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Date: January 26, 2006
Refer to: ER2006-0045

Mr. James Bearzi
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303



**SUBJECT: RESPONSE TO APPROVAL WITH MODIFICATIONS, MORTANDAD
CANYON BIOTA INVESTIGATION WORK PLAN, LOS ALAMOS
NATIONAL LABORATORY, EPA ID #NM0890010515**

Dear Mr. Bearzi:

Contained in this letter and on the enclosed CD is the information the New Mexico Environment Department (NMED) requested in the "Approval with Modifications, Mortandad Canyon Biota Investigation Work Plan, Los Alamos National Laboratory, EPA ID #NM0890010515," dated December 13, 2005. Additional requirements of the approval will be addressed in the Mortandad Canyon investigation report, as requested.

In General Comment 4, NMED requested, in electronic format, all data used during the screening level ecological risk assessment. These data were previously included in electronic format on a CD with the Mortandad Canyon biota investigation work plan, as Appendix F, with the exception of several fields specified in your letter (detection limit, practical quantitation limit or method detection method (MDL), and background levels). The Laboratory is resubmitting these data, with the additional requested fields, on the enclosed CD.

In Specific Comment 1, NMED requested clarification of the Laboratory's proposal to sample the 0–6-in. depth for soils in the small mammal trapping arrays to support the assumption made in the work plan that "most exposure occurs during foraging and not in building or maintaining underground burrows." The Laboratory's assumption of relatively low exposure to animals from ingestion during burrowing is supported by the estimate in the Environmental Protection Agency's *Wildlife Exposure Factors Handbook* (EPA/600/R-93/187a, 1993, Vol. 1, Tables 4-4 and 4-5, pp. 4-20 and 4-21) that soil ingestion for mice and voles is only 2–2.4% of their diet, with some of this ingestion being soil adhering to plants and insects in addition to soil ingestion from burrowing. It is also worth noting that because the Laboratory is directly analyzing small mammals in this study (both pelts and carcasses), any contamination to the animals resulting from exposure to deeper soil would be captured by these analyses, thus providing a direct measure of exposure.



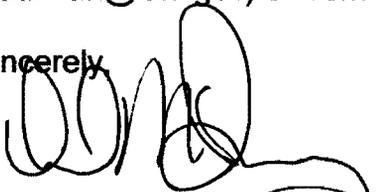
January 26, 2006

Additionally, this assumption was adopted from the sampling design for the Los Alamos and Pueblo Canyons biota investigation, as presented in Attachment 1 of the "Los Alamos and Pueblo Surface Aggregate Report, Record of Communication," submitted to NMED on September 26, 2002. That record of communication documented agreements reached with NMED on the technical aspects of the Los Alamos and Pueblo Canyons biota investigation, and the Laboratory's intent with the Mortandad Canyon biota investigation was to remain consistent, where possible, with prior agreements with NMED on technical approach.

In Specific Comment 2, NMED requested two procedures: "Spring and Surface Water Sampling" (ENV-DO-204 RO) and "Aquatic Invertebrate Sampling" (RRES-WQH-HCP-058). Electronic copies of these procedures are included on the enclosed CD.

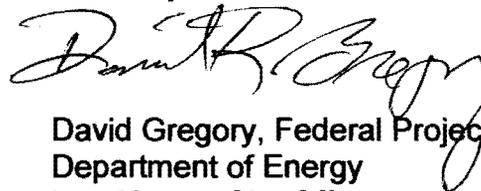
If you have any questions, please contact Danny Katzman at (505) 667-6333 (katzman@lanl.gov) or Tom Whitacre at (505) 665-5042 (twhitacre@doeal.gov).

Sincerely,



David McInroy, Deputy Program Director
Environmental Remediation & Surveillance
Los Alamos National Laboratory

Sincerely,



David Gregory, Federal Project Director
Department of Energy
Los Alamos Site Office

DK/jk

Enclosure: Attachments to the Letter to New Mexico Environment Department in Response to "Approval with Modifications" for the Mortandad Canyon Biota Investigation Work Plan (LA-UR-06-0405)

Cy:(w/enc)

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IM-9, MS A150

AQUATIC INVERTEBRATE SAMPLING

Purpose This Water Quality and Hydrology Group procedure describes the process for installing and collecting aquatic macro-invertebrates from streams located on LANL property.

Scope This procedure applies to the pre-field work activities, field work and post-field work activities.

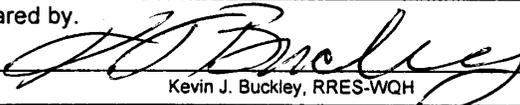
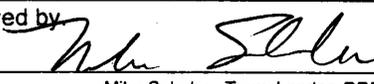
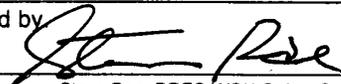
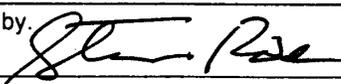
In this procedure This procedure addresses the following major topics:

Topic	See Page
General Information about this Procedure	2
Who Requires Training to this Procedure?	2
Preparations for Sampling	4
Arriving at the Sample Location	5
Bug Basket Sampling	6
Hess Sampling	8
Pebble Count	9
Complete Documentation	10
Records Resulting from this Procedure	11

Hazard Control Plan The hazards associated with this procedure are described in RRES-WQH-HCP-002, *General Field Work*, Attachment 1.

Initial risk = medium. Residual risk = low. Work permits required: none.

Signatures

Prepared by.  Kevin J. Buckley, RRES-WQH	Date: 3/15/04
Approved by  Mike Saladen, Team Leader, RRES-WQH	Date: 3/15/04
Approved by  Steve Rae, RRES-WQH Safety Committee Chair	Date: 3-15-2004
Approved by  Steve Rae, RRES-WQH Group Leader	Date: 3-15-2004

CONTROLLED DOCUMENT

This copy is uncontrolled if no signatures are present or if the copy number stamp is black. Users are responsible for ensuring they work to the latest approved revision.

General Information About This Procedure

Attachments This document has the following attachments:

Number	Attachment Title	No. of pages
1	Equipment and Supplies Checklist	1
2	LANL Bioassessment Field Data Sheet	13
3	Zig-Zag Pebble Count Procedure	1

History of revision This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	3/04	New document.

Who requires training to this procedure The following personnel require training before implementing this procedure:

- All RRES-WQH staff, contract personnel, and students who perform aquatic macro-invertebrate sampling.

Training method The training method for this procedure is “self-study” (reading) and is documented in accordance with the procedure for training (RRES-WQH-QP-024, *Training*).

Prerequisites In addition to training to this procedure, the following training is also required for all personnel who reside in the building:

- RRES-WQH-HCP-002, General Field Work
- RRES-WQH-HCP-003, Vehicle Operations
- RRES-WQH-HCP-004, Radio and Cellular Phone Use
- RRES-WQH-HCP-018, Working in Burn Areas
- RRES-WQH-HCP-019, Chainsaw Use

General Information About This Procedure, continued

Definitions to this procedure

Aquatic macro-invertebrates: Insects that live part of their life cycle in water.

Bug basket: An 8 inch by 2 inch square mesh basket filled with rocks used to simulate stream substrate to sample aquatic macro-invertebrates.

Hess sampler: A circular aquatic macro-invertebrate sampler.

Surface water: Water on the earth's surface including ponds, lakes, and streams.

Reach: Section of stream selected for study.

Riffle: Shallow section of stream, usually with swift water and larger substrate.

Median Axis: Each pebble has a short axis (shortest section of pebble) and a long axis (longest section of pebble) that is perpendicular to the short axis. The median axis is perpendicular to the longest and shortest axes.

References

The following documents are referenced in this procedure:

RRES-WQH-QP-029, *Creating and Maintaining Chain of Custody*
RRES-WQH-QP-035, *Calibration of and Measurement with Field Instruments*

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Preparations for Sampling

Equipment needed	Assemble equipment necessary for sampling prior to leaving for the sampling site. Required equipment is listed in Attachment 1, "Equipment and Supplies Checklist".
Two person process	Aquatic macroinvertebrate sampling, as discussed in this document, is a two-person process.
Access to sampling site	Notify the Facility Manager (FM) and access control prior to accessing canyon locations at DX and ESA.
Pre job briefing	Conduct the pre-job briefing prior to conducting sampling. Use the most current RDL-approved Integrated Work Document. Obtain worker signatures.
Sampling sequence	<p>Follow the sequence of activities below for all sampling for aquatic macroinvertebrates. Each sampling step will be explained in full in the following sections of this document.</p> <ul style="list-style-type: none">• Place analytical instrument in stream water.• Collect Bug Basket samples• Collect Hess samples• Collect pebble count data• Complete Field Form

Arriving at the Sampling Location

Field Parameters Each time a stream is sampled for aquatic macro-invertebrates, water quality parameters are also collected.

It is best to calibrate the field parameter meters before leaving for the field. Refer to RRES-WQH-QP-035, *Calibration of and Measurement with Field Instruments*.

Obtain the following water quality parameters using analytical instruments:

- pH
- Conductivity
- Temperature (water and air)
- Dissolved Oxygen

Record the parameters on the Field Form.

Photos Take digital photos of the sampling reach each time the site is visited. If taking digital photographs in a cleared area, have an ADC review the photos before leaving the cleared area.

Bug Basket Sampling

Placing the Bug Basket

Place three Bug Baskets in riffle sections of the designated sampling locations and upstream from where sampling will be occurring. Secure a small cable from the Bug Baskets to a tree or other solid object on the stream bank with wire nuts so that during high flows they do not wash away.

Leave Bug Baskets in the stream for six weeks to allow aquatic macro-invertebrates to colonize.

Steps for Bug Basket Sampling

Approximately Six weeks after placing the Bug Baskets, return to the site to collect samples. Perform the following steps to collect samples:

Step	Action								
1	Approach bug baskets in sample reach from downstream so as not to disturb debris and possibly aquatic macro-invertebrates from sampling reach.								
2	Fill a one gallon bucket with clean stream water.								
3	Set bucket near bug basket. Using pliers, open Bug Basket and remove rocks and debris into bucket.								
4	Place empty Bug Basket on the stream bank.								
5	Wash rocks in bucket with soft bristle brush to remove bugs and debris. As each rock is washed place it back into the Bug Basket.								
6	When all rocks are washed, strain sample thru a #35 sieve (500 um). If there is a large amount of debris (sticks, leaves, pine needles, or other large debris) perform the following steps: <table border="1"><thead><tr><th>Step</th><th>Action</th></tr></thead><tbody><tr><td>1</td><td>Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.</td></tr><tr><td>2</td><td>Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.</td></tr><tr><td>3</td><td>Sieve the wash water.</td></tr></tbody></table>	Step	Action	1	Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.	2	Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.	3	Sieve the wash water.
Step	Action								
1	Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.								
2	Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.								
3	Sieve the wash water.								

Steps continued on next page.

Bug Basket Sampling, continued

**Steps for Bug
Basket
Sampling,
con't**

Step	Action
7	Place the sieved sample in the sample jar. A small amount of debris can be placed in the sample jar.
8	Label the sample jar with the date, location, and sample number (ex., 1 of 3).
9	Place a slip of waterproof paper with the same information as the sample label inside the sample jar.
10	Preserve the sample with Ethanol.
11	Repeat steps 1 through 10 for the next two bug baskets.
12	When all sampling is complete, place bug baskets in a safe place above the normal high water mark for use during the next sampling period.
13	Complete chain of custody forms. Reference RRES-WQH-QP-029, <i>Creating and Maintaining Chain of Custody</i>
14	Transport samples to TA-59

Hess Sampling

Placing the Hess Sampler Place Hess Sampler in stream in riffle with sample net downstream. Use handles to drive Hess sampler 2 to 3 inches into substrate so that water enters net on front of the sampler and flows through the sampler.

Steps for Sampling with Hess Collect three samples from riffle sections of the designated sampling reach using the Hess Sampler. To collect a sample at each sample site, perform the following steps:

Step	Action								
1	Disturb stream substrate inside the Hess sampler with your hands for approximately 1 minute.								
2	Wash larger rocks inside sampler with soft bristle brush to remove bugs and debris. Set rocks aside.								
3	Fill the one gallon bucket with clean stream water.								
4	Remove sample net from Hess and empty sample collected into bucket.								
5	Strain sample in bucket thru a #35 sieve (500 um). If there is a large amount of debris (sticks, leaves, pine needles, or other large debris) perform the following steps: <table border="1" data-bbox="506 1083 1425 1341"> <thead> <tr> <th>Step</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.</td> </tr> <tr> <td>2</td> <td>Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.</td> </tr> <tr> <td>3</td> <td>Sieve the wash water.</td> </tr> </tbody> </table>	Step	Action	1	Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.	2	Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.	3	Sieve the wash water.
Step	Action								
1	Wash the debris vigorously in the bucket with water to remove aquatic macro-invertebrates.								
2	Visually inspect debris to insure that no aquatic macro-invertebrates remain and cast debris aside.								
3	Sieve the wash water.								
6	Place the sieved sample in the sample jar. A small amount of debris can be placed in the sample jar.								
7	Label the sample jar with the date, location, and sample number (ex., 1 of 3).								
8	Place a slip of paper with the same information as the sample label inside the sample jar.								
9	Preserve the sample with Ethanol.								
10	Repeat steps 1 through 10 using Hess sampler in two additional riffles.								
11	Complete chain of custody forms. Reference RRES-WQH-QP-029, <i>Creating and Maintaining Chain of Custody</i>								
12	Transport samples to TA-59.								

Pebble Count

Conducting the Pebble Count

Each time a sampling reach is visited, conduct a pebble count to sample the coarse streambed material.

After aquatic macro-invertebrate samples have been collected, start the pebble count using the Zig-Zag Pebble Count Method (Attachment 3). This is a two person process: one person measures the pebbles and the second person records the data on the Field Form.

Perform the following steps:

Step	Action
1	Starting at the downstream end of the sampling reach: <ul style="list-style-type: none">• take two small steps and• pick up the first piece of substrate that your fingers touch at the tip of your boot, without looking at it.
2	Measure the median axis of the piece of substrate in millimeters with the ruler. The median axis is the side of the rock exposed to stream flow.
3	Announce the measurement to the second person who will record the data on the Field Form, page 8.
4	Drop the piece of substrate back into the stream.
5	Repeat steps 1 through 4 using the Zig Zag Method until 100 pieces of substrate have been measured. NOTE: If 100 pieces of substrate have not been measured at the end of the sampling reach, turn around and zig zag the other way until 100 pieces of substrate have been measured.

Complete Documentation

Complete the Field Form Complete the Bioassessment Field Data Sheet (Field Form) (Attachment 2).

Note: Water samples are not collected, therefore do not complete the water collection method section on page 2 of the Field Form.

Calculate discharge

Calculate and record discharge on the Field Form. Discharge data is important and must be calculated and recorded each time, especially if stream discharge is not present. If a gage station is present at the sampling location, read the level of the water off the staff gage. RRES-WQH Operations Team can provide the discharge data based on the level on the staff gage.

If a gaging station is not present at the sampling location, perform the following steps to calculate discharge:

Step	Action
1	Mark off a 1 foot section of the stream that has even flow.
2	Measure the width and the depth of the stream and record them on the Field Data Sheet.
3	Find three twigs of even length, place the first twig in the water above the marked section of stream
4	Measure the time it takes the twig to move one foot.
5	Repeat this two more times and then average the time.
6	Calculate the discharge using formulas provided in Field Form.

**Channel/
habitat
complexity
data**

To collect the channel/habitat complexity data, start at the bottom of the sampling reach and pace the distance of each habitat type listed. Follow all directions on the Field Form, page 6.

**Embedded-
ness data**

To collect embeddedness, select 10 softball size rocks from three riffles and determine the percentage of the rock was buried in the stream sediment. Usually the embedded side of the rock will be covered with algae and the embedded side will not. Follow all directions on the Field Form, page 6.

Data storage

Completed Field Forms are to be stored in Aquatic Monitoring Data notebooks located at TA-59.

Records Resulting from this Procedure

Records

The following records generated are as a result of this procedure.

- Field Data Sheet for each sampling location, or Field Form (stored in Aquatic Monitoring Notebook located at TA-59)
- Chain-of-Custody Forms
- Digital Photos

[Click here to record self-study training to this document.](#)

EQUIPMENT AND SUPPLIES LIST

For each sampling reach, take the following equipment:

- Field data sheet
- “Rite-in-Rain” notebook
- Pencils
- “Sharpie” marker
- Sampler jars, 3 for Hess and 3 for bug baskets, for each sampling location
- Hess sampler
- Pliers
- Two one gallon buckets
- Ruler
- # 35 Sieve (500 um)
- Plastic spoon
- Ethanol
- GPS unit
- Digital camera
- 2-way Radio
- Safety glasses
- Meter for analytical parameters

FIELD OBSERVATIONS

Precipitation (Circle one) None Light Moderate Heavy
 Previous precipitation (24hr) (Circle one): None Light Moderate Heavy
 Cloud cover (%) _____

FIELD MEASUREMENTS

Air T (°C): _____ Turbidity (NTU): _____
 Water T (°C): _____ D.O. (mg/l): _____ D.O. % Sat.: _____ Conductivity (µmos/cm): _____ TDS (mg/l): _____ pH: _____
 Samples Collected Sample Time: _____ QC Sample (Y / N): _____

Water Collection Method:	Parameter Sets:	Biological Samples:	
___ Composite	___ Inorganics	Macroinvertebrates:	Macroinvertebrates:
___ Grab	___ Nutrients	___ Riffle (field split _____)	___ Edge (field split _____)
	___ Total Metals	___ Pool (field split _____)	___ Other (field split _____)
	___ Dissolved Metals	Algae:	Algae:
	___ Bacteria	___ Diatoms, Riffle	___ Filamentous, Riffle
	___ Radiochemicals	___ Diatoms, Pool	___ Filamentous, Pool
	___ Parasites/Viruses	___ Diatoms, Artificial Substrate	___ Filamentous, composite
	___ Other _____		

ADDITIONAL SAMPLE NOTES

GENERAL SITE CHARACTERISTICS

General Appearance in the Stream Reach (Check all that apply)

- | | |
|---|--|
| <input type="checkbox"/> No refuse visible | <input type="checkbox"/> Large volume refuse (e.g., tires, carts) rare |
| <input type="checkbox"/> Small volume refuse (e.g., cans, paper) rare | <input type="checkbox"/> Large volume refuse common |
| <input type="checkbox"/> Small volume refuse common | |

General Appearance of the Streambank along the Reach (Check all that apply)

- | | |
|---|--|
| <input type="checkbox"/> No refuse visible | <input type="checkbox"/> Large volume refuse (e.g., tires, carts) rare |
| <input type="checkbox"/> Small volume refuse (e.g., cans, paper) rare | <input type="checkbox"/> Large volume refuse common |
| <input type="checkbox"/> Small volume refuse common | |

Water Appearance (Check all that apply)

- | | | |
|---------------------------------|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> Clear | <input type="checkbox"/> Light brown | <input type="checkbox"/> Reddish |
| <input type="checkbox"/> Milky | <input type="checkbox"/> Dark Brown | <input type="checkbox"/> Greenish |
| <input type="checkbox"/> Turbid | <input type="checkbox"/> Oily Sheen | <input type="checkbox"/> Other _____ |

Water Odor (Check all that apply)

- | | | |
|---------------------------------|-----------------------------------|--------------------------------------|
| <input type="checkbox"/> None | <input type="checkbox"/> Chlorine | <input type="checkbox"/> Rotten eggs |
| <input type="checkbox"/> Sewage | <input type="checkbox"/> Fishy | <input type="checkbox"/> Other _____ |

Appearance at Water's Edge (Check one)

- | | |
|---|---|
| <input type="checkbox"/> No evidence of salt crusts | <input type="checkbox"/> Numerous white crusty deposits localized |
| <input type="checkbox"/> White crusty deposits rare | <input type="checkbox"/> Banks covered with white crusty deposits |

Fish (Based on observation)

1. Abundant Comments: _____
2. Rare Comments: _____
3. Absent Comments: _____

Crayfish (Based on observation)

1. Abundant Comments: _____
2. Rare Comments: _____
3. Absent Comments: _____

Recent (past 2 months) flood or long term drought evidence (Check all that apply)

- | | |
|--|---|
| <input type="checkbox"/> No recent flood evidence | <input type="checkbox"/> Fresh debris suspended in bushes/trees |
| <input type="checkbox"/> Fresh debris line | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Grasses laid over | <input type="checkbox"/> Drought Conditions Prevailing |
| <input type="checkbox"/> Recent flood event greater than baseflow:
< bankfull width | |
| > bankfull width - estimated width _____ | |

Flow Regime (Check one)

- Perennial stream channel. Surface water persists all year long.
- Intermittent stream channel. One which flows only seasonally or sporadically. Surface sources include springs, snow melt and flows that reappear along various locations of a reach, then run subterranean (interrupted).
- Subterranean stream channel. Flows parallel to and near the surface for various seasons; a subsurface flow which follows the stream bed.
- Ephemeral stream channel. Flows only in response to precipitation.

Flow Variability (Check one)

- Seasonal variation in stream flow dominated primarily by **snowmelt** runoff.
- Seasonal variation in stream flow dominated primarily by **stormflow** runoff.
- Uniform stage and associated stream flow due to **spring fed condition**.
- Regulated stream flow** due to diversions, dam release, dewatering, etc.
- Altered flows** due to development such as urban streams, cut-over watersheds, vegetation conversions (e.g. forested to grassland) that changes flow response to precipitation events.

AQUATIC PLANTS

Filamentous Algae

Estimated percent of filamentous algae covering stream bed throughout study reach: _____ % cover

Floating Algae

Are any detached clumps or mats of algae floating downstream?

1. Abundant Comments: _____
2. Rare Comments: _____
3. Absent Comments: _____

Algal Slime (not filamentous)

Are the submerged rocks, bedrock, woody material in the stream coated with a layer of algal slime? May be slippery to the touch, but not readily visible.

- Abundant - thick-coating Comments: _____
- Rare - thin-coating Comments: _____
- Absent Comments: _____

Percent macrophytes covering stream bed throughout the reach: _____ % cover

Description of algae/macrophytes in reach (emergent and submergent):

CHANNEL/HABITAT COMPLEXITY

(Reach length equals 2 meander lengths or 20-30 times bankfull width of the stream) Use a minimum of 100 m reach to identify habitat types for large streams.

Habitat	Number of Paces	%	
Pool			
Riffle			
Run			Riffle/Pool Ratio
Total			

EMBEDDEDNESS

(Estimate the percent Embeddedness of 10 cobbles along each of three riffle transects. Select three different riffles within the reach wherever possible. Begin and end transect at edges of riffle, don't include edge particles of the wetted width. Count sand and fines as 100% embedded and bedrock and hardpan as 0% embedded. Gravel that is selected from a patch of gravel is considered 100% embedded)

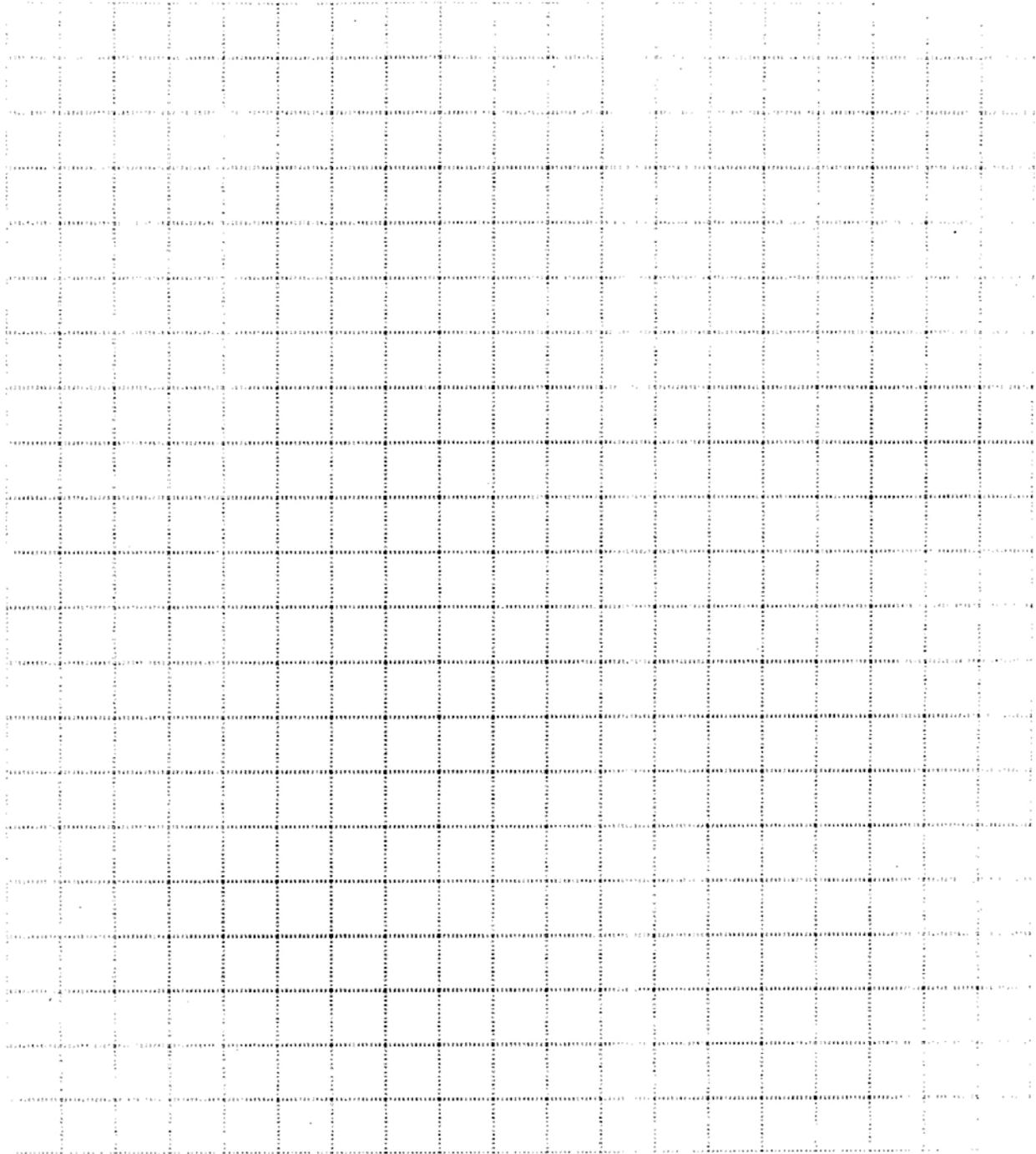
											Average % Embeddedness
Transect #1											
Transect #2											
Transect #3											

ORGANIC DEBRIS/CHANNEL BLOCKAGES (IN ACTIVE CHANNEL)

Mark single most appropriate description

- | | |
|--|--|
| <input type="checkbox"/> No organic debris or channel blockages | <input type="checkbox"/> Extensive, large debris dams either continuous or influencing over 50% of channel area. Forces water onto flood plain even with moderate flows. Generally presents a fish migration blockage. |
| <input type="checkbox"/> Infrequent debris, what's present consists of small, floatable organic debris. | <input type="checkbox"/> Beaver dams. Few and/or infrequent. Spacing allows for normal stream/flow conditions between dams. |
| <input type="checkbox"/> Moderate frequency, mixture of small to medium size debris affects less than 10% of active channel area. | <input type="checkbox"/> Beaver dams - Frequent. Back water occurs between dams - stream flow velocities reduced between dams. |
| <input type="checkbox"/> Numerous debris mixture of medium to large sizes - affecting up to 30% of the area of the active channel. | <input type="checkbox"/> Beaver dams - abandoned where numerous dams have filled in with sediment and are causing channel adjustments of lateral migration, avulsion, and degradation etc. |
| <input type="checkbox"/> Debris dams of predominantly large material affecting over 30% to 50% the channel area and often occupying the total width of the active channel. | <input type="checkbox"/> Man made structures - diversion dams, low dams, controlled by-pass channels, baffled bed configuration with gabions, etc. |

SITE MAP SKETCH: (Include location of riffles, pools, runs, snags, submerged logs, undercut banks, areas of stable rubble habitat, point bars, mid-channel or side bars, areas with cut or eroding banks, location and types of riparian vegetation, etc.)



Riffle Pebble Count (Transect method; do 100 pebble counts in riffle habitat only; measure particles at equal increments across multiple line transects within the wetted width of available riffle habitat throughout the reach)

Size Class	Size Range(mm)	Tally	Count	Percent	Cumulative Percent
Silt/Clay*	<0.062				
Sand**	0.063-2				
Very Fine Gravel	3-4				
Fine Gravel	5-8				
Medium Gravel	9-16				
Coarse Gravel	17-32				
Very Coarse Gravel	33-64				
Small Cobble	65-96				
Medium Cobble	97-128				
Large Cobble	129-180				
Very Large Cobble	181-256				
Small Boulder	257-512				
Medium Boulder	513-1024				
Large Boulder	1025-2048				
Very Large Boulder	2049-4096				
Bedrock	>4097				
Totals					
Comments: (record # of transects and increment size)				%Fines (<2mm)	
				# Size Classes	
				D15	
				D50	
				D84	

- * Particles feel slick when rubbing between thumb and forefinger
- ** Particles feel gritty when rubbing between thumb and forefinger

RIPARIAN VEGETATION COVER: (Record the % cover of each vegetation type. Consider each vegetative layer separately with a score of 0-100% for each)

Riparian Vegetation Cover	Percent Cover
Canopy of riparian trees (>5m high)	
Understory of woody shrubs, saplings, herbs, grasses & forbs (0.5 to 5 m high)	
Ground cover of woody shrubs seedlings, herbs, grasses & forbs (<0.5 m high)	
Barren, bare dirt	

METHODS OF MEASURING AREAL EXTENT

143

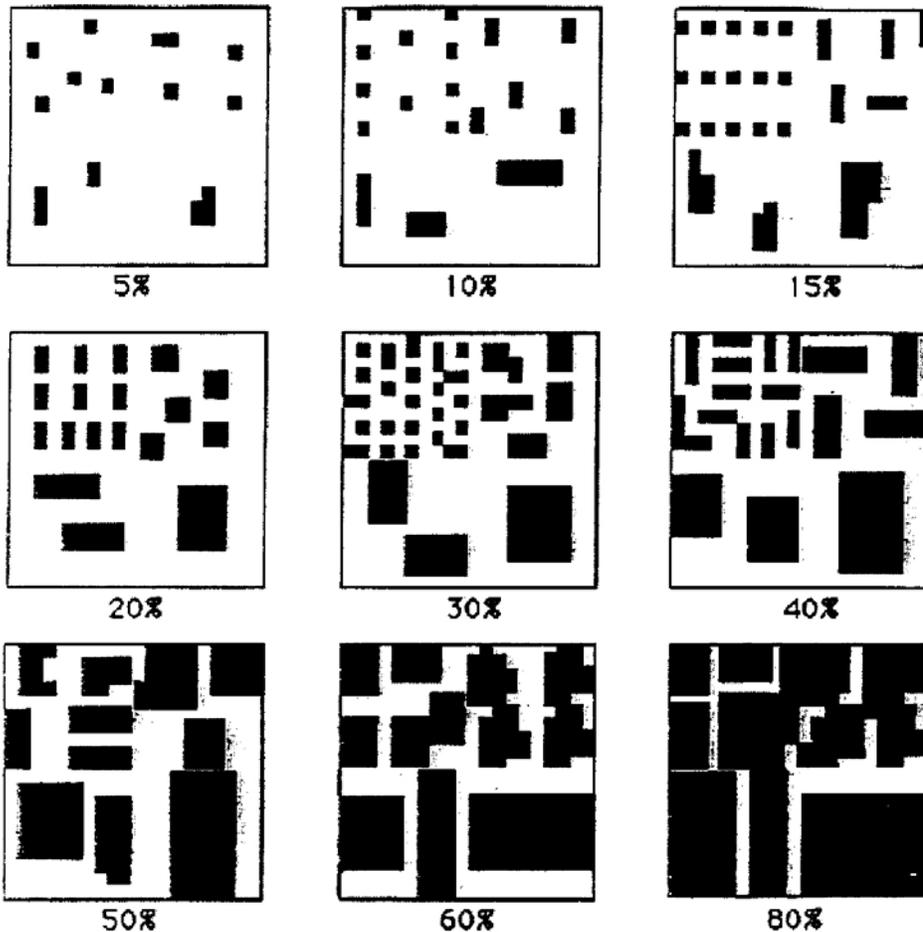


Figure 5.9. Chart for visual estimation of areal coverage. Modified from Northcote (1979) by permission of Rellim Technical Publications

REGENERATION POTENTIAL OF RIPARIAN TREES

List the common riparian species in order of most abundant to least, then check the boxes for each age class that is present)

Species	Mature Trees	Young Trees	Saplings	Seedlings*
1)				
2)				
3)				
4)				
5)				

Mature trees = diameter > 40 cm (16") @ 1 m height

Young trees = diameter 3-40 cm @ 1 m height

Saplings = diameter < 3 cm (<1.2")

Seedlings = New growth this year; *note if present but don't count as an age class*

AGE CLASSES OF THE DOMINANT RIPARIAN TREE SPECIES (Check the one that applies)

- Species abundant in 3 age classes
- Abundant in 2 age classes
- Only one age class present.
- No regeneration evident, few mature trees found, no saplings or seedlings or if present they are heavily grazed/damaged.

HABITAT ASSESSMENT FIELD DATA SHEET - HIGH GRADIENT STREAMS

STREAM NAME _____		LOCATION _____			
STATION # _____ RIVERMILE _____		STREAM CLASS _____			
LAT _____ LONG _____		RIVER BASIN _____			
STORET # _____		AGENCY _____			
INVESTIGATORS _____					
FORM COMPLETED BY _____			DATE _____ TIME _____ AM PM		REASON FOR SURVEY _____
Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate & Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Adapted from EPA Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition, 1999.

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of > 25.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
Note: determine left or right side by facing downstream																					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth, potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

Parameters to be evaluated broader than sampling reach

Total Score _____

Adapted from EPA Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition, 1999.

ZIG-ZAG PEBBLE COUNT METHOD

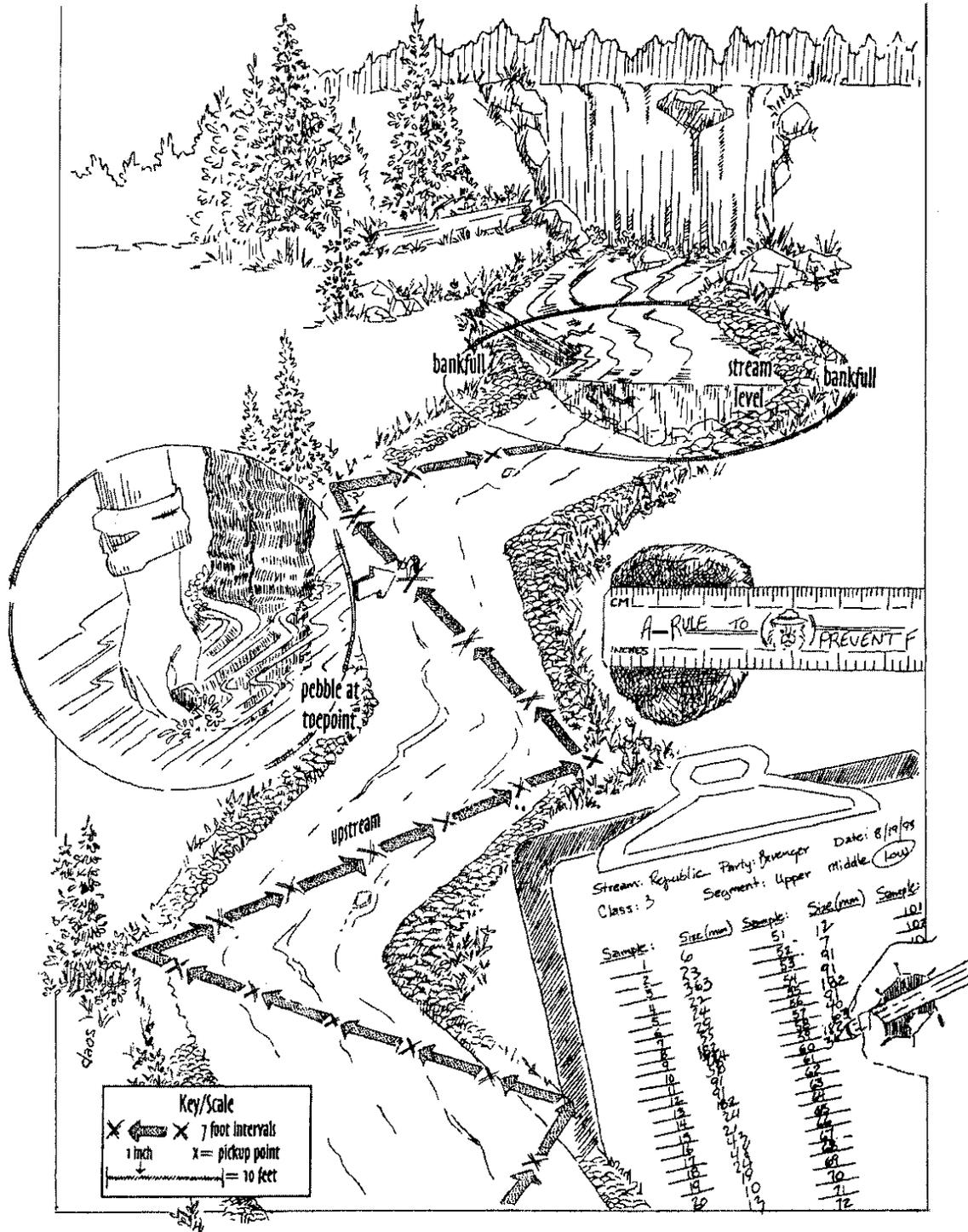


Figure 1.—Zig-zag pebble count procedure.

Bevenger, Gregory S.; King, Rudy M. A pebble count procedure for assessing watershed cumulative effects. Res. Pap. RM-RP-319. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 17 p.

SPRING AND SURFACE WATER SAMPLING

Purpose This procedure describes the responsibilities and process for collecting, documenting, and submitting samples from surface water (baseflow and snowmelt) and springs collected as part of the Environmental Surveillance Program and other ENV sampling programs.

Scope This procedure applies to the ENV-WQH, ENV-ECR, and contractor personnel assigned to collect samples from surface water (baseflow and snowmelt) and springs for the Environmental Surveillance Program and other ENV sampling programs.

In this procedure This procedure addresses the following major topics:

Topic	See Page
1. General Information About This Procedure	3
Who Requires Training to This Procedure?	3
2. Preparations for Sampling	6
3. Spring Sampling	7
4. Surface Water Sampling	11
5. Lessons Learned	14
6. Records Resulting from this Procedure	15

Integrated Work Management The work specified in this procedure shall be conducted in accordance with applicable Integrated Work Documents, in accordance with LANL IMP 300, Integrated Work Management for Work Activities.

CONTROLLED DOCUMENT

This copy is uncontrolled if no signatures are present or if the copy number stamp is black. Users are responsible for ensuring they work to the latest approved revision.

First authorization review date is one year from division leader signature below.

Signatures

Prepared by: Signature on file _____	Date: <u>7/28/05</u>
Approved by: Signature on file _____	Date: <u>7/28/05</u>
Approved by: Signature on file _____	Date: <u>7/28/05</u>
Approved by: Signature on file _____	Date: <u>7/29/05</u>
Approved by: Signature on file _____	Date: <u>7/29/05</u>

1. General Information about this Procedure

This procedure has the following attachments:

Attachments

Number	Attachment Title	No. of pages
1	Equipment and Supplies Checklist	1
2	Spring and Surface Water Sampling Field Data Sheet	1

This table lists the revision history and effective dates of this procedure.

History of revisions

Revision	Date	Description Of Changes
0		New document. Supersedes RRES-WQH-SOP-047.1 and ER SOP 6.13

Who requires training to this procedure Personnel assigned to collect samples from surface water and springs require training before implementing this procedure.

Training method

The training method for this procedure is read-training. Training is in accordance with group specific procedures for training. Retraining to this procedure is “self-study” (reading).

Personnel who have not previously collected spring or surface water samples at LANL should be mentored before performing this procedure.

1. General Information about this Procedure, continued

Prerequisites In addition to training to this procedure, the following training is also required prior to performing this procedure:

- Training as specified in RRES-ES-Field, General Field Work for All
- ENV-DO-207, *Handling, Packaging, and Transporting Field Samples*
- RRES-ES-Driving, Driving, Towing, and Winching for All
- RRES-WQH-SOP-004, Radio and Cellular Phone Use
- ENV-WQH-SOP-009, Operation of Stream Gaging stations and Collection of Storm Water Runoff Samples

Knowledge of the applicable ENV sampling programs is important in fulfilling the procedure.

Definitions to this procedure Confluence: A flowing together of two or more streams.

Groundwater: Subsurface water in the saturated zone from which wells and springs are supplied

Participant – Personnel trained to this procedure and authorized to conduct the work prescribed in this procedure.

Requestor: Team leader, project leader, or other individual who requests that spring or surface water sampling be conducted.

Spring: A place where groundwater flows from the ground onto the surface.

Stagnant water: Surface water where there is no detectable flow either upstream or downstream of the water.

Surface water: Water on the earth's surface including ponds, lakes, and streams.

To aid in water quality interpretation, we divide stream flow into three types or matrices. Each of the three flow types might be collected at a single location within a time span of as little as a week, depending on weather conditions. At times, the flow might represent a combination of several of these components. This procedure discusses sampling for the first two of the three types:

Baseflow: Persistent stream flow, but not necessarily perennial water. This stream flow is present for periods of weeks or longer. The water source may be effluent discharge or shallow groundwater that discharges in canyons.

Snowmelt: Flowing water that is present as a result of melting snow. This type of water often may be present for a week or more and in some years may not be present at all.

Storm runoff: Flowing water that is present in response to rainfall. These flow events are generally very short lived, with flows lasting from less than an hour to several days.

1. General Information about this Procedure, continued

References The following documents were referenced in preparing in this procedure:

- LANL-RRES-ES-Field, General Field Work for All
- USEPA SW-846, Test Methods for Evaluating Solid Waste, 3rd edition, U.S. Environmental Protection Agency, November 1986 p11.4.3
- USEPA/530-R-93-001, RCRA Ground-water Monitoring: Draft Technical Guidance, November 1992
- LIR 404-00-02, General Waste Management Requirements
- LIR 404-00-04, Managing Solid Waste
- LIR 404-50-01, Water Pollution Control
- RRES-RS-QMP, Quality Management Plan for the LANL RRES Remediation Services Project
- LANL-ER-QP-2.2, Personnel Training Management
- LANL-ER-QP-3.5, Peer Review Process
- LANL-ER-QP-4.4, Record Transmittal to the Records Processing Facility
- LANL-ER-QP-4.9, Document Development and Approval Process

Note All directives in RRES-ES-Field, *General Field Work for All*, and its addendums are explicitly included in this procedure.

Actions specified within this procedure, unless preceded with “should” or “may,” are to be considered mandatory guidance (i.e., “shall”, “must”).

2. Preparations for Sampling

Check the COC and sampling plans

Prior to sampling, **participant** shall meet with the requestor or designee to:

- Review sampling plans and Analytical Requests.
- Ensure that proper samples will be collected according to the sampling plan.
- Discuss any issues related to sample collection or the sampling site.
- Initiate a chain of custody form.

If any unexpected issues arise in the field that cause a significant variation in sample collection protocol, **participant** shall contact the requestor or designee to resolve these issues prior to continuing with sampling.

If unusual conditions at the sampling site might affect the sampling, **participant** shall meet with the requestor or designee after sampling to pass on this information.

Equipment needed

The equipment that may be needed for a sampling activity is given in Attachment 1, "Equipment and Supplies Checklist."

Equipment calibration

Equipment shall be calibrated before leaving for the field. Reference ENV-DO-203, *Field Water Quality Analysis*.

3. Spring Sampling

Locating sampling sites Sampling sites may include posts with bar code labels used to identify the station name. Prior to going to the field, **participant** may need to obtain maps or a GPS programmed with spring coordinates.

Check that station is marked Locations for all stations shall be marked in the field with stakes. Bring extra stakes to the field in case replacement is needed. The locations for stations along the Rio Grande (such as Rio Grande at Pajarito) may not be marked as the location is too close to the stream bank to retain a stake.

this block from 012 Stakes shall be removed from sampling locations when stations are moved or sampling at a location is discontinued.

Selection of spring sampling location The **participant** must choose where (or even whether) to sample springs, in order to obtain a representative water sample.

Step	Action
1	Upon arrival at the site, locate the spring.
2	Determine where/whether the spring should be sampled in accordance with the guidance provided in section below (Sampling Site Approach and Considerations) . Note: If there is any question about whether a representative sample can be collected, contact the requestor before proceeding.
3	Document in the field notes the rationale for choosing the sample location or for choosing not to sample.
4	Photograph the sampling location (or spring area not to be sampled).
5	If a sample will be collected, continue with the next section.

3. Spring Sampling, continued

Sampling site approach and considerations

Sampling site characteristic	Approach	Considerations
Spring with clearly established sampling locations.	Sample at the established location.	None.
Spring with clear discharge points and large flow of water.	Select a sampling location that will provide a representative sample.	Ensure that the sampling location is not contaminated by surface materials or nearby surface water.
Spring with low-flow rate that issue along the Rio Grande (or other water source)	Select a sampling location that is NOT influenced by the other water source.	Ensure that the sampling location is not contaminated by nearby surface water. Typically this means that a relatively strong flow is present at least one foot above the level of the other water source.
Spring with low-flow rate that discharge over a large area but water is not more than an inch or so deep.	Select a location where the water is at its deepest and where a low-turbidity sample can be collected.	Ensure that the sampling location is not contaminated by surface materials or nearby surface water. Do not sample from a newly-dug hole.

3. Spring Sampling, continued

Selection of spring sampling location, con't Several springs discharge over a large area. Some, like Spring 8A, discharge on a large grassy hillside with no one large source of flow and no significant depth of water. Others, like Sandia Spring and Ancho Spring, discharge over some length in a gully or steam drainage (and also over a hill side in the case of Sandia Spring). One school of thought advocates collecting a sample at the discharge point farthest upstream based on the idea that this would represent the spring source.

These springs do not issue from a point, but over a large area where surface flow is found. To obtain a representative sample, collect it at a point where a strong flow occurs and a sample most clear of soil influence can be collected.

At Sandia Spring this sample collection point might be in the drainage downstream from the grassy slope where past samples were collected. This collection point is where a large pool forms in the drainage due to adjacent spring discharge.

3. Spring Sampling, continued

Steps for sampling springs

To collect a sample at each sample site, **participant** shall perform the following steps

Step	Action
1	Where flow conditions allow, make a discharge measurement using a Parshall flume in accordance with ENV-WQH-SOP-009, Operation of Stream Gaging stations and Collection of Storm Water Runoff Samples. If flow is spread over too large an area, a quantitative discharge measurement may not be possible. When quantitative measurements are not possible, a qualitative description of flow should be made (e.g., no visible flow). Photos may be used to help document the qualitative description.
2	Use deionized water to decontaminate all analytical instruments before taking first sample and between samples (pH meters, etc.).
3	Collect sample. <ul style="list-style-type: none"> • Use a pre-cleaned, new polyethylene bottle or other transfer device (for example a Parastaltic pump and clean tubing) and nitrile gloves to retrieve samples. • Filter sample, if required, by attaching a 0.45mm filter to the Parastaltic pump tubing. • Collect organic samples using a glass bottle rather than a polyethylene bottle. • The water sample can also be collected directly by dipping the collection bottle into the water.
4	Take parameters of collected samples and document on field data sheet (Attachment 2).
5	Preserve samples as specified on the Analytical Request forms. Use assigned (based on Analytical Request Forms) bottle/preservative for proper analysis. Reference ENV-WQH-SOP-066, Chemical Preservation of Water Samples, and ENV-DO-206, Sample Containers and Presevation, for guidance. Take precaution when handling bottles with preservatives
6	Apply chain of custody tape.
7	Complete field data sheet (Attachment 2).
8	Store sample in cooler with blue ice or equivalent and transfer to SMO Reference ENV-DO-207, Handling, Packaging, and Shipping of Samples, for guidance.

4. Surface Water Sampling

Locating sampling sites Permanent surface water sampling sites may be identified by posts with labels identifying the station name; however, this may not be possible at some sites due to potential for public access, vandalism, physical location (e.g., near a road), or short-term nature of sampling campaign. Bring extra stakes to the field in case replacement is needed. Stakes shall be removed from sampling locations when stations are moved or sampling at a location is discontinued.

Baseflow and snowmelt samples shall be collected from running water. In some cases, a project may require sampling pooled or ponded water. Consult with the requestor or designee if any questions about where or how to collect the water samples.

Samples shall be collected far enough upstream of a confluence so that the sample is not influenced by water from another stream. Document on field data sheet (Attachment 2) the flow conditions of each stream and the distance upstream from the confluence at which the sample was collected.

4. Surface Water Sampling, continued

Steps for sampling surface waters To collect a sample at each sample site, **participant** shall perform the following steps:

Step	Action
1	Where flow conditions allow, make a discharge measurement using a current meter or Parshall flume in accordance with ENV-WQH-SOP-009, Operation of Stream Gaging stations and Collection of Storm Water Runoff Samples.
2	Use deionized water to decontaminate all analytical instruments before taking first sample and between samples (pH meters, conductivity meters, etc.).
3	<p>Collect sample.</p> <ul style="list-style-type: none"> • Use a pre-cleaned, new polyethylene bottle or other transfer device (for example a Peristaltic pump and clean tubing) and nitrile gloves to retrieve samples. • Filter sample, if required, by attaching a 0.45mm filter to the Peristaltic pump tubing. If approved by the requestor, sample may be filtered at the laboratory rather than in the field. • Collect organic samples using a glass bottle rather than a polyethylene bottle. • For samples collected from the bank, the water sample can also be collected directly by dipping the collection bottle into the water. • • Use proper size bottle/preservative for proper analysis.
4	Take parameters of surface water and document on field data sheet (Attachment 2).
5	Preserve samples as specified on the Analytical Request forms. Use assigned (based on Analytical Request Forms) bottle/preservative for proper analysis. Reference ENV-WQH-SOP-066, Chemical Preservation of Water Samples, and ENV-DO-206, Sample Containers and Preservation, for guidance. Take precaution when handling bottles with preservatives
6	Apply chain of custody tape.
7	Complete field data sheet (Attachment 2).
8	Store sample in cooler with blue ice or equivalent and transfer to SMO. Reference ENV-DO-207, Handling, Packaging, and Shipping of Samples, for guidance.

4. Surface Water Sampling, continued

Disposing of wastes For all wastes generated, contact the Waste Management Coordinator (667-9415). To salvage or recycle components or materials, contact the ENV Division property representative (667-2303).

Work plans or sampling plans should provide specific guidance on waste disposal requirements. If additional guidance is needed, contact the sampling lead or reference ECR SOP 01.06, *Management of ER Project Wastes*.

Surface water sampling performed in accordance with work plans required by the NMED Consent Order must be managed in accordance with the investigation-derived waste management requirements specified in the approved work plan. Dispose of waste in accordance with the work plan. The work plan can be obtained from the sample requestor.

5. Lessons Learned

Review lessons learned Before performing work described in this SOP, **participants** shall go to the Department of Energy Lessons Learned Information Services home page, located at <http://www.tis.eh.doe.gov/ll/ll.html>, and/or to the LANL Lessons Learned Resources web page, located at http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons.

Provide lessons learned During work performance and/or after the completion of work activities, **participants**, as appropriate, shall identify, document, and submit lessons learned in accordance with the LANL, Lessons Learned System located at http://www.lanl.gov/projects/lessons_learned/.

6. Records Resulting from this Procedure

Records

The **participant** shall ensure that the following records, generated as a result of this procedure, shall be permanently stored with participant's Group within ENV Division in accordance with group-specific procedures:

- Chain-of-custody forms
- Field Data Sheets

Copies of records will be made available to requestors upon their request.

[Click here to record "self-study" training to this procedure.](#)

EQUIPMENT AND SUPPLIES CHECKLIST

For sampling, the following equipment may be needed:

- Analytical Request form
- GPS unit
- Peristaltic pump and tubing/or equivalent
- filters
- meters for measuring pH, temperature, electrical conductance, and turbidity
- properly labeled sample containers
- clean 250 - ml bottle
- ball-point pen (indelible dark ink)
- felt-tip marker pen (indelible dark ink)
- 1-14 pH indicator paper
- disposable gloves (latex, PVC, other suitable plastic, or rubber)
- disposable wipes
- safety glasses
- clipboards
- deionized water
- duct tape
- blue ice or equivalent
- insulated coolers
- trash bags
- custody seals or custody tape
- other equipment specified in EPA Methods, as needed (pH measurements, conductivity, etc.)
- fire extinguisher
- preservatives
- Surface Water Sampling Field Data Sheet
- battery for pump
- backpack (if needed)
- camera
- stakes (if needed)

**Los Alamos National Laboratory
Surface Water Sampling Field Sheet**

(ENV-D0-204 R0, Attachment 2)

Location:	
Sample Retrieval Time:	Date:
Analytical Request Record No.:	
Sampled By:	
FIELD PARAMETERS	
pH:	Temperature:
Specific conductance:	DO:
Turbidity:	Other: (specify)

STREAMS (circle all that apply)						
Location:	Wading Bridge: upstream	Bank downstream	Station gage: at / above / below Side bridge _____ ft mile	Boat	Ice	Other (specify):
Sampling Site:	Pool	Riffle	Open channel	Braided	Backwater	
	Sampler type:					
Bottom:	Bedrock Concrete	Rock	Cobble	Gravel Other (specify):	Sand	Mud
Stage Conditions:	Not determined Falling	Stable: normal Rising	low high Peak	Other (specify):		
Hydraulic Event:	Routine Sampling Snowmelt	Flood	Regular Flow Drought	Spill	Other (specify):	
	Ice cover: thickness _____		inches _____			
Stream Color(s):	Brown	Clear	Green	Blue	Gray	
	Other (specify):					
Stream Mixing:	Excellent	Good	Fair	Poor		
SPRINGS (circle all that apply)						
Sampling Site:	Pool	Riffle	Braided	Backwater		
Bottom:	Bedrock	Rock	Cobble	Gravel	Sand	Mud
Stage Conditions:	Not determined Falling	Stable: normal Rising	low high Peak	Other (specify):		
Stream Color(s):	Brown	Clear	Green	Blue	Gray	
	Other (specify):					
Stream Mixing:	Excellent	Good	Fair	Poor		

Other Observations: _____

Notes on revised tables of sample results for sediment and storm water in Mortandad Canyon.

I. Water tables (Revised Stormwater Tables.xls)

These tables are revised versions of tables F-2.0-1 (radionuclides in water) and F-2.0-2 (nonradionuclides in water). Numbers in the table are not truncated. Results that were mg/L were converted to µg/L for these tables to be consistent with screening values used for this media in other tables of the original biota plan. Column headings, analytical laboratory and LANL qualifiers used in the water workbook are described below and on the notes sheet in the workbook. For these tables, “ – “ = information field was blank or unpopulated in the database, WS = base flow surface water, WT = storm water, F = filtered sample, and UF = unfiltered sample.

Explanation of headers for table columns:

Header	Description
Location	Location ID/Location Synonym (Gage number or Abbreviation)
Collection Date	Date Collected
Field Matrix	Matrix designation assigned by Field Team
Field Prep	F=filtered, dissolved; UF=unfiltered, total
Analyte Code	CAS number for organics; chemical symbol or abbreviation for others
Analyte Name	Constituent by name
Result	Result reported by Laboratory standardized to common reporting units
Units	Units of measure
Detect Status	Detection status (D=detect, U=nondetect); the utility of this column is that it shows status used in screening and plots (shows decision based on Uncertainty, MDA, MDL, Lab Qual, Valid Qual)
Uncertainty	Uncertainty (same as TPU for rads)
MDA	Minimum detectable activity (rads)
MDL	Minimum detection limit
Lab Qualifier	Laboratory Qualifier
LANL Validation Qualifier	LANL Validation Qualifier
Lab Name Code	Code for Analytical Laboratory Name
Analytical Suite	Suite or grouping of constituents for analysis
Analytical Method	Analytical Method used for quantification
URI	Unique Record Identifier (data base ID)
Sample ID	LANL Sample ID

Qualifier descriptions for the water table file

Lab Qualifier	Description
-	Information field was blank or unpopulated in data base
*	(Inorganic)- Duplicate analysis not within control limits. (Organic) - Spike recovery is equal to or outside the control criteria used.
B	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Organic) - Analyte present in the blank and the sample.
B*	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Inorganic)- Duplicate analysis not within control limits.
BE	Low surrogate recovery; analyzed twice
BE*	(Inorganics) - reported value <CRDL and >IDL. Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. Duplicate analysis not within control limits.
BJ	(Inorganic)- The associated numeric value is an estimated quantity. The reported value was obtained from a reading that was less the Contract Required Detection Limit.
BN	(Organic) - Analyte was detected in the associated method blank as well as in the sample. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
BN*	(Inorganics) - reported value <CRDL and >IDL. Duplicate Analysis not within control limits. Spiked sample recovery not within control limits.
E	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. (Organic) - Analyte concentration exceeded the upper level of
E*	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution concentration exceeds 10%. - Duplicate analysis not within control limits. (Organic) -
EJ	(Inorganic) - Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. Having concentrations between the MDL and the PQL (or reporting limit).
EN	(Organic) - Identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte. (Inorganic) - The qualifier that is used when the percent difference between the parent sample and its serial dilution's concentration exceeds 10%. The sample's concentration must be greater than 50 times the IDL/MDL for ICP or 100 times
H	Holding time exceeded
J	(Inorganic) -The associated numerical value is an estimated quantity. (Organic) - The associated numerical value is an estimated quantity.

Qualifier descriptions for the water table file (cont.)

Lab Qualifier	Description
JN	(Inorganic) - Having concentrations between the MDL and the PQL (or reporting limit). Analytical results associated with a spike analysis that was outside control limits.
N	(Inorganic) - Spiked sample recovery not within control limits. (Organic) -Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
N*	(Inorganic) - Spiked sample recovery not within control limits. Duplicate analysis not within control limits.
U	(Inorganic) -The material was analyzed for, but was not detected above the level of the associated numeric value. The associated numerical value is either the sample quantitation limit or the sample detection limit. (Organic) -The material was analyzed
U*	(Inorganic) - Compound was analyzed for, but was not detected. Duplicate analysis not within control limits.
UE	(Inorganic) - Compound was analyzed for, but was not detected. Reported value is estimated because of the presence of interference.
UN	(Inorganic) - Compound was analyzed for, but was not detected. - Spiked sample recovery not within control limits.
UUI	Compound analyzed for, but not detected above detection limit; uncertain identification for gamma spectroscopy
X	Reported concentration is a false positive
LANL Validation Qualifier	Description
-	Information field was blank or unpopulated in data base
A	The contractually required supporting documentation for this datum is absent.
J	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual.
J+	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential positive bias.
J-	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential negative bias.
JN-	Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
PM	Manual review of raw data is recommended to determine if the observed non-compliances with quality acceptance criteria adversely impacts data use.
U	The analyte is classified as not detected.
UJ	The analyte is classified as not detected, with an expectation that the reported result is more uncertain than usual.

II. Sediment Table (Mortandad_biota_plan_sediment_revised.xls)

Blank cells within the spreadsheet indicate that no value was available for this field. Due to the size of the data set, the worksheets are broken out into three sets of reaches. Analytical laboratory and LANL qualifiers used in the sediment workbook are described below and on the notes sheet in the workbook.

Qualifier descriptions for the sediment table file

Lab Qualifier	Description
*	(Inorganic)- Duplicate analysis not within control limits. (Organic) - Spike recovery is equal to or outside the control criteria used.
B	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Organic) - Analyte present in the blank and the sample.
B*	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Inorganic)- Duplicate analysis not within control limits.
BE	Low surrogate recovery; analyzed twice
BNE	(Inorganic)-The value is between the instrument detection limit and the contract required detection limit. The qualifier that is used when the percent difference between the parent sample and its serial dilutions concentrations exceeds 10%., Spiked sample recovery not within control limits.
BN	(Organic) - Analyte was detected in the associated method blank as well as in the sample. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
D	(Organic) - Analytes analyzed at a secondary dilution.
E	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. (Organic) - Analyte concentration exceeded the upper level

Qualifier descriptions for the sediment table file (cont.)

Lab Qualifier	Description
E*	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution concentration exceeds 10%. - Duplicate analysis not within control limits.
J	(Inorganic) -The associated numerical value is an estimated quantity. (Organic) - The associated numerical value is an estimated quantity.
JB	(Organic) The value is an estimated quantity between MDL and PQL in the blank
JBD	(Organic) The value is an estimated quantity between MDL and PQL in blank and the percent difference between the 2 columns is greater than 40%
JD	(Organic) The value is an estimated quantity and the percent difference between the 2 columns is greater than 40%
LT	Spectral interference problems for RAD D
N	(Inorganic) - Spiked sample recovery not within control limits. (Organic) -Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
N*	(Inorganic) - Spiked sample recovery not within control limits. Duplicate analysis not within control limits.
NE	(Inorganic) The matrix spike was not within control limits (80-120) in the serial dilutions
NE*	(Inorganic) The matrix spike was not within control limits (80-120) in the serial dilution duplicate
P	(Organic) - > 40% difference for detected concentrations between two columns -- changed from 25% per DOE SOW Rev.4 (6/30/04)
SI	Spectral interference problems for RAD
TI	Spectral interference problems for RAD B
U	(Inorganic) -The material was analyzed for, but was not detected above the level of the associated numeric value. The associated numerical value is either the sample quantitation limit or the sample detection limit. (Organic) -The material was analyzed
U*	(Inorganic) - Compound was analyzed for, but was not detected. Duplicate analysis not within control limits.

Qualifier descriptions for the sediment table file (cont.)

Lab Qualifier	Description
UD	(Organic) The value was analyzed for, but not detected. The percent difference between the columns exceeded 40%
UJ	(Inorganic) - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise. (Organic) -The material was analyzed for, but was not detected. Quantitation limit is an estimated quantity.
UL	(Organic) The value was analyzed for, but not detected.
UN	(Inorganic) - Compound was analyzed for, but was not detected. - Spiked sample recovery not within control limits.
UW	Analyte analyzed for but was not detected. Post digestion spike recovery is outside control.
X	Reported concentration is a false positive
LANL Validation Qualifier	Description
J	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual.
J+	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential positive bias.
J-	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential negative bias.
U	The analyte is classified as not detected.
UJ	The analyte is classified as not detected, with an expectation that the reported result is more uncertain than usual.

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Lab Qualifier	Description
*	(Inorganic)- Duplicate analysis not within control limits. (Organic) - Spike recovery is equal to or outside the control criteria used.
B	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Organic) - Analyte present in the blank and the sample.
B*	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Inorganic)- Duplicate analysis not within control limits.
BE	Low surrogate recovery; analyzed twice
BNE	(Inorganic)-The value is between the instrument detection limit and the contract required detection limit., The qualifier that is used when the percent difference between the parent sample and its serial dilution's concentrations exceeds 10%., Spiked sample recovery not within control limits.
BN	(Organic) - Analyte was detected in the associated method blank as well as in the sample. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
D	(Organic) - Analytes analyzed at a secondary dilution.
E	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. (Organic) - Analyte concentration exceeded the upper level
E*	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution concentration exceeds 10%. - Duplicate analysis not within control limits.
J	(Inorganic) -The associated numerical value is an estimated quantity. (Organic) - The associated numerical value is an estimated quantity.
JB	(Organic) The value is an estimated quantity between MDL and PQL in the blank
JBD	(Organic) The value is an estimated quantity between MDL and PQL in blank and the percent difference between the 2 columns is greater than 40%
JD	(Organic) The value is an estimated quantity and the percent difference between the 2 columns is greater than 40%
LT	Spectral interference problems for RAD D
N	(Inorganic) - Spiked sample recovery not within control limits. (Organic) -Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
N*	(Inorganic) - Spiked sample recovery not within control limits. Duplicate analysis not within control limits.
NE	(Inorganic) The matrix spike was not within control limits (80-120) in the serial dilutions
NE*	(Inorganic) The matrix spike was not within control limits (80-120) in the serial dilution duplicate
P	(Organic) - > 40% difference for detected concentrations between two columns -- changed from 25% per DOE SOW Rev.4 (6/30/04)
SI	Spectral interference problems for RAD
TI	Spectral interference problems for RAD B
U	(Inorganic) -The material was analyzed for, but was not detected above the level of the associated numeric value. The associated numerical value is either the sample quantitation limit or the sample detection limit. (Organic) -The material was analyzed
U*	(Inorganic) - Compound was analyzed for, but was not detected. Duplicate analysis not within control limits.
UD	(Organic) The value was analyzed for, but not detected. The percent difference between the columns exceeded 40%
UJ	(Inorganic) - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise. (Organic) -The material was analyzed for, but was not detected. Quantitation limit is an estimated quantity.
UL	(Organic) The value was analyzed for, but not detected.
UN	(Inorganic) - Compound was analyzed for, but was not detected. - Spiked sample recovery not within control limits.
UW	Analyte analyzed for but was not detected. Post digestion spike recovery is outside control.
X	Reported concentration is a false positive
LANL Validation Qualifier	Description
J	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual.
J+	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential positive bias.
J-	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential negative bias.
U	The analyte is classified as not detected.
UJ	The analyte is classified as not detected, with an expectation that the reported result is more uncertain than usual.

Header	Description
Location	Location ID/Location Synonym (Gage number or Abbreviation)
Collection Date	Date Collected
Field Matrix	Matrix designation assigned by Field Team
Field Prep	F=filtered,dissolved; UF=unfiltered,total
Analyte Code	CAS number for organics; chemical symbol or abbreviation for others
Analyte Name	Constituent by name
Result	result reported by Laboratory standardized to common reporting units
Units	units of measure
Detect Status	detection status (D=detect, U=nondetect); the utility of this column is that it shows status used in screening and plots (shows decision based on Uncert, MDA, MDL, Lab Qual, Valid Qual)
Uncertainty	Uncertainty (same as TPU for rads)
MDA	minimum detectable activity (rads)
MDL	minimum detection limit
Lab Qualifier	Laboratory Qualifier
LANL Validation Qualifier	LANL Validation Qualifier
Lab Name Code	Code for Analytical Laboratory Name
Analytical Suite	Suite or grouping of constituents for analysis
Analytical Method	Analytical Method used for quantification
URI	Unique Record Identifier (data base ID)
Sample ID	LANL Sample ID
Notes for Table	
WS	= base flow surface water
WT	= storm water
F	= filtered sample
UF	= unfiltered sample
-	= information field was blank or unpopulated in data base
Numbers are not truncated. Results that were mg/L were converted to ug/L to be consistent with screening values.	
Lab Qualifier	Description
-	information field was blank or unpopulated in data base
*	(Inorganic)- Duplicate analysis not within control limits. (Organic) - Spike recovery is equal to or outside the control criteria used.
B	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Organic) - Analyte present in the blank and the sample.
B*	(Inorganic) - reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL). (Inorganic)- Duplicate analysis not within control limits.
BE	Low surrogate recovery; analyzed twice
BE*	(Inorganics) - reported value <CRDL and >IDL. Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. Duplicate analysis not within control limits.
BJ	(Inorganic)- The associated numeric value is an estimated quantity. The reported value was obtained from a reading that was less than the Contract Required Detection Limit.
BN	(Organic) - Analyte was detected in the associated method blank as well as in the sample. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
BN*	(Inorganics) - reported value <CRDL and >IDL. Duplicate Analysis not within control limits. Spiked sample recovery not within control limits.
E	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. (Organic) - Analyte concentration exceeded the upper level of
E*	(Inorganic) Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution concentration exceeds 10%. - Duplicate analysis not within control limits. (Organic) -
EJ	(Inorganic) - Paragon- Reported value is estimated because of the presence of interference. GEL- Percent difference between the parent sample and its serial dilution's concentration exceeds 10%. Having concentrations between the MDL and the PQL (or reporting limit).
EN	(Organic) - Identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte. (Inorganic) - The qualifier that is used when the percent difference between the parent sample and its serial dilution's concentration exceeds 10%. The sample's concentration must be greater than 50 times the IDL/MDL for ICP or 100 times
H	Holding time exceeded
J	(Inorganic) -The associated numerical value is an estimated quantity. (Organic) - The associated numerical value is an estimated quantity.
JN	(Inorganic) - Having concentrations between the MDL and the PQL (or reporting limit). Analytical results associated with a spike analysis that was outside control limits.
N	(Inorganic) - Spiked sample recovery not within control limits. (Organic) -Presumptive evidence based on a mass spectral library search to make a tentative identification of the analyte.
N*	(Inorganic) - Spiked sample recovery not within control limits. Duplicate analysis not within control limits.
U	(Inorganic) -The material was analyzed for, but was not detected above the level of the associated numeric value. The associated numerical value is either the sample quantitation limit or the sample detection limit. (Organic) -The material was analyzed
U*	(Inorganic) - Compound was analyzed for, but was not detected. Duplicate analysis not within control limits.
UE	(Inorganic) - Compound was analyzed for, but was not detected. Reported value is estimated because of the presence of interference.
UN	(Inorganic) - Compound was analyzed for, but was not detected. - Spiked sample recovery not within control limits.
UUI	compound analyzed for, but not detected above detection limit; uncertain identification for gamma spectroscopy
X	Reported concentration is a false positive
LANL Validation Qualifier	Description
-	information field was blank or unpopulated in data base
A	The contractually-required supporting documentation for this datum is absent.
J	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual.
J+	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential positive bias.
J-	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential negative bias.
JN-	Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
PM	Manual review of raw data is recommended to determine if the observed non-compliances with quality acceptance criteria adversely impacts data use.
U	The analyte is classified as not detected.
UJ	The analyte is classified as not detected, with an expectation that the reported result is more uncertain than usual.