CLARK, LINCOLN, AND WHITE PINE COUNTIES GROUNDWATER DEVELOPMENT PROJECT EIS

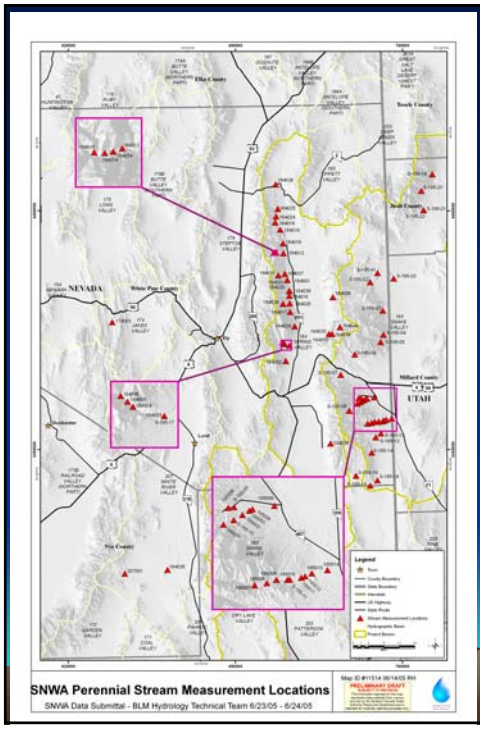
WATER RESOURCES TECHNICAL REVIEW
MEETING 1 – BASELINE DATA
June 23-24, 2005

SURFACE WATER DATA COLLECTION

Gavin Kistinger
Southern Nevada Water Authority

Presentation Overview

- Description of the two data sets
  - Discharge from perennial streams (SNWA data only)
  - Characterization of selected springs in Eastern, Nevada (Multi-agency data set)
- How the data were collected
- Use of the data
- Qualifying the data
- Questions



Perennial Stream Discharge Data

- Discharge measurements at approx. 50 streams
- Majority of the data were collected in Snake Valley and Spring Valley
- Collected in 1993, 1996-2004 (Late July, Early August)

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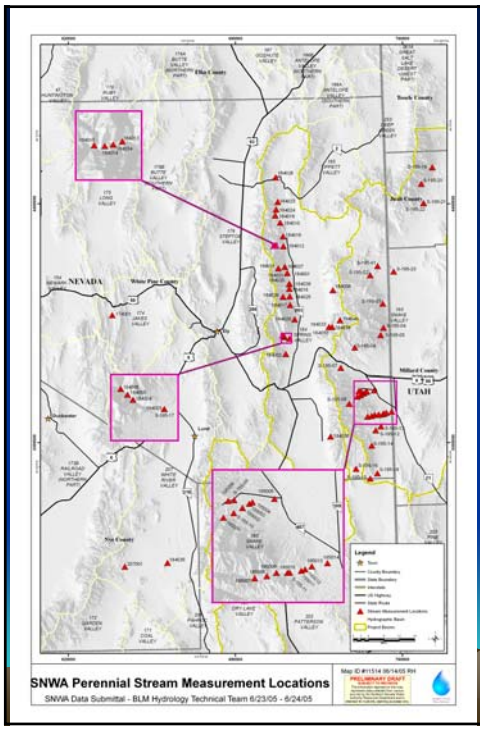

Spring Valley

- Data were collected at a suitable measurement section at the edge of the mountain block
- At selected streams "seepage runs" were done, to determine gains and losses over the length of the stream within the mountain block
- Results of these studies were published in:

  Katzer T., and Donovan, D., 2003, Surface water Resources and Basin Water Budget for Spring Valley, White Pine and Lincoln Counties, Nevada

- A PDF of this report has been included in the data transmittal

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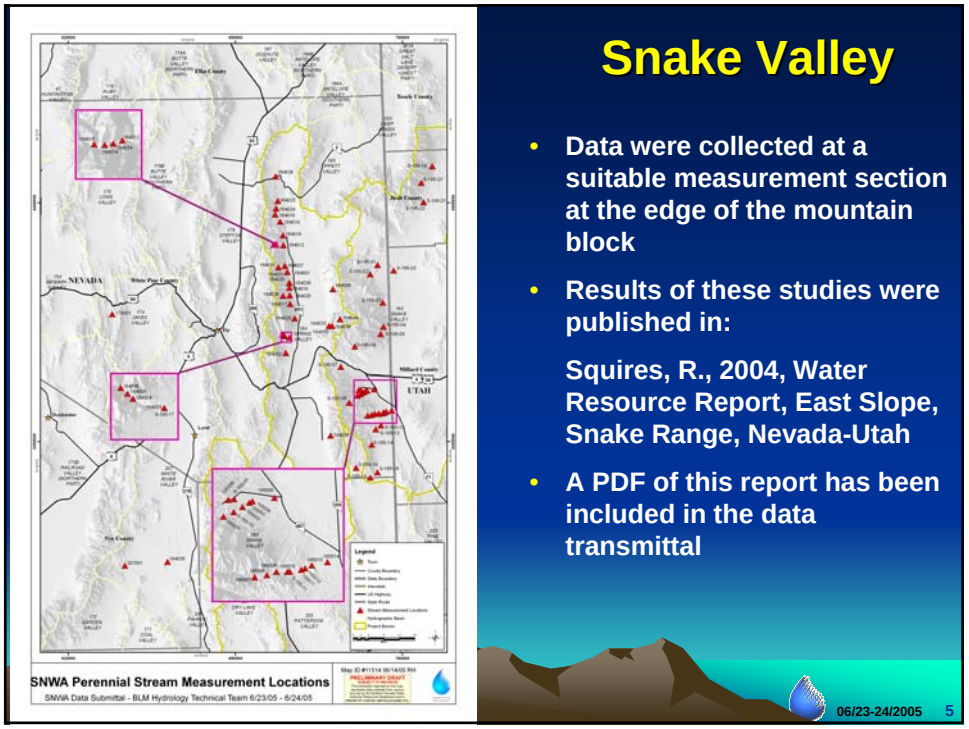
Snake Valley
Data were collected at a suitable measurement section at the edge of the mountain block
Results of these studies were published in:
Squires, R., 2004, Water Resource Report, East Slope, Snake Range, Nevada-Utah
A PDF of this report has been included in the data transmittal
SNWA Perennial Stream Measurement Locations
SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05
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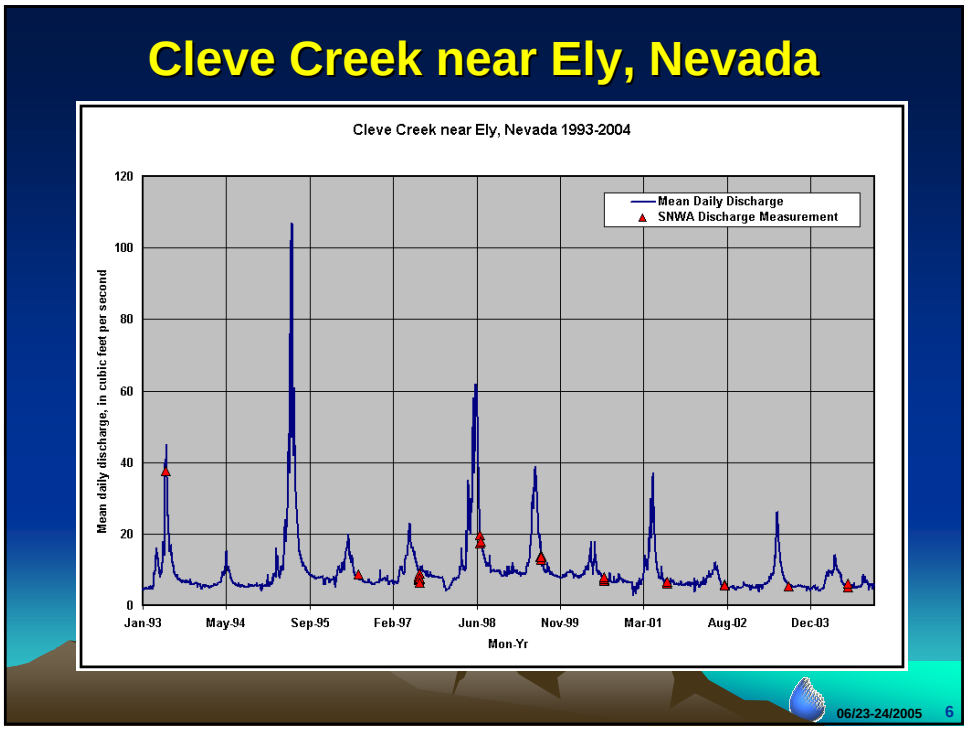
Cleve Creek near Ely, Nevada
Cleve Creek near Ely, Nevada 1993-2004
Mean Daily Discharge
SNWA Discharge Measurement
Mean daily discharge, in cubic feet per second
120
100
80
60
40
20
0
Jan-93
May-94
Sep-95
Feb-97
Jun-98
Nov-99
Mar-01
Aug-02
Dec-03
Mon-Yr
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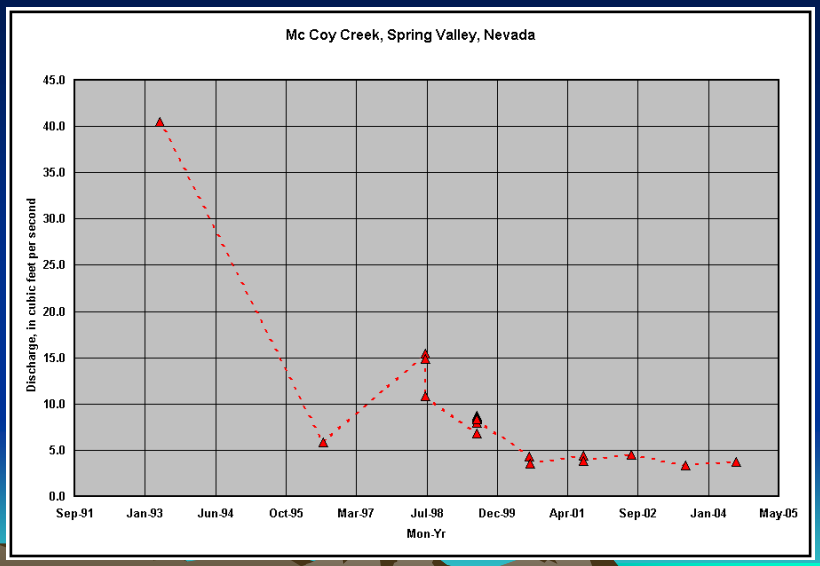
Mc Coy Creek, Spring Valley, Nevada



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Spring Data Compilation and Collection

- Sources
  - USGS
  - Nevada State Engineer
  - Ertec Western Inc. (MX-Missile Program)
  - Nevada Bureau of Mines and Geology
  - SNWA Field Investigations
  - SNWA Reports
  - DRI / UNLV / UNR

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U.S. Geological Survey

- NWIS Database, June 2004
- Water Resource Data Reports
- Miscellaneous Data Requests
- Water-Supply Papers
- Recon Reports

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Nevada State Engineer

- Water Resources Reconnaissance Series
- Biennial Reports
- Water Resource Bulletins

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Nevada Bureau of Mines and Geology

- Bulletins
  - County Geology Reports
  - Thermal Springs Report

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DRI-UNLV-UNR

- Graduate Work
- DRI Reports

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SNWA

- Reports
  - CWP Series (Published under LVVWD)
  - Katzer and Donovan (2003)
  - Squires (2004)
- Field Work
  - Characterization of springs
  - Quantification mountain front runoff

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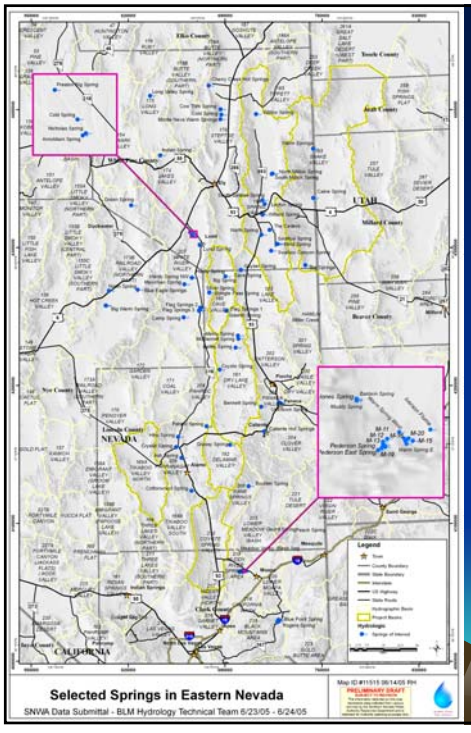

Characterization of Springs

- Data Collection
  - Approx. 75 springs
  - Summer of 2004 (June-September)
  - Geologic mapping at selected springs
  - Discharge measurements
  - Photographic log
  - Water quality samples

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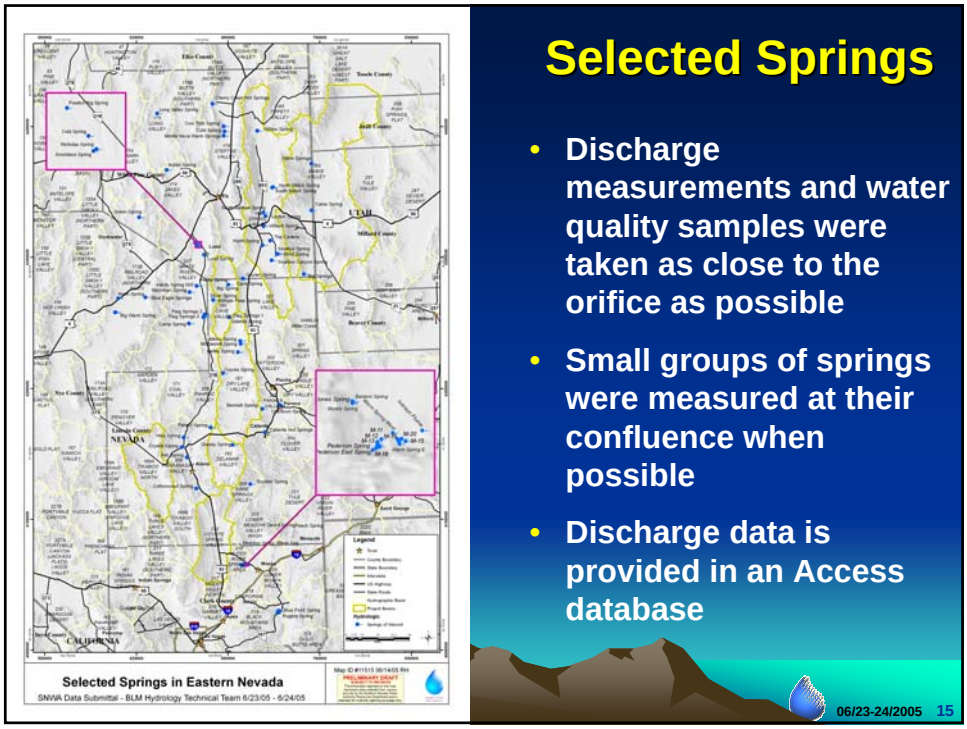
Selected Springs in Eastern Nevada
SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05
Selected Springs
• Discharge measurements and water quality samples were taken as close to the orifice as possible
• Small groups of springs were measured at their confluence when possible
• Discharge data is provided in an Access database
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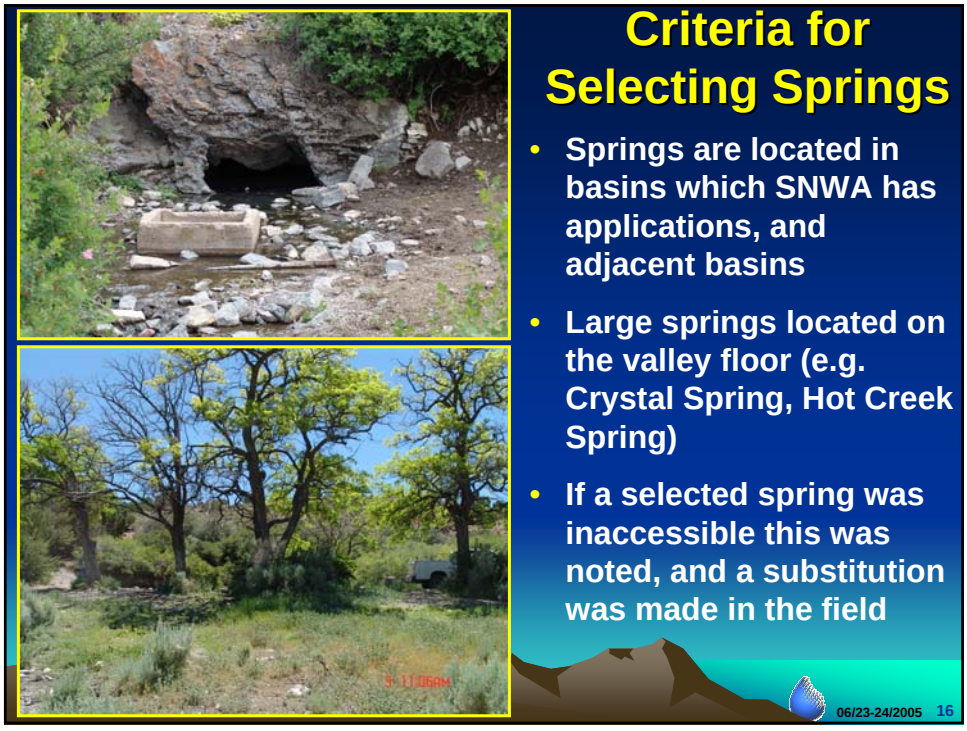
Criteria for Selecting Springs
• Springs are located in basins which SNWA has applications, and adjacent basins
• Large springs located on the valley floor (e.g. Crystal Spring, Hot Creek Spring)
• If a selected spring was inaccessible this was noted, and a substitution was made in the field
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Summary of Data Collection Efforts, at Springs in Eastern Nevada, Over the Past 100 Years

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Methods of Discharge Measurements

- Discharge measurements were made using:
  - Stream Gaging
  - Artificial Controls
  - Volumetric
  - Estimation

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Stream Gaging

- Used methods described in Rantz and others (1982)
- Used Price AA, Pygmy, and Swoffer meters
- Discharge was calculated using the USGS standard rating (June, 1999) (except for Swoffer)

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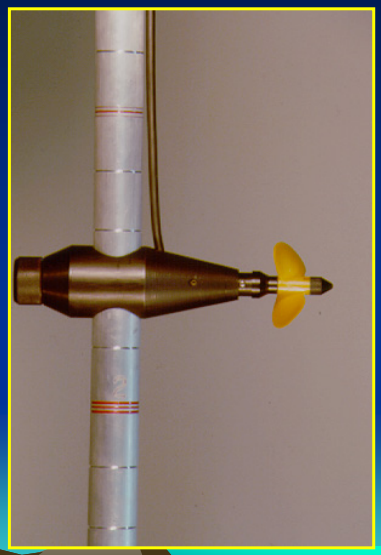
Swoffer Meter

- Data collected for SNWA by Western States Engineering, used a Swoffer meter.
- Uses 2-inch propeller with an optical sensor inside the meter
- Velocities are reliable in the range of 0.1 to 25 ft/sec
- Comparison measurements were made at Cleve Creek using standard Price meters



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Artificial Controls

- Cippoletti Weir
  - $Q=3.367*L*H^{3/2}$
- 3-inch Modified Parshall Flume
  - Calibrated by USGS-HIF

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Volumetric Measurement

- Used containers of known volume
- Recorded the amount of time to fill the given container
- Repeated at least 3 times
- Used at small springs usually 1 to < 1 gpm

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Water Quality Sample Collection

- SNWA's procedures are based on USGS sample collection protocol as defined in Wood, 1976
- Samples were collected as grab samples
- Field parameters collected included: pH, Temperature, Electrical Conductivity, Dissolved Oxygen

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Photographic Documentation

- Orifice
- Diversions
- Discharge measurement devices
- Cross sections
- Spring Pool
- Channel conditions
- General Area

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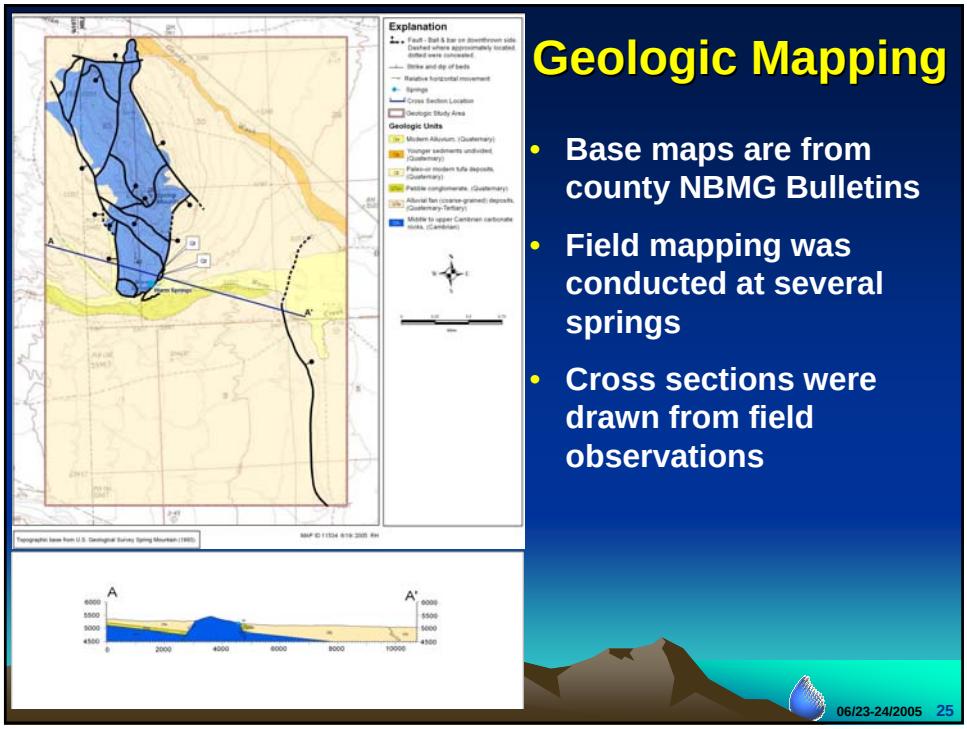
Geologic Mapping
Base maps are from county NBMG Bulletins
Field mapping was conducted at several springs
Cross sections were drawn from field observations
Explanation
Geologic Units
A
A'
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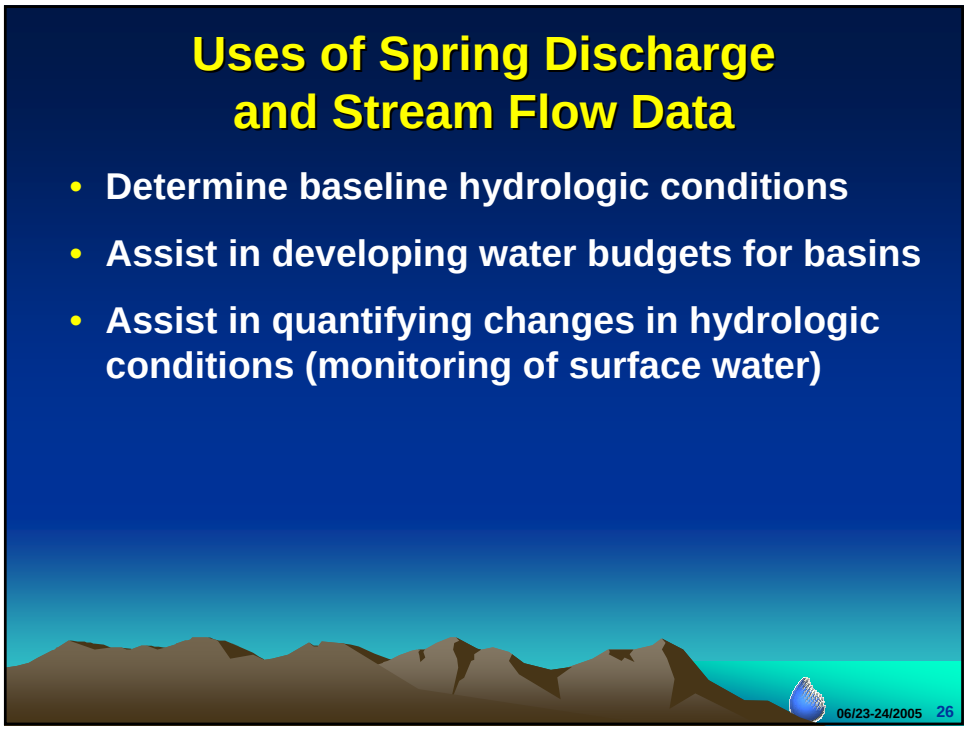
Uses of Spring Discharge and Stream Flow Data
Determine baseline hydrologic conditions
Assist in developing water budgets for basins
Assist in quantifying changes in hydrologic conditions (monitoring of surface water)
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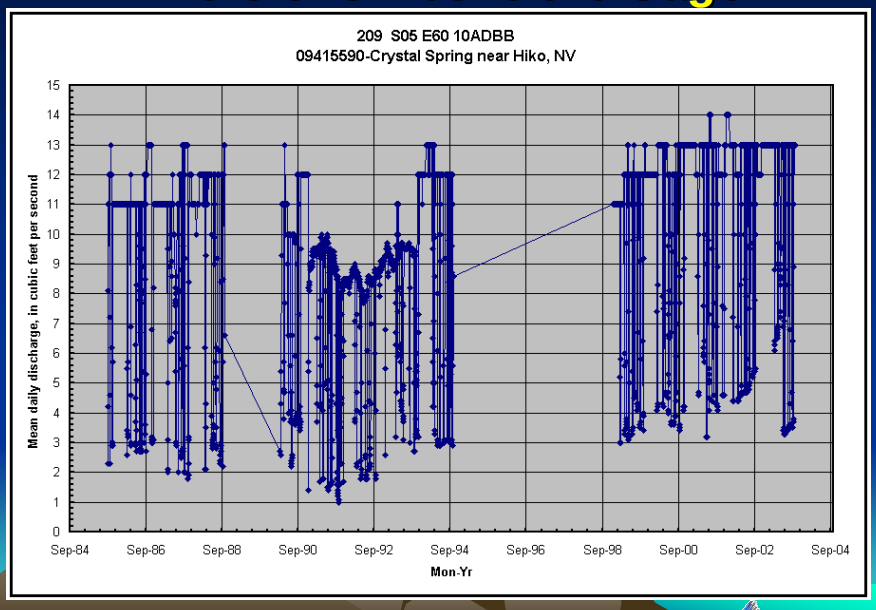
Qualifying Data

- Accounting for diversions above the gage
- Condition of artificial controls
- Measurement cross section locations
- Change in diversion structure

Diversions Above the Gage



Condition of Artificial Controls

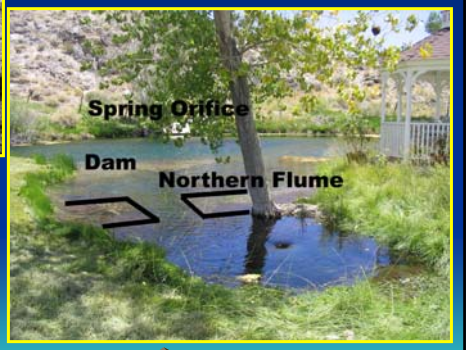
Measurement Locations

- Warm Spring in Northern Snake Valley, Utah
- Rush and Kazmi (1965) estimated 8 cfs
- SNWA (2004) measured below the main orifice 8.4 cfs
- SNWA (2004) measured above the diversion box 15 cfs

Change of Diversion Structures

Hiko Spring, 1963

Hiko Spring, 2004



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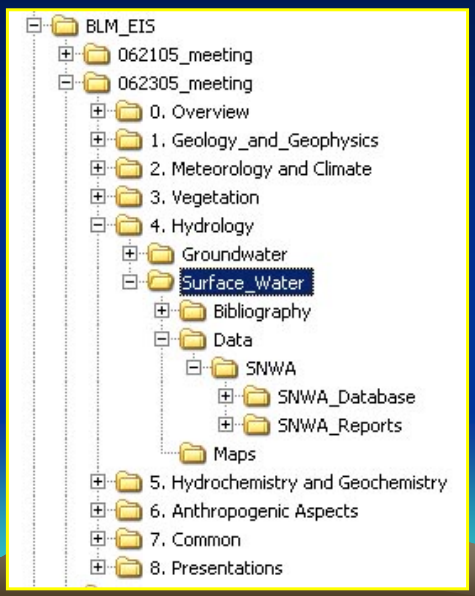
How to Access the Data



- **Spring and perennial stream discharge data are found under the "Hydrology" heading in an Access database**
- **Water quality are found under the "Hydrochemistry and Geochemistry" heading**
- **Interpretive geologic maps and photographs will be available in a technical report**

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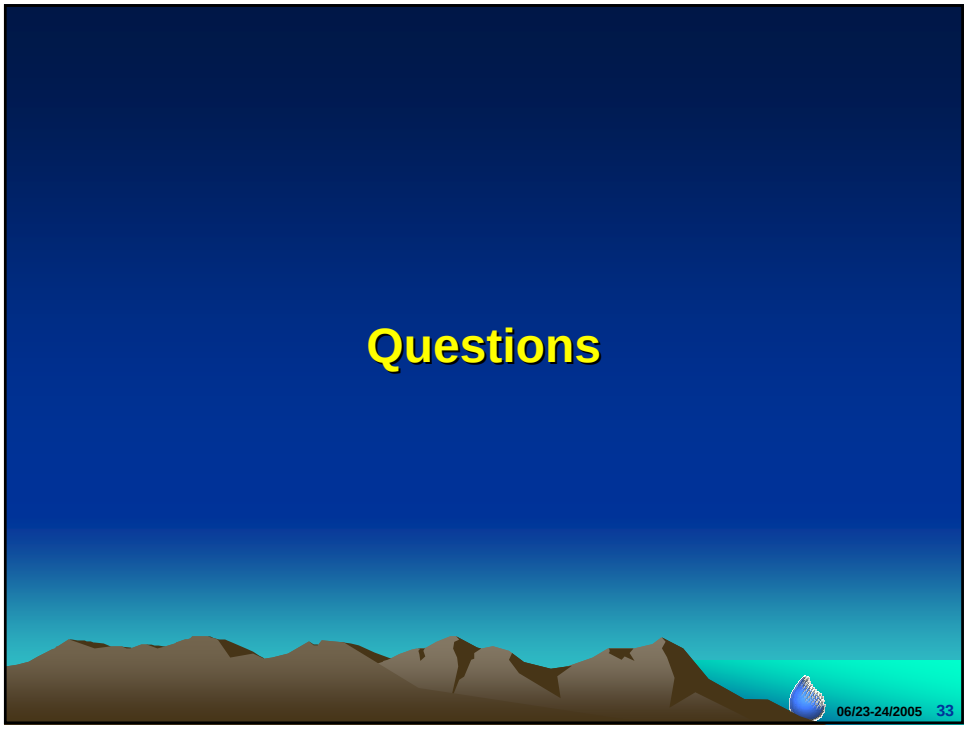
Questions
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