-organization of Laboratory's Water Quality and Hydrology Group (Mike Saladen):**

Mike Saladen briefly discussed the new organization chart for the Laboratory's Water Quality & Hydrology Group (ESH-18). Mike Alexander, ESH-18, is the Team Leader for the Operations Team. The team's major responsibilities include sample collection\monitoring of all the water quality programs (i.e., surface water, ground water, storm water, NPDES outfalls, NM Water Quality Act compliance, etc.) managed by ESH-18 and Cerro Grande erosion control\rehabilitation activities. David Rogers, is the Team Leader of the Environmental Surveillance Team. This team is responsible for interpretation and reporting of surface water and ground water quality in the Laboratory's Annual Environmental Surveillance Report. Mike Saladen, is the Team Leader for the Regulatory Compliance and Services Team. This team is responsible for submitting applications for the water quality compliance programs (NPDES, Storm Water, Dredge and Fill, Water Quality Act, etc.), notices of intent to discharge (NOIs), and compliance documentation and notifications to the regulators and stakeholders. Additionally, this team provides technical and regulatory assistance to operating groups regarding water quality compliance. Ken Mullen is the Project Leader for Institutional Surface Water Issues and Steve Rae is the ESH-18 Group Leader.

EPA Response: EPA requested a copy of the ESH-18 Organizational Chart. A copy was provided to EPA and NMED representatives.

(2) **Cerro Grande Fire and Laboratory Recovery Efforts Overview (Mike Alexander):**

Mike Alexander gave an overview of the fire rehabilitation progress made since the Cerro Grande Fire (May 2000) to reduce erosion and the movement of sediment from potentially contaminated sites at the Laboratory. Massive fire rehabilitation and flood mitigation efforts have been ongoing, and will continue for several years until areas prone to erosion are stabilized. Mr. Alexander gave a brief summary of history of wildfires on the Pajarito Plateau. The Cerro Grande Wildfire was the largest fire in recorded time in

New Mexico. The wildfire consumed approximately 47,000 acres, over 200 structures, and the homes of 400 families. The wildfire impacted property from the National Park Service, U. S. Forest Service, U. S. Department of Energy, County of Los Alamos, Baca Ranch, Santa Clara and San Ildefonso Reservations. Fify-two Laboratory structures were destroyed. Because of the inherent capacity for flooding to Laboratory facilities and the washing of canyon bottom sediments onto Pueblo lands and into the Rio Grande, implementation of watershed stabilization began as soon as field assessments identified treatment locations. Hand crews were responsible for treating approximately 900 acres of burned areas with hand seeding, contour raking, installation of contour wattles, and spreading of straw mulch. ESH-18 helped develop the Burned Area Rehabilitation Tracking System (BART) in coordination with the U. S. Forest Service and Merrick & Co. BART is used to determine the effectiveness of treatments and areas needing additional work. BART findings documented that the aerial seeding, hand seeding and hydo-mulching was effective in producing an average of 60% ground cover. Mulch treatment, aerial seeding and aerial hydro-mulching were the most effective treatments. Contour felling was the least effective treatment. Mr. Alexander discussed costs associated with the fire rehabilitation efforts. Mr. Alexander also discussed post fire flood flows and monitoring efforts. The Laboratory conducted approximately 95 flood flow and storm water sampling events during the summer of 2000. Approximately 75 gaging and partial record stations have been established to monitor flood and storm water events. Mr. Alexander talked briefly about the Pajarito Flood Retention Structure, Los Alamos Reservoir hardening, and Los Alamos Lowhead Weir projects constructed by the Army Corps of Engineers. A total of 82 construction projects were implemented to control runoff, reduce flooding, protect utilities, and to reduce further fire threats. The Laboratory has been working, training and sharing information with the U. S. Forest Service and Northern Arizona's Ecological Restoration Institute regarding burned area and tree thinning evaluations and rehab techniques. Copies of the presentation view graphs were distributed during the meeting.

EPA Response: EPA commended the Laboratory's efforts in fire rehabilitation and flood mitigation.

(3) **Storm Water Monitoring Conducted for the Multi-Sector General Permit (Steve Veenis):**

SWMU Related Reports and Studies: Steve Veenis provided a copy of the "Cerro Grande Fire One Year After" for EPA and NMED review. This report provides an update on ER activities to reduce the potential movement of contaminants at potential release sites due to the Cerro Grande fire. Mr. Veenis also discussed the TA-46 BMP Effectiveness Study conducted by Barbara Hoditschek. This is a joint study between the NMED and LANL regarding the treatment efficiencies of BMPs at a PRS site in TA-46.

Review of Industrial Activities authorized under the MSGP 2000. The Laboratory received coverage under the new Storm Water Multi-Sector General Permit on December 23, 2000. LANL Industrial Activities identified under the MSGP (ref: Table 1, Part IV, p.

64749) include the following: Steam electric power generating facilities (Sector O); Asphalt batch plants as described in the Asphalt Paving Mixtures category (Sector D); Hazardous waste treatment, storage, or disposal (TSD) facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA (Sector K). The Laboratory also included Solid Waste Management Units (SWMUs) under Sector K; Landfills including those that are subject to regulation under Subtitle D of RCRA (Sector L); Chemical and Allied Products (Sector C); Primary Metals (Sector F) and Fabricated Metal Products (Sector AA); and, Land Transportation and Warehousing (Sector P).

Storm Water Monitoring: Mr. Veenis provided an overview of the Laboratory's current storm water monitoring approach. Mr. Veenis explained the Laboratory's analytical monitoring program, utilizing maps, which includes gaging stations located near the industrial activities, as well as downstream from industrial activities on a sub-watershed basis. Monitoring stations are located within ephemeral canyon systems at both branches of a confluence. Some monitoring stations may be from .25 to 2 miles downstream from SWMUs. Discharge Monitoring Reports (DMRs) are submitted for each gaging station that collects storm water samples from regulated industrial activities. The Laboratory conducts storm water analytical monitoring only for sector-specific benchmark parameters listed in the MSGP.

The Laboratory indicated that not every inactive Solid Waste Management Units (SWMUs) at LANL be covered under the MSGP. Only SWMUs "which may reasonably be expected to affect the quality of storm water discharges" are addressed in the Laboratory's Storm Water Pollution Prevention Plan (SWPPP). The Laboratory is using Standard Operating Procedure 2.01 "Surface Water Site Assessments" to make this determination. The assessments are then reviewed by the Surface Water Assessment Team (SWAT), which consists of DOE/OB, NMED and Laboratory personnel to provide appropriate recommendations.

Mr. Veenis gave a short overview on how the Laboratory developed and implemented Standard Operating Procedure 2.01 "Surface Water Site Assessments" with support from the NMED and DOE/OB. The assessments provide a systematic approach to identifying SWMUs with the highest erosion potential based on proximity to watercourses, slope, vegetative cover, visible erosion and run-on concerns. Based on these assessments, approximately 165 SWMUs have been identified that may reasonably be expected to affect the quality of storm water discharges. For SWMUs, the potential pollutants are identified using soil sample data (found between 0"-12" in depth) provided by the Environmental Restoration Project. The data tables are compared to background data concentrations and those pollutants with a value >10X background are listed as potential pollutant sources. Pollutants found at this level would be subject to erosional processes and therefore could reasonably be expected to affect the quality of storm water discharges.

Storm Water BMPs: The Laboratory has taken numerous corrective actions to improve water quality at the Laboratory. Corrective actions include, but are not limited to, Environmental Restoration Cleanups (VCA, CMS, IM, Accelerated Actions); BMP

installation to reduce erosion; SWPP Plan development and implementation for industrial activities; SWPP Plan development and implementation for construction activities; fire and flood mitigation efforts; implementation of new technologies (reactive barriers, storm water filtration units, etc.); SWAT Team evaluations and recommendations; and, the enhanced surface water-monitoring network.

Data Quality Objectives for Storm Water Sampling: In January 2002 the Surface Water Site Assessment Team (SWAT) began a new effort to review the Laboratory's Storm Water Monitoring Program for the Multi-Sector General Permit. A Data Quality Objective (DQO) process will be used to determine the adequacy of the data collected by the Laboratory's monitoring network. The SWAT role is to provide a review of Industrial Activities, SWMUs, station locations, analytical methods, benchmark parameters, approved monitoring waivers, and to make recommendations on how to improve the overall approach. There were three monitoring options discussed: (1) Monitor below SWMU groupings and conventional industrial activities (current approach); (2) Monitor conventional industrial activities but not SWMUs. Address SWMUs under SWPPPs; and, (3) Monitor conventional industrial activities and monitor SWMUs using the identical outfall provision. EPA indicated that a fourth option could be to monitor conventional industrial activities (Option 1) and seek an individual permit for SWMUs.

There was also some discussion about including surface water monitoring requirements for SWMUs in the RCRA permit. Monitoring on a watershed basis may not be appropriate for storm water compliance monitoring, but may be more appropriate for RCRA monitoring. This is an option that may be considered Option 5. It was the Laboratory's opinion that EPA had not considered SWMUs in the Multi-Sector General Permit until NMED brought it up with respect to LANL. Thus, there is no firm guidance or precedent for this matter. This places the burden of proposing a monitoring approach on LANL. Copies of the presentation view graphs were distributed during the meeting.

EPA response: EPA and NMED indicated that the current option (1) may be inadequate and that all options discussed had their weaknesses. EPA agreed that it would be extremely difficult to meet the monitoring requirements of the MSGP due to the large number of SWMUs and the size of the facility. EPA also stated that they felt that LANL has made good faith efforts to comply. EPA will also need to discuss option (5) with their RCRA representatives.

(4) Watershed Management at LANL (Ken Mullen):

Ken Mullen provided an overview of watershed management at the Laboratory. Topics discussed were the Pajarito Plateau Watershed Partnership, fire impacts, enhanced data collection, process for evaluating data, risk evaluations and modeling. Data collected by the Laboratory is available on the ESH-18 website.

Watershed Management: The Laboratory's watershed program is an institutional program to manage surface water, sediments, and alluvial ground water. It is a coordinated effort among the Laboratory's Environmental Restoration (ER) Program, Environmental Surveillance Program and Storm Water Program. External coordination includes the U. S. Forest Service, Pueblos, Los Alamos County, stakeholders and activists groups. The Laboratory is developing an Integrated Natural and Cultural Resources Management Plan. The development and implementation of a comprehensive natural resources management plan at the Laboratory will directly support DOE's policy to manage all of it's land and facilities as valuable national resources. Through the implementation of such a plan, DOE will improve the agency's role as a steward of natural resources by integrating its mission and operations with biological, water and air resources, using a comprehensive process that will guide land and facility use decisions.

The current state at the Laboratory is that radionuclides and other contaminates do run off the Laboratory's property, cross San Ildefonso, and enter the Rio Grande. However, the levels are usually low. The Laboratory's ER program is risk based and often does not fit well with water quality requirements. The objectives of the watershed management at the Laboratory is to address watershed scale issues, for example, impacts of forest service on the Laboratory, and impacts of Laboratory to Pueblos, Los Alamos County and Rio Grande. The Laboratory needs to reach agreement with regulators and stakeholders on acceptable concentrations in surface water to support ER closeout.

Pajarito Plateau Watershed Partnership (PPWP). Mr. Mullen discussed the PPWP's role in the Cerro Grande rehabilitation effort and has representatives from the Laboratory, NMED, San Ildefonso Pueblo, Cochiti Pueblo, Bandelier National Park, Concerned Citizens for Nuclear Safety, and DOE's Citizen's Advisory Board. PPWP is also a working group of the East Jemez Resource Council. The purpose of the PPWP is to plan and implement a program aimed at identifying and resolving the primary issues effecting water quality in the watershed.

Fire Impacts: Mr. Mullen discussed pre-fire and post fire flows in Pueblo and Water Canyons, and the increased movement and concentrations of metals and radionuclides due to high runoff. However, the highest concentrations often were observed off Laboratory property (i. e. Guaje Canyon). Peak concentrations of radionuclides in water exceeded pre-fire maximums by 5 to 20 times. Metals were also elevated in runoff.

Runoff Sampling and Data Evaluation: Due to the increase in erosion and flooding potential, the Laboratory and stakeholders were concerned with transport of potentially contaminated sediment off Laboratory property. As a result, the Laboratory implemented an enhanced monitoring program that monitored for radionuclides, metals, and organics. The Laboratory collected nearly 100 samples during calendar year 2000. NMED Oversite Bureau collected over 30 samples in 2000. The Laboratory collected over 40 snow melt samples and 140 runoff samples in 2001. The U. S. Geological Service collected samples along the Rio Grande for the Laboratory and U. S. Army Corps of Engineers in 2000 and 2001.

The Laboratory has a large and growing set of surface water data, collected at numerous locations over a number of years. The Laboratory is currently evaluating and validating these data to get a better feel for the general health of the Laboratory's watersheds. The Laboratory is developing a process to evaluate storm water runoff and surface water data. The Laboratory is considering the following elements:

1. Develop tools for evaluating/interpreting the data, in order to focus on subsequent efforts on "real" problems – i.e., those that were created by Laboratory activities and are subject to the Laboratory's control. A key aspect of this analysis is to enhance the ability to distinguish between LANL-derived contamination and "background" or "baseline" levels. Three potential approaches were discussed:

   (a) The first is mentioned above, eliminating the results that are consistent with background soil or sediment concentrations from further consideration.

   (b) Another approach involves establishing the ratio of a given analyte to the aluminum concentration. Radionuclides and metals preferentially adsorb to the fine-grained sediments. The parent materials of the fine grain sediments are higher in aluminum. This ratio may allow us to better distinguish LANL impacts from background.

   (c) A third approach involves time series analyses. Work conducted to date suggests that the concentrations of legacy contaminants have been decreasing as contaminants distribute themselves through the environment and are washed off site. Temporal analysis will allow us to evaluate how concentrations of contaminants may decline through natural attenuation.

2. The Laboratory must also determine how the concept of risk will apply. Risk assessment is a core principle of the Environmental Restoration Project, including its approach to surface water. If regulators are amenable, it may be possible to broaden the applicability of risk-based analysis to the full range of the watershed management program.

<u>Modeling</u>: Mr. Mullen discussed flood flow and sediment transport modeling efforts at the Laboratory. These models are necessary to assess flood flows for facilities protection and safety, provide defensible predictions of offsite transport of sediment and contaminants, and provide data for internal and external risk assessments.

The Laboratory has an aggressive watershed management program. The Laboratory continues to work hard to include stakeholders in decisions and development plans. The Laboratory is contentiously evaluating impacts from the fire impacts and flooding. This

evolving process will be utilized for prioritization of corrective actions and implementation of BMPs to address water quality at the Laboratory. A copy of the presentation view graphs is attached.

EPA Response: The Laboratory will need to continue to monitor the watershed and take mitigation activities, as necessary.

Overview

- Watershed Management at LANL
  - Pajarito Plateau Watershed Partnership
  - Fire impacts
  - Enhanced data collection
  - Process for evaluating data
  - Risk evaluations
  - Modeling
- Data availability
  - Web data

Watershed Management at LANL

- Institutional program to manage surface water, sediments, and alluvial groundwater
- Coordinate internally between Environmental Remediation, Surveillance, and Storm water
- Coordinate externally with Forest Service, Pueblos, Los Alamos County, Stakeholders, and activist groups

Mitigation Action Plan - October 1999

Integrated Natural and Cultural Resources Management Plan

The development and implementation of a comprehensive natural resources management plan at LANL will directly **support DOE's policy to manage all of its land and facilities as valuable national resources**. Through the implementation of such a plan, DOE will improve the agency's role as a steward of natural resources by integrating its mission and operations with biological, water and air resources, **using a comprehensive process that will guide land and facility use decisions**.

Current state

- Radionuclides and other contaminants do runoff the Lab's lands, cross San Ildefonso, and enter the Rio Grande
  - Many are from legacy sources
- Levels are usually low
- ER is risk based program
  - Often doesn't fit well with water quality standards
  - Example- Plutonium in Pueblo Canyon

Objectives of Watershed Management at LANL

Develop a Watershed Management Plan for the Laboratory

- Must address watershed scale issues
  - Impacts of FS on LANL
  - Impacts of LANL to San Ildefonso, Cochiti (Pueblo and Reservoir), Los Alamos County, Rio Grande

- Reach a signed agreement on acceptable concentrations in surface water to support ER closeout
  - DOE/LANL, NMED, San Ildefonso Pueblo, Cochiti Pueblo, LA County, EPA?

Pajarito Plateau Watershed Partnership

Pajarito Plateau Watershed Partnership

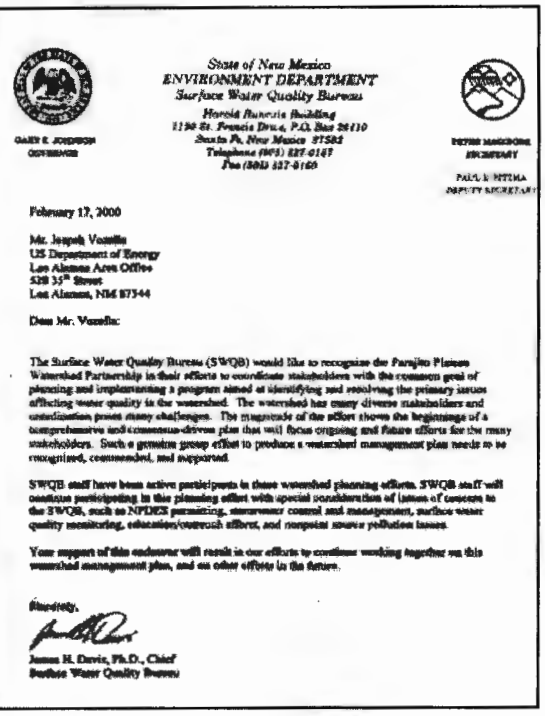
STATEMENT OF PURPOSE:

The partner agencies, organizations, and entities will work together to protect, improve, and/or restore the quality of water in the Pajarito Plateau Watershed. The purpose of the Pajarito Plateau Watershed Partnership is to plan and implement a program aimed at identifying and resolving the primary issues affecting water quality in the watershed.

PPWP

- LANL, DOE, NMED, San Ildefonso Pueblo, Cochiti Pueblo, Los Alamos County, Bandelier National Park, Concerned Citizens for Nuclear Safety (CCNS), DOE's Citizens Advisory Board (CAB)
- Working group of East Jemez Resource Council

The Surface Water Quality Bureau (SWQB) would like to recognize the Pajarito Plateau Watershed Partnership in their efforts to coordinate stakeholders with the common goal of planning and implementing a program aimed at identifying and resolving the primary issues affecting water quality in the watershed. . . The magnitude of the effort shows the beginnings of a comprehensive and consensus-driven plan that will focus ongoing and future efforts for the many stakeholders. Such a genuine group effort to produce a watershed management plan needs to be recognized, commended and supported.



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ENVIRONMENT DEPARTMENT
Surface Water Quality Bureau
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Telephone (505) 827-0187
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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL E. PITTMA
DEPUTY SECRETARY

February 17, 2000

Mr. Joseph Vozella
US Department of Energy
Los Alamos Area Office
528 35th Street
Los Alamos, NM 87544

Dear Mr. Vozella:

The Surface Water Quality Bureau (SWQB) would like to recognize the Parajito Plateau Watershed Partnership in their efforts to coordinate stakeholders with the common goal of planning and implementing a program aimed at identifying and resolving the primary issues affecting water quality in the watershed. The watershed has many diverse stakeholders and coordination poses many challenges. The magnitude of the effort shows the beginnings of a comprehensive and consensus-driven plan that will focus ongoing and future efforts for the many stakeholders. Such a genuine group effort to produce a watershed management plan needs to be recognized, commended, and supported.

SWQB staff have been active participants in these watershed planning efforts. SWQB staff will continue participating in this planning effort with special consideration of issues of concern to the SWQB, such as NPDES permitting, stormwater control and management, surface water quality monitoring, education/outreach efforts, and nonpoint source pollution issues.

Your support of this endeavor will result in our efforts to continue working together on this watershed management plan, and on other efforts in the future.

Sincerely,

James H. Davis, Ph.D., Chief
Surface Water Quality Bureau

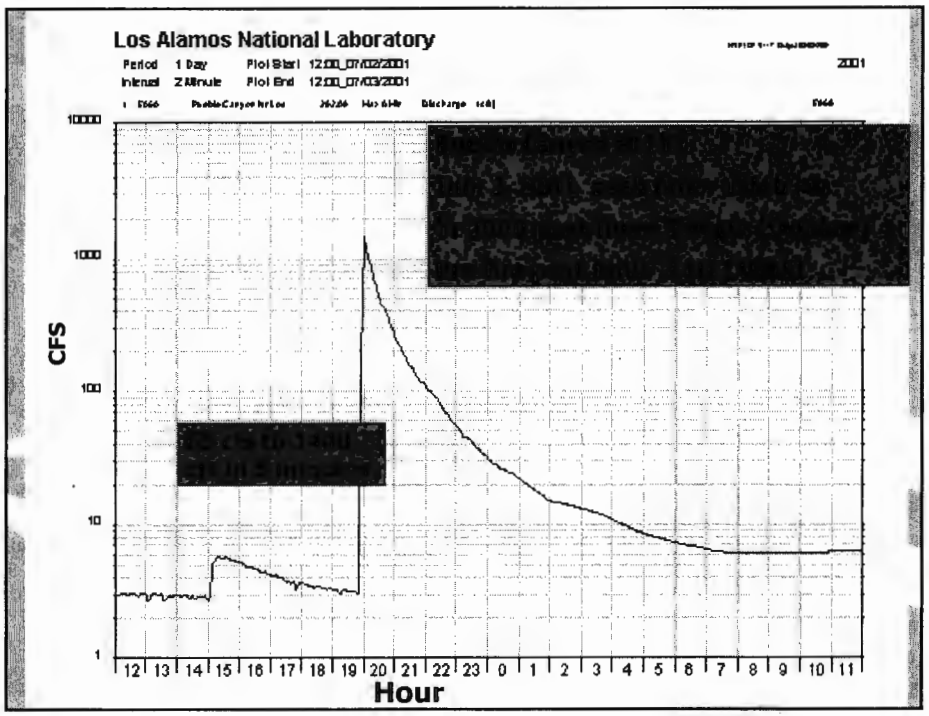
PPWP
Erosion related issues

- protect county utilities/roads
- prevent "unnatural" accelerated erosion
- finding common ground on BMPs
- pinon-juniper thinning and its impact on erosion
- grazing and fire suppression and their impact on erosion
- impact of erosion control on attainment of state/tribal water quality standards
  - -- e.g., prevent transport of contaminated sediments
- control of site degradation (on-site erosion)
- biological, cultural and archaeological impacts
- training/outreach

PPWP
Factors to prioritize activities

- utilities/infrastructure at risk
- high erosion potential
- cultural resources at risk
- water quality standards/permits/benchmarks
- downstream impact (both contaminated and cleans sediments)
- "visibility" (e.g., does it show promise as a demonstration project?)
- land owner interest
- bang for the buck (cost effectiveness)

Fire impacts


Los Alamos National Laboratory
Period 1 Day
Interval 2 Minute
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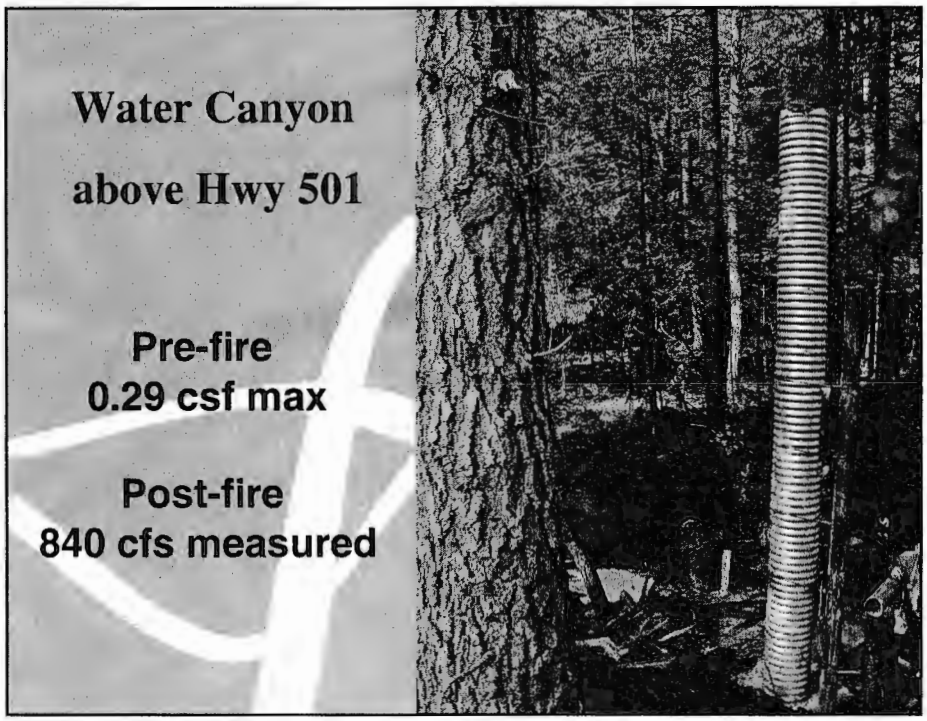
Hour

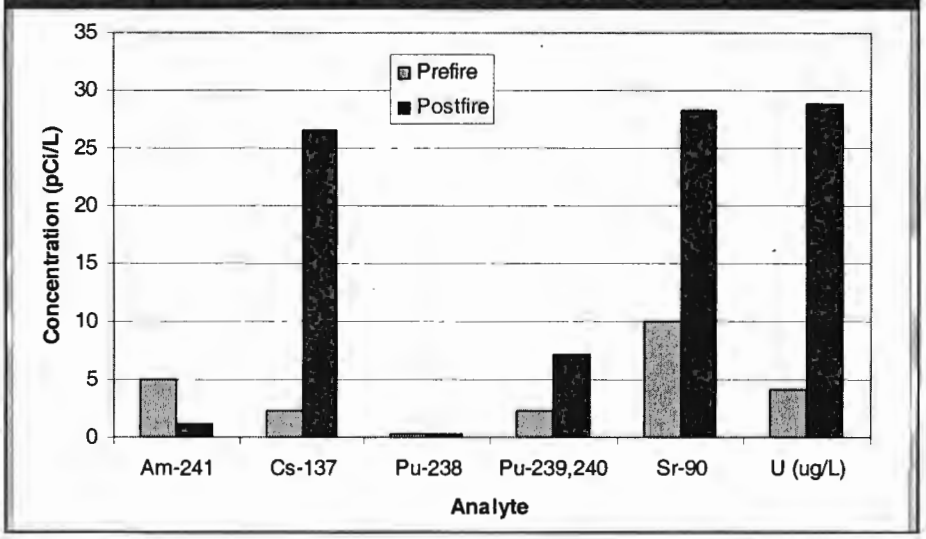

Water Canyon
above Hwy 501
Pre-fire
0.29 csf max
Post-fire
840 cfs measured

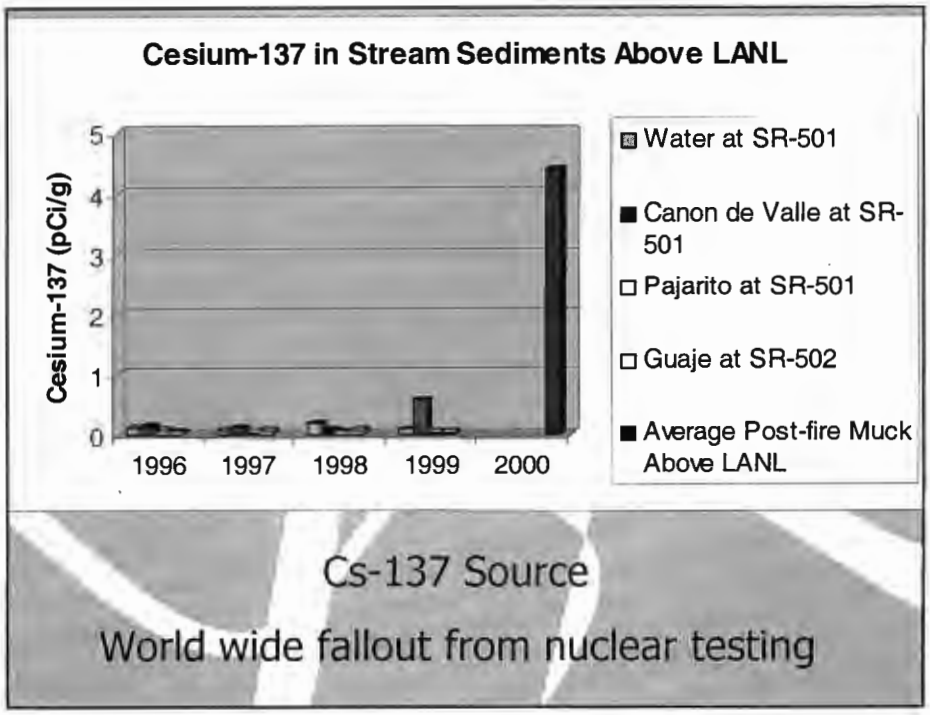
Rills began forming after first rains in 2000

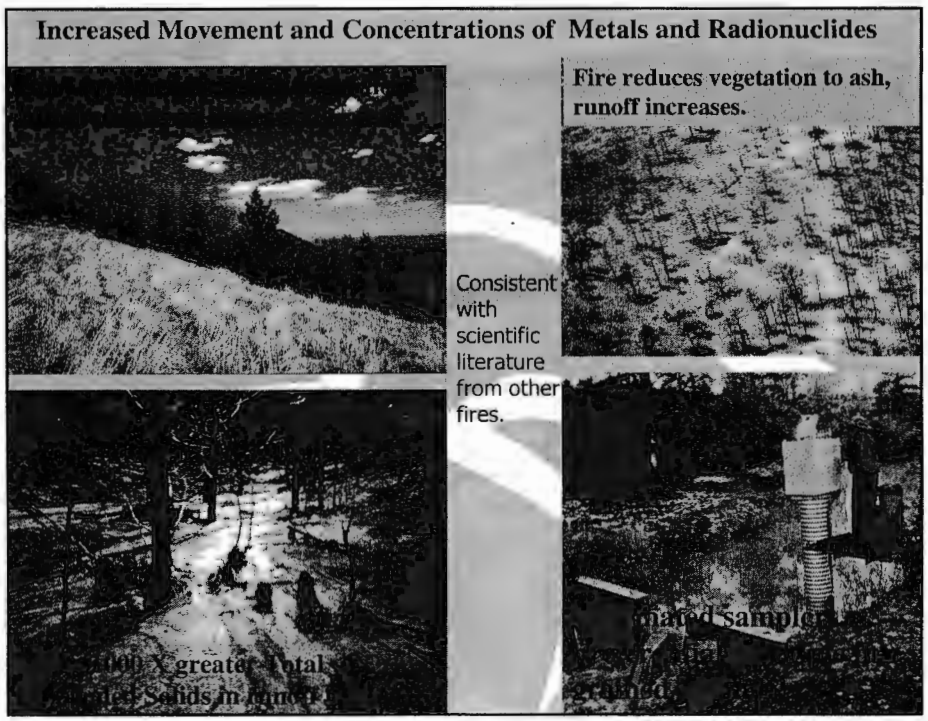
Concentrations @ Eastern Lambourdary Trip 2000 data

Flow weighted average weights [illegible]

Divide by [illegible] to get worst case Rid concentration




Cesium-137 in Stream Sediments Above LANL
Cesium-137 (pCi/g)
0
1
2
3
4
5
1996
1997
1998
1999
2000
Water at SR-501
Canon de Valle at SR-501
Pajarito at SR-501
Guaje at SR-502
Average Post-fire Muck Above LANL
Cs-137 Source
World wide fallout from nuclear testing


Increased Movement and Concentrations of Metals and Radionuclides
Fire reduces vegetation to ash, runoff increases.
Consistent with scientific literature from other fires.

Observations

- Highest concentrations often observed in Guaje Canyon- north of LANL
- Peak concentrations of radionuclides in water exceeded pre-fire maximums by 5 to 20 times
  - Metals elevated- many by 5 to 10 times

Enhanced data collection program

Monitoring Concerns

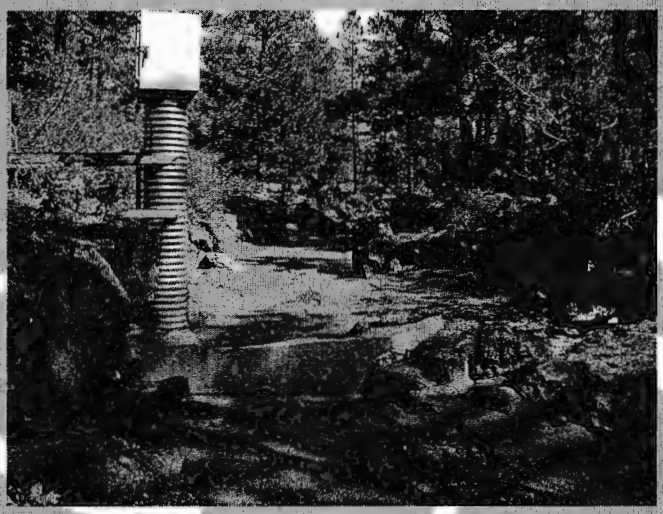
- Radionuclides
- Metals
- Organics
  - PCBS
  - High Explosives
  - Volatile and semi-volatile organics

Runoff Sampling

- LANL collected nearly 100 samples during 2000
  - NMED Oversight Bureau collected over 30 samples in '00
- LANL collected 40+ snow melt samples in 2001
- LANL collected 140 runoff samples in 2001
- USGS collected samples along the Rio Grande for LANL and COE in '00 and '01

Process for evaluating data

Ancho Canyon near Bandelier



Canyon at Mouth (#40- Above confluence

About 70 Storm water stations across the Lab

Process

- Identify LANL impacts
  - Background
    - Soils, sediments, and runoff
  - Ratio- Analyte/Al
- Trend
- Risk
  - ER
- Action

Add Al ratio to evaluation

because:

- Samples with low TSS may skew evaluation
- High power storms may increase course grain fraction of TSS and conceal Lab impacts
- Higher proportion of Al in minerals that form fine grained sediments

Example of evaluating an unfiltered sample (4)

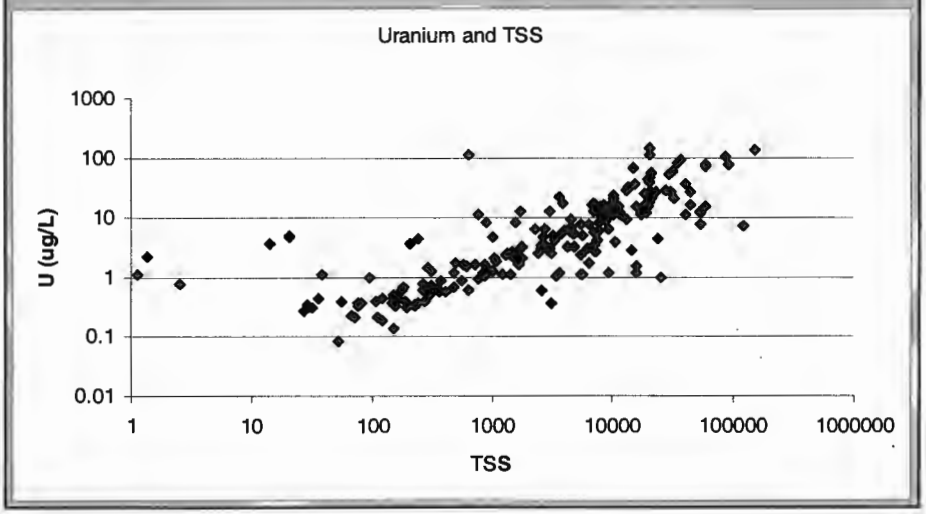
- Twomile above SR-501, October 23, 2000
- Cs-137 measured at 511 pCi/L
  - in storm water runoff (WT)
- DOE DCG for Public Exposure for Cs-137 is 120 pCi/L
  - 511 pCi/L > 120 pCi/L so exceeds DCG
- Average TSS for this sample = 7580 mg/L
  - Two measurements- 8080 mg/L and 7080 mg/L
  - Average 7580 mg/L
- Calculated concentration in suspended sediments- 67.41 pCi/g
- Identify results where calculated sediment concentration exceeds background
  - 67.41 pCi/g > 1.65 pCi/g
- Identify results where sed > background and sed > soil risk level
  - No EPA residential soil screening level so screen against ER SAL- 5.3 pCi/g
  - 67.41 pCi/g > 5.3 pCi/g

Example of evaluating an unfiltered sample (5)

- Add Al ratio to evaluation
  - For this sample- calculate Al concentration in sediments
    - 10883.9 ug/g
  - Analyte/Al ratio- Cs-137 pCi/g / Al ug/g
    - 67.41/10883.9 = 0.0062
    - Multiply by 1000 to make the numbers easier to look at
    - 6.2
  - Calculate average Analyte/Al ratio for all data
    - Average Cs-137/Al x 1000 = 1.2
    - Screen against 2 X Analyte/Al ratio
    - 6.2 > 2 X 1.2

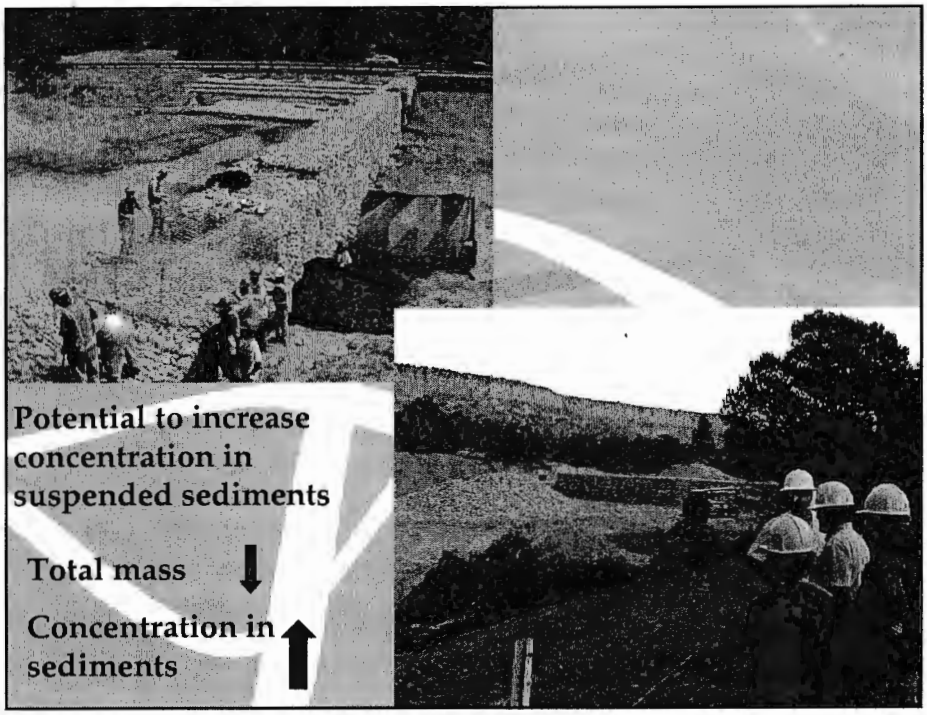
TSS

- 100 mg/L unlikely for arid environments
- More TSS often means greater contaminant concentrations



Impact of high suspended load

- Se in soil naturally
- Background concentrations
  - Median- 0.3 mg/kg
  - Max- 1.7 mg/kg
- Above standard with median soil concentration requires 17,000 mg/L TSS
  - With max soil concentration- 3,000 mg/L TSS


Potential to increase concentration in suspended sediments
Total mass
Concentration in sediments

Risk evaluations

Fire Risk Evaluated

- Los Alamos National Laboratory
- Interagency Flood Risk Assessment Team (IFRAT)
- Centers for Disease Control
- Agency for Toxic Substances and Disease Registry
- Risk Assessment Corporation
- San Ildefonso Pueblo

Interagency Flood Risk Assessment Team (IFRAT)

- Los Alamos National Laboratory
- U.S. Department of Energy
- New Mexico Environment Department
- New Mexico Department of Health
- U.S. Environmental Protection Agency
- U.S. Forest Service
- U.S. Army Corps of Engineers

LANL Risk Assessment

- Estimates risks from flooding/transport in CY2000, as well as future potential risks
- Focuses on possible LANL contributions to offsite transport from flooding
  - radioactive constituents
  - chemicals
- Emphasizes realistic risk scenarios
- Being conducted by ESH, EES, and E Divisions

Risks to Who?

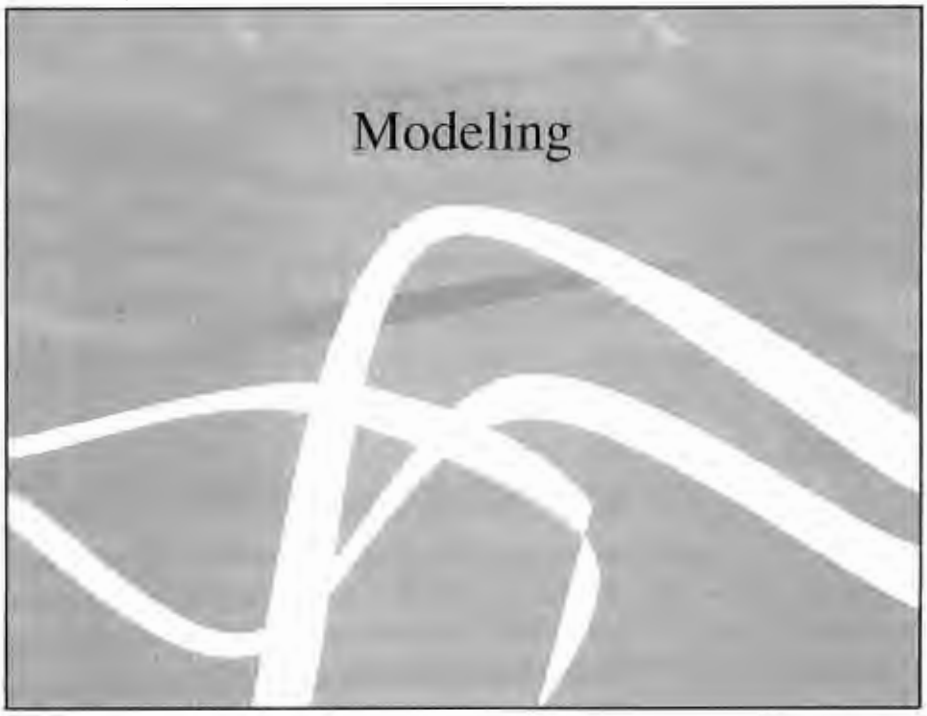
- Off-site resident, (located in Los Alamos Canyon near LANL's eastern boundary):
  - external radiation
  - inhalation of dust
  - inadvertent soil ingestion
- User of the Rio Grande:
  - fishing
  - irrigation
  - swimming
  - livestock watering
  - drinking water

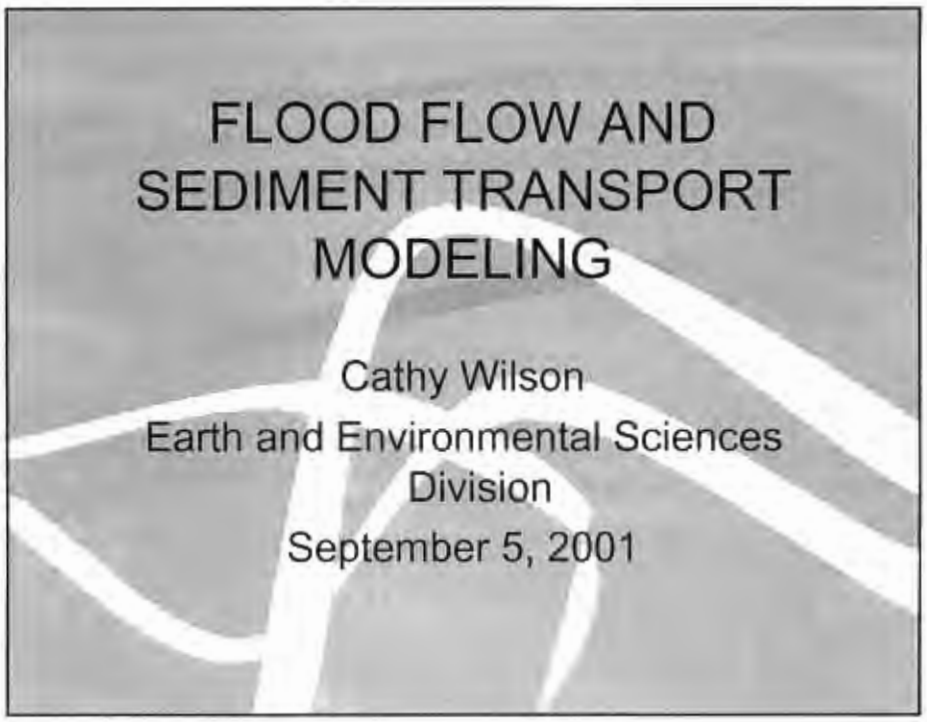
Risk Analysis Conclusions

- Some increased risk from chemicals and radionuclides, primarily associated with ash
- Incremental radiation doses in CY2000 are less than 0.1 mrem/year
- IFRAT issued a warning about using ash for gardening

RAC Risk Assessment

- Comprehensive risk assessment of both initial CGF event and subsequent flood events
- Still in early stages: final expected in Spring, 2002
- Particular emphasis on LANL contribution to total risk

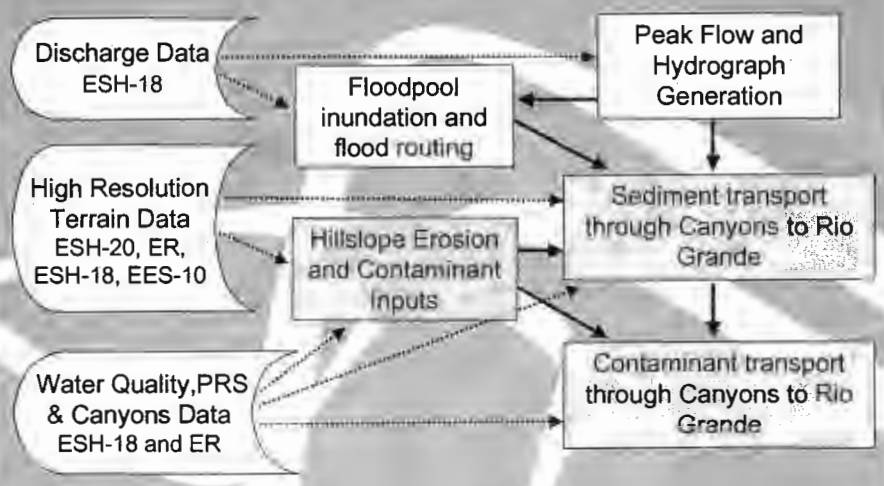

Modeling


FLOOD FLOW AND
SEDIMENT TRANSPORT
MODELING
Cathy Wilson
Earth and Environmental Sciences
Division
September 5, 2001

WHY MODEL?

- Assess flood flows for facilities protection.
- Interact with Defense Nuclear Facilities Safety Board on unresolved safety questions at TA-18.
- Support individual facilities operations as requested.
- Provide defensible predictions of offsite transport of sediment and contaminants (NMED, NM Attorney General, etc.).
- Perform flood analyses for LANL RCRA permit renewal.
- Provide data for internal and external risk assessments (e.g., Till Study)

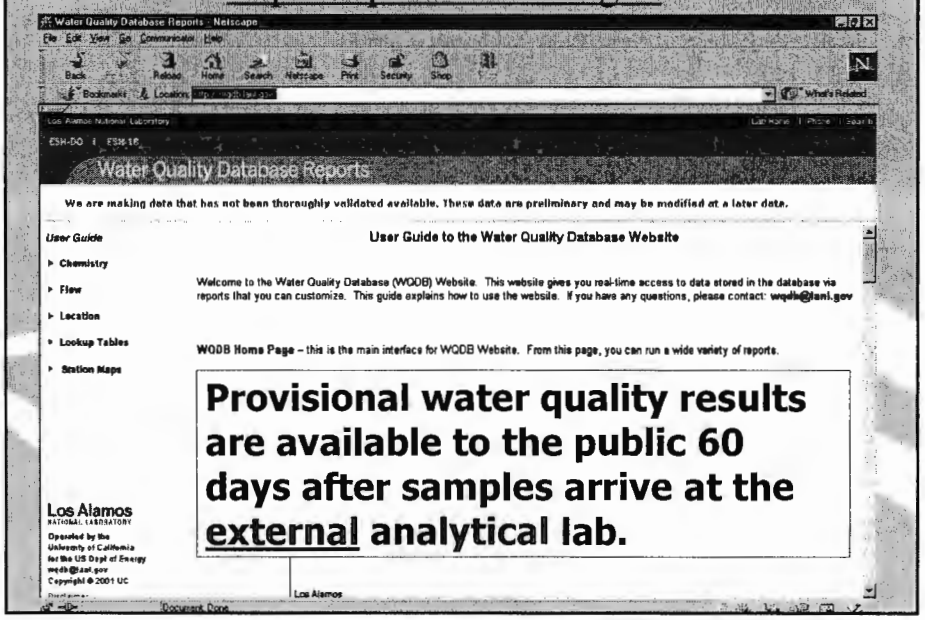
ACTIVITIES



Data availability

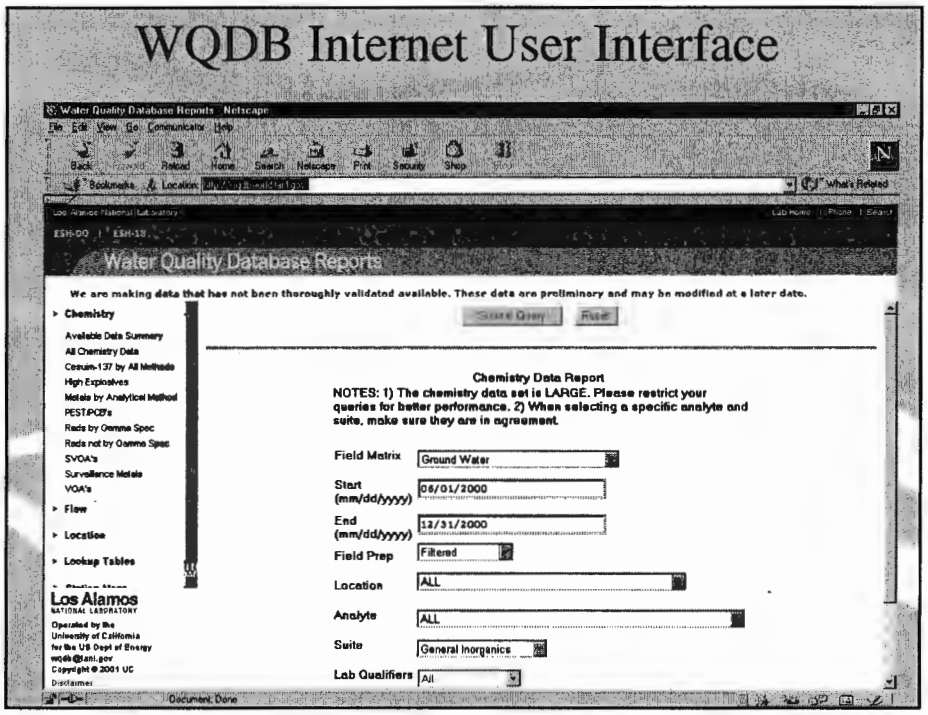
WQDB Website

http://wqdbworld.lanl.gov

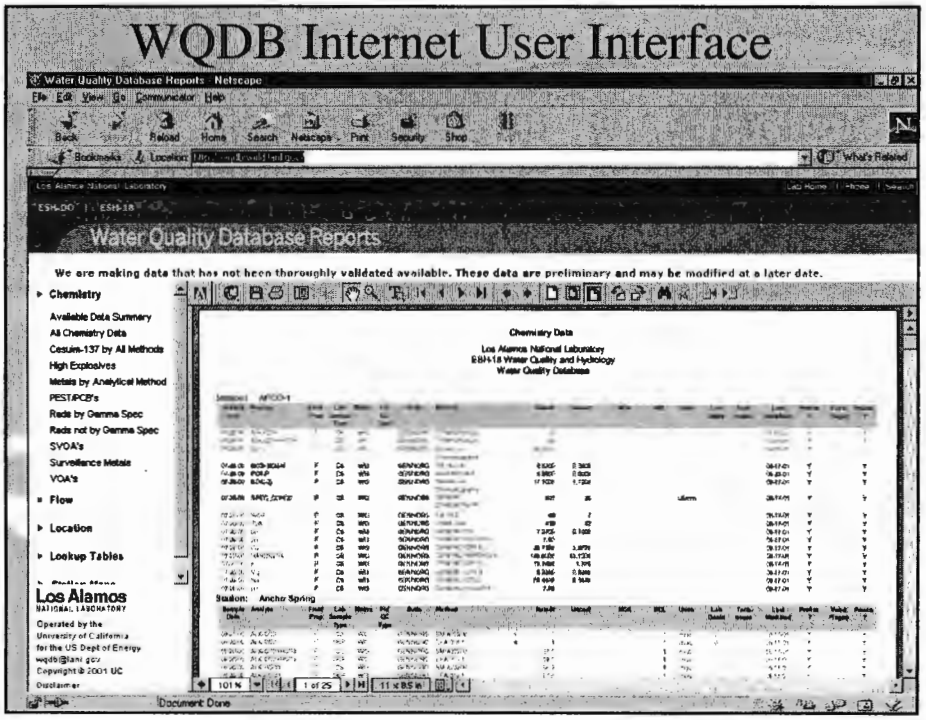


Provisional water quality results are available to the public 60 days after samples arrive at the <u>external</u> analytical lab.

WQDB Internet User Interface



WQDB Internet User Interface



Provisional Results

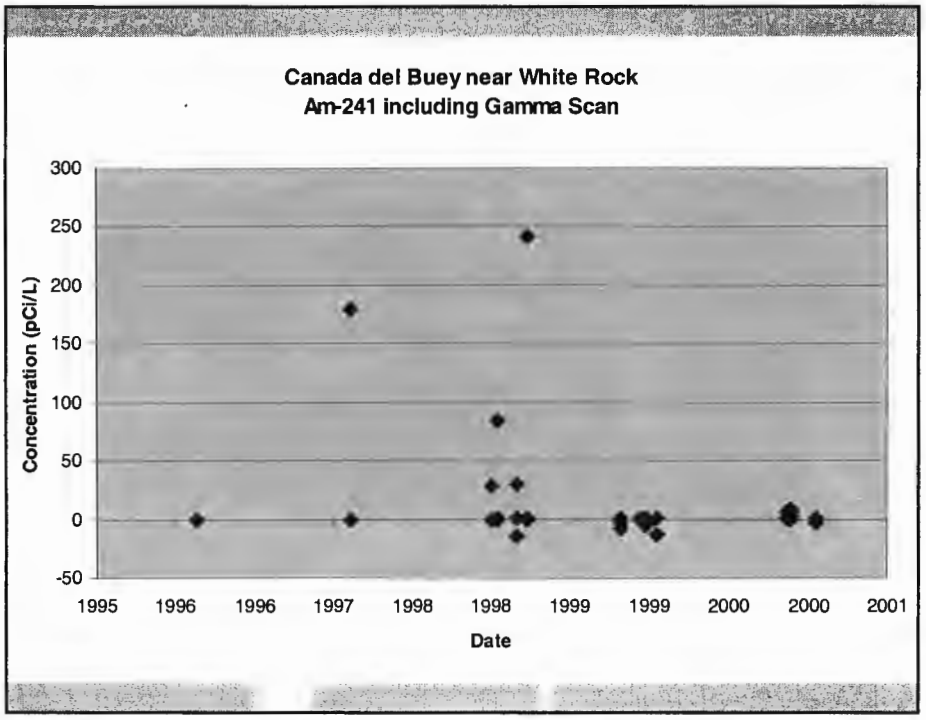
- Modeled after USGS process
- Only way we could get data available quickly
- Data is provisional until published in a hardcopy report
- Add validation data as available

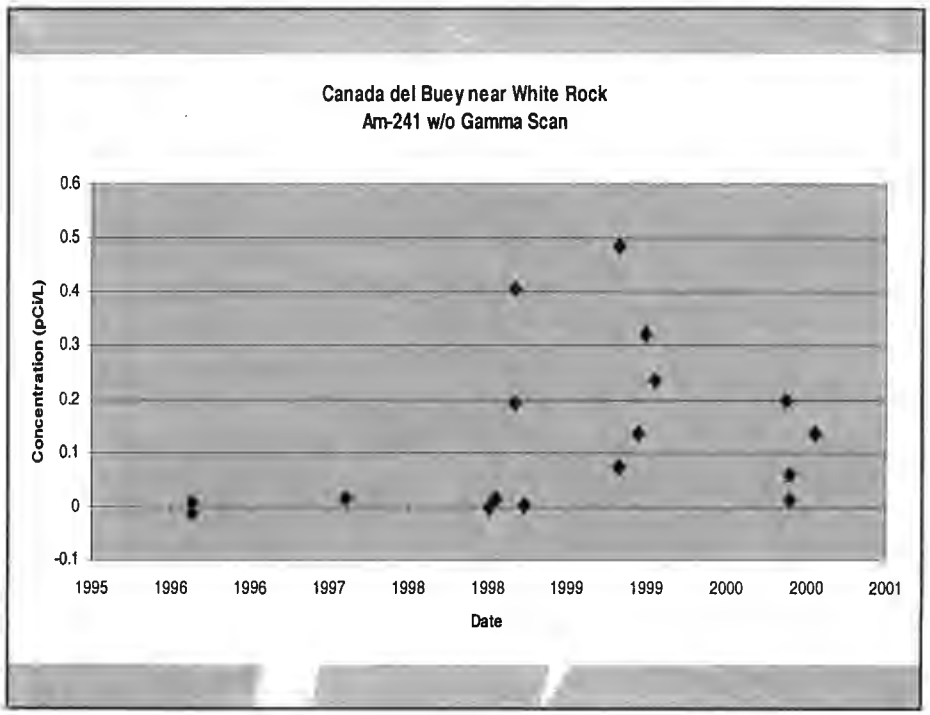
Issues associated with providing provisional data to public

- Increases internal focus on quality and timeliness
  - People are very aware that data is available to the public as soon as they can see it
  - Occasionally discuss whether we should post a new finding because of uncertainty about result, method, analytical bias
- Increased trust- Allows us to say emphatically that we don't hide data
- Removed sample location maps after Sept. 11

Issues (cont.)

- Intended to make life easier by reducing time spent answering requests for data
  - Special requests still common
- Updating records
  - Results are updated as problems are found
  - Use of "old" data that has been corrected
  - Modified date- not so good
- In case of anomalous result, reanalysis not immediately available
- Incorrect use of data
  - Inappropriate methods- gamma scan vs. alpha spec
  - No control over how data is used





Conclusions

- LANL has an aggressive watershed management program
  - Fire impacts have muddied the water
  - Working hard to include stakeholders in decisions and development of plans
  - Contentiously evaluating LANL impacts
    - Collect far more data than required
    - For surface water, LANL is probably the most intensively monitored 43 square miles in the world
    - Necessary because of the high intensity, short duration flows
    - Evolving process for prioritizing corrective actions
      - Consider all contaminants and potential contaminants
      - Beyond Storm water program

Conclusions- cont

- Resolve contradictory drivers between risk and action levels
- Modeling to refine knowledge of erosion and contaminant transport
- Water quality data is freely available