WESTERN NUCLEAR, INC.

SHERWOOD PROJECT
P. O. BOX 392 • WELLPINIT, WASHINGTON 99040 • (509) XXXXXXX 258-4521

NOV 18 1999
DIV. OF RADIATION PROTECTION

November 15, 1999

Mr. Gary Robertson
Washington Department of Health
Waste Management Section
Division of Radiation Protection
P.O. Box 47827
Airdustrial Park, Building 5
Olympia, Washington 98504-7827

RE: Radioactive Materials License WN-I0133-1; License Condition No. 29: Request for Termination of License WN-I0133-1 Issued for the Sherwood Project Operated by Western Nuclear, Inc.

Dear Mr. Robertson:

In accordance with license condition 29 "the licensee shall expedite license termination and follow the US Nuclear Regulatory Commission (NRC) Procedure SA-900, as specifically identified in Appendix B (a)," Western Nuclear, Inc. (WNI) is hereby transmitting documentation that satisfies all remaining license conditions. In addition, the steps outlined in the US NRC Procedure SA-900 are enclosed. Specifically, the following information is attached:

1. Responses to the two outstanding administrative questions regarding the Tailing Reclamation Plan Construction Completion Report (dated June 1997) as detailed in your letter dated September 21, 1999;

2. Responses to the 12 issues in your letter of August 20, 1999 which summarized the results of WDOH surface stability inspections;

3. A final Monitoring and Stabilization Plan Report indicating the successful post-construction reclamation success;

4. An inventory of the license with discussion of each condition and conclusions that all license condition requirements have been met;

5. Our documentation of completed remedial and decommissioning actions (step 1 of the NRC Procedure SA-900);

6. A discussion of the additional steps required by the NRC Procedure SA-900 and the responsible parties for each step;

7. An environmental report satisfying requirements of Criterion 9, 10 CFR Part 51 and WAC 246-252-030 and referenced in the February 16, 1999, draft NRC Procedure SA-900; and

8. A copy of the previously submitted "Certificate of Disposition of Materials".

Given the information referenced above and in accordance with Step 5 of the NRC Procedure SA-900, WNI hereby provides formal notification to the Washington Department of Health that all site reclamation and decommissioning activities are complete and, as such, Radioactive Material License No. WN-I0133-1 should be terminated. WNI assumes that license termination is imminent and is therefore proceeding to obtain and analyze a final groundwater sample as required under Step 2 of NRC Procedure SA-900. Specifically, that requirement states "At license termination, the State should require licensees to sample for all constituents previously identified in the tailings liquor to ensure that no further remediation is necessary." This activity is being performed in coordination with Ms. Dorothy Stoffel of your staff.

WNI wishes to expedite license termination as required by License Condition 29 and, therefore, requests that this submittal receive your prompt attention. If we can be of assistance with your review and approval of these last remaining issues, please let us know.

Sincerely,

Brad K. DeWaard

BD/hr

Enclosure

cc: L. J. Corte, Esq. (w/enc.)
E. M. Schern (w/enc.)
L. L. Miller (SMI) (w/enc.)
H. W. Shaver, Esq. (S&L)(w/enc.)
E. Fordham (WDOH)(w/enc.)
D. B. Stoffel (WDOH)(w/enc.)
J. R. Blacklaw (WDOH)(w/enc.)

WNI - Central File (Sherwood, WN-I0133-1, L.C. 29), 2 copies

Prepared For:

WESTERN NUCLEAR, INC.
SHERWOOD MINE
Wellpinit, WA

REQUEST FOR LICENSE TERMINATION FINAL DATA SUBMITTAL

Prepared By:

SHEPHERD MILLER, INC.
Fort Collins, CO 80525

November 1999

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

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RANDOM SAMPLE POINTS STAKED IN TAILING & MARGIN AREA

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NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

D-1

TAILING RECLAMATION PLAN COMPLETION REPORT
OUTSTANDING ADMINISTRATIVE ISSUES

In a letter from WDOH dated September 21, 1999, it was stated ". . . the department is satisfied that mill decommissioning and tailing reclamation activities at the Sherwood Project site are complete and acceptable in meeting regulatory and license requirements." However, the WDOH requested additional information on two issues. The WDOH requests and the WNI responses are presented below.

WDOH REQUEST

Please provide AutoCAD electronic files to the department that indicate the Tailings Reclamation Plan plans and specifications as officially approved and revised by your licensed engineer, and as documented in the as-built report (for the northern alignment of the diversion channel). Please provide 5 copies of these files on PC readable CD format.

WNI RESPONSE

Enclosed are 5 copies of the as-built map and 5 electronic copies on CD format which include the AutoCAD drawing file and a text file containing the survey data points.

WDOH REQUEST

Please explain how this void area (an area approximately 150 square feet downstream of confluence G) was overlooked during construction, and quality assurance inspections, including your preparation of Appendix H of your response report.

WNI RESPONSE

The diversion channel is approximately 9,000 feet long. The average channel cross section has approximately 75 feet of riprap along the sides and bottom of the channel. The total area of riprap is approximately 675,000 square feet. The area in question is approximately 0.02% of the total area. Therefore the small area that was "overlooked" is a small insignificant section of the channel. Additionally, riprap was placed in this area to fill the void after the WDOH supervisor verbally iterated to WNI during the field review on September 7, 1999 that placement of riprap in this area would end all further questions regarding riprap placement. The placement of the additional riprap was inspected and approved by the WDOH.

WDOH SURFACE STABILITY INSPECTION ISSUES

In a letter dated August 20, 1999, from WDOH, a total of 12 issues were raised relative to soil erosional stability and riprap placement. A site meeting was held on September 7 with WDOH and WNI representatives. This meeting resulted in a plan to address the 12 issues raised in the August 20 letter. A letter was transmitted from WNI to WDOH on September 16, 1999, that described the actions to be taken to address each issue. A September 21, 1999, letter from the WDOH acknowledged receipt of the September 16 letter and presented WDOH's position on each of the issues.

The following presents each of the 12 issues raised by the WDOH and WNI's response to each of the issues.

ISSUE 1

Area west of the impoundment near the dam outslope and the site access road where some surface flow and soil erosion is occurring away from the constructed channel and culvert due to local ditching from construction effect.

RESPONSE

Remedial construction was performed in the area to address the WDOH concerns. The design of the remedial construction was included in a letter to WDOH dated October 11, 1999 (Attachment A). Construction was completed on October 20, 1999, and the as-built conditions are included in the final structural stability inspection report dated November 15, 1999, which is included in Section 3 of this submittal.

ISSUE 2

Northwest section of the diversion channel where silty soil has been deposited in the channel.

RESPONSE

As indicated in the September 16, 1999, letter and as agreed to in the WDOH letter of September 21, 1999, the sediment deposited in this area was redistributed up- and down-stream of the area. This regrading was completed on September 31, 1999, and was observed and approved by WDOH personnel.

ISSUE 3

Area of gully soil erosion up-gradient of the silt collection point in the diversion channel.

RESPONSE

Remedial construction was performed in the area to address the WDOH concerns. The design of the remedial construction was included in a letter to WDOH dated October 11, 1999 (attached). Construction was completed on October 25, 1999, and the as-built conditions are included in the final structural stability inspection report dated November 15, 1999, which is included in Section 3 of this submittal.

ISSUE 4

Areas of rill erosion in the diversion channel (both sides) up-gradient from the rock-covered slopes.

RESPONSE

Some minor rilling has occurred on the diversion channel side slopes above the riprap lined portion of the diversion channel. This rill erosion is most prominent on the long (approximately 100 feet) slopes on the outside slope of the channel along the east side of the reclaimed impoundment. These long slopes exist between confluences where quartz monzonite bedrock is at the surface of the cut slopes. An analysis was performed to determine if this rilling would adversely impact the long-term performance of the diversion channels. This analysis is included in Attachment B to this submittal.

As demonstrated in the analysis (Attachment B) the minor amount of rilling that is expected along these slopes will not impact the performance of the channel. The only potential impact would occur if excess sediment were to occur that would reduce the capacity of the diversion channel so that the channel could not convey the runoff from the design storm event (the possible maximum precipitation (PMP) event). As the evaluation shows, the channel was designed and constructed to accommodate approximately 30 times the amount of sediment predicted from the slope above the riprap.

ISSUE 5

Areas of rill soil erosion on margin slopes between the diversion channel and the impoundment surface.

RESPONSE

Erosional stability of the margins is provided by vegetation and/or the inherent stability of the underlying quartz monzonite. A complete discussion of the erosional stability of the margins, including the results of the vegetation monitoring and the quartz monzonite mapping is included in the Monitoring and Stabilization Plan (MSP) completion report which is included in this submittal as Section 3. The monitoring, evaluation and discussion included in the MSP completion report concludes that the margin stability meets the performance objectives of WAC 246-252.

ISSUE 6

Area west (actually east as discussed during the September 7, 1999, site visit) (about 200 feet) of the impoundment outfall where gully soil erosion and deposition is occurring from southerly stormwater flow.

RESPONSE

There is a small area (approximately 3 acres) between the swale outlet and the margin, as shown on Figure 1, that drains to the south. This drainage configuration is consistent with the original design. As the regraded gentle slope transitions into the steeper natural topography, a small amount of gullying and general erosion is apparent. This erosion will not, however, impact the reclaimed tailing impoundment. Any head-cutting would be limited to the small drainage basin, which is at least 700 feet from the edge of the reclaimed tailing surface. Additionally, quartz monzonite bedrock is at or near the surface for much if not all of this small drainage basin and therefore any gullying would be limited to a depth of only a few inches.

ISSUE 7

Area immediately south and southwest of the impoundment outfall swale showing gully soil erosion and deposition from stormwater flow across the swale.

ISSUE 8

Gullies have developed at the toe of the outlet swale. In these areas, silty topsoil has eroded away and underlying quartz monzonite bedrock is exposed. Some of the quartz monzonite bedrock in the tailing impoundment area weathers quire readily when exposed, and other areas are quite resistant to weathering. The distinction between the two types of quartz monzonite was apparent during construction of the diversion channel because some quartz monzonite was readily ripped and some areas of quartz monzonite required blasting. Has the nature of the quartz monzonite underlying the toe of the outlet swale been characterized and documented? What construction features of the outlet swale would prevent shifting of the riprap (raveling), if the exposed quartz monzonite significantly weathers over time?

RESPONSE

Issues seven and eight are both in regards to the swale outlet and are therefore addressed together.

During the design of the surface reclamation it was determined that erosion could occur at the transition from the swale outlet and the steeper natural ground. It was recognized that this erosion could undercut the riprap at the swale outlet unless this area was designed and constructed to address undercutting. A rock filled toe trench at the end of the swale outlet was added to address this concern. The design of this toe trench was included in Appendix G of the Tailing Reclamation Plan, December 1994, WNI submittal and was included in the approved construction specifications and drawings. Documentation of the construction of the swale outlet including the toe trench was included in the Tailing Reclamation Plan (TRP) completion Report (WNI, 1997). A copy of the design documentation, the relevant portions of the construction specifications and drawings and the relevant portions of the TRP completion report are attached as Attachment C to this submittal.

As can be seen from the design report, erosion at the toe of the swale outlet was not only expected but the outlet toe trench was designed and constructed to address the concern of preventing this erosion from head-cutting into the swale outlet. Further, as presented in the design documentation, the toe trench was designed assuming the underlying material was loose sand. As discussed by WDOH, the toe trench is in quartz monzonite. Visual observations and pocket penetrometer test results indicate that the underlying quartz monzonite material is much more resistant to erosion than loose sand, which was assumed in the design. The pocket penetrometer results indicated an unconfined strength of less than 0.5 tons/ft^2 for the loose sand and greater than 4.5 tons/ft^2 for the quartz monzonite. However, regardless of the extra stability afforded by the underlying quartz monzonite, the swale outlet toe will be stable since it was designed assuming only loose sand.

ISSUE 9

There is a 150 ft^2 area at the southern transition from Confluence G, which lacks placement of large riprap. A geological evaluation appears to indicate that visible filter material overlies quartz monzonite. Has the underlying quartz monzonite been characterized and is it adequate to provide long-term stability to the riprap in this confluence?

ISSUE 10

There is an area approximately 10 feet by 15 feet at the downstream transition zone of Confluence G that is missing larger riprap (ie., 10"D_{50}) and only underlying filer material is visible.

RESPONSE

Issues nine and ten relate to the same area and are addressed together.

Additional riprap was placed in this area to cover the 10 x 15 foot area as agreed upon during the September 7 site visit. The riprap was placed on September 30, 1999 under WDOH staff direction and was then inspected and approved by WDOH.

ISSUE 11

In all confluences, except Confluence A, there are several random areas in which the large riprap is thin and segregated (not well graded) (i.e., not touching adjacent riprap, thus resulting in voids in the riprap layer, and less than 100% coverage) with the filter layer visible. While most of these random areas are 1 to 2 ft^2*, some were noted as large as 5 to 6* ft^2*.*

RESPONSE

As decided upon during the September 7 site visit, these areas were remediated by adding additional rock. This work was done from September 27 through September 30 and in areas determined by WDOH. All work was under WDOH staff direction and was then inspected and approved by WDOH.

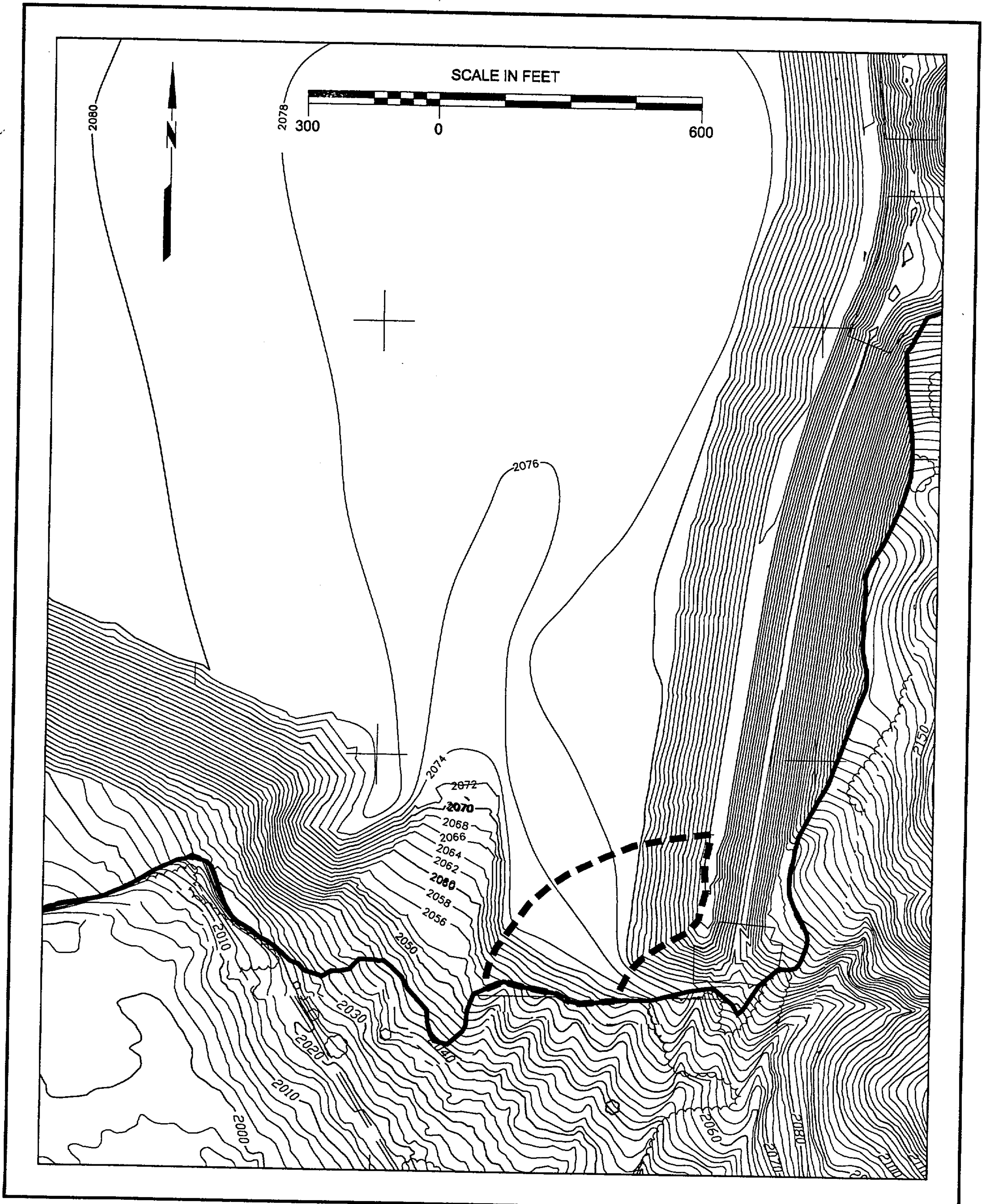
ISSUE 12

There is scarring (from equipment gouging) and compaction (rock imbedded into the filter) in small rock (i.e., 3" D_{50}) placement areas, predominantly in the smaller portion of the diversion channel on the west side of the impoundment.

RESPONSE

As with issue 11, all areas where additional rock was determined to be necessary was decided in the field with WDOH. The additional rock was placed from September 27 through September 30. All work was under WDOH staff direction and was then approved by WDOH.

Areas where construction traffic has imbedded the overlying riprap into the underlying filter were not modified. The erosional stability of these areas are not diminished as a result of the riprap being imbedded in the filter and in fact, the stability of the rock should be enhanced since the imbeddment will tend to stabilize the rock from any motion that might be induced by flowing water.



SHEPHERD MILLER INCORPORATED

FIGURE 1

Date:	NOVEMBER 1999
Project:	03-317/1999
File:	FIG-1199-01.DWG

ATTACHMENT A.1

OCTOBER 11, 1999 LETTER FROM SMI TO WNI

ATTACHMENT 1.

SHEPHERD MILLER
INCORPORATED

October 11, 1999

SMI # 03317

Mr. Brad DeWaard
Western Nuclear, Inc.
P.O. Box 392
Wellpinit, Washington 99049

This letter is in response to your letter dated September 21, 1999 regarding surface stability inspection issues at the Sherwood project site. Specifically this letter presents the required design to address the regrading activities for Issue 1, the area immediately west of the reclaimed embankment and Issue 3, the reclaimed northwest borrow area.

Area west of the reclaimed embankment

The WDOH raised concern that the regrading in this area directs flow from an area immediately west of the southern portion of the reclaimed impoundment to the south and close to the rock lined groin along the west edge of the reclaimed embankment. Concern was raised that if this flow were deep enough it could flow into the groin area.

As discussed during our site inspection on September 7, 1999 this concern will be addressed by enlarging the existing drainage to the south to keep drainage water away from the groin area. This will be done by removing the existing rock in the drainage, excavating the subsoil material and replacing the existing rock. Figure 1 depicts a typical cross section of the reconfigured drainage.

Your letter suggested that regrading be done in the small drainage basin to direct flow towards the west and the roadway culvert. I disagree with performing any regrading in the drainage basin for two reasons. First, enlarging the existing drainage to the south will address the concern and thus regrading the drainage basin is not necessary. Additionally, this area has become revegetated and any regrading in the area will destroy the successful revegetation effort. Since enlarging the existing drainage addresses the concern and regrading the drainage basin will destroy the revegetation effort, regrading will not be done in this area. This is consistent with conversations I had with John Blacklaw of your office during our site visit of September 7.

Environmental & Engineering Consultants

3801 Automation Way, Suite 100
Fort Collins, CO 80525
Phone: (970) 223-9600
Fax: (970) 223-7171
www.shepmill.com

Reclaimed northwest borrow area

The WDOH raised concern that the existing bench on the reclaimed northwest borrow area would continue to contribute sediment to the diversion channel. To address this concern, the bench will be removed and the area will be regraded to a uniform slope. All disturbed areas will be reseeded with the same seed mixture that was used for all other disturbed areas outside of the tailing area. Erosion control netting (jute matting) will be installed over the disturbed area. This netting will insure erosional stability until the vegetation becomes established and will eliminate any need for any type of vegetation success criteria for this area. The netting will be installed in accordance with manufacturer's recommendations.

Both of these areas will be inspected and documented as part of the semi-annual surface stability inspection. If the inspector concludes that the areas have been constructed as designed, these issues will be considered successfully completed and closed.

Because of the short remaining construction season, we request that you give prompt concurrence to this design letter so that construction activities can be completed as soon as possible.

If you have any questions, please let me know as soon as possible.

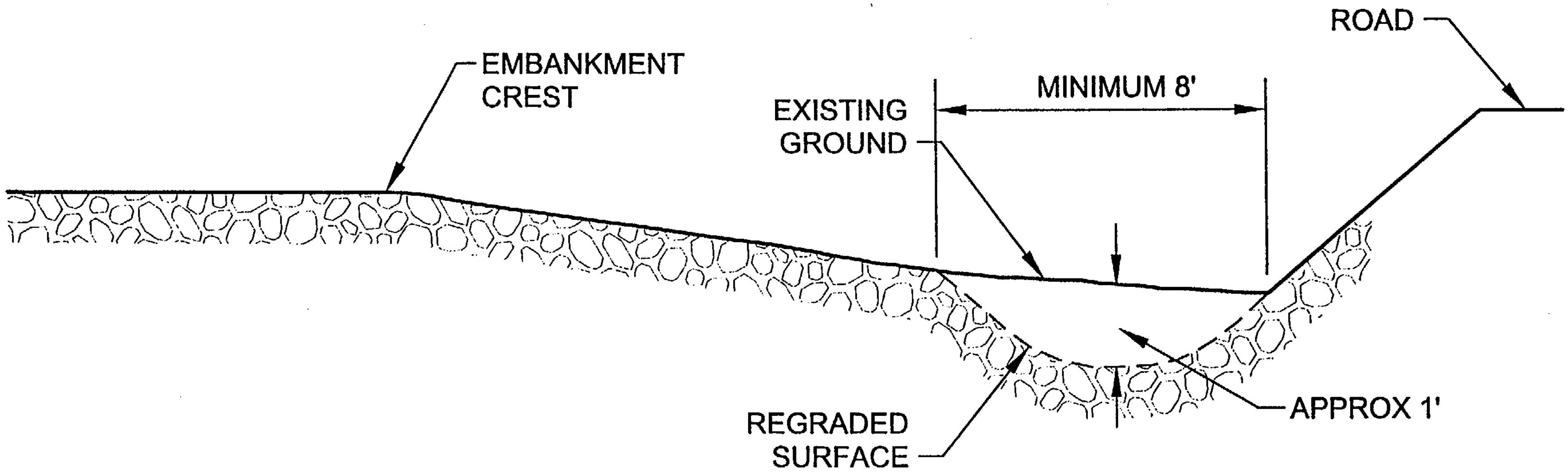
Sincerely,
SHEPHERD MILLER, INC.

Louis Miller

Louis Miller, PE
Vice President

Attachments

LOUIS L. MILLER
STATE OF WASHINGTON
27992
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 5/1/00
10-11-99



SHEPHERD MILLER INCORPORATED

FIGURE 1
TYPICAL CROSS SECTION

Date:	OCTOBER 1999
Project:	03-317
File:	XS-10-99.dwg

ATTACHMENT B

B.1 EVALUATION OF IMPACT OF RILLING ON DIVERSION CHANNEL

B.2 1995 SEDIMENT TRANSPORT ANALYSIS

B.3 DIVERSION CHANNEL CROSS SECTIONAL AREA VERIFICATION, TABLE 9 FROM: SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT

ATTACHMENT B.1

EVALUATION OF IMPACT OF RILLING ON DIVERSION CHANNEL

Introduction

Rilling has been observed on the slopes of the diversion channel above the riprap lined portion of the channel. The rilling is most evident on the long (approximately 100 ft) slopes above the riprap on the east side of the diversion channel east of the impoundment. These slopes exist between confluences and are in areas with shallow quartz monzonite bedrock. Inspection of the rills indicates that the depth of the rills is a maximum of approximately 2 inches and covers approximately 10% of the total area of the slope. The underlying quartz monzonite bedrock appears to be a stable base that limits deeper rilling.

Concern has been raised by WDOH regarding the impact of this rilling on the long-term performance of the diversion channel. Specifically, the WDOH has expressed concern that excess sediment could reduce the capacity of the channel to the point that the channel might overflow during the design storm event.

The following presents an estimate of the amount of sediment that might be expected from the worse case slope, and compares that to the capacity of the channel to accommodate sediment. The analysis concludes that the channel was designed and built to accommodate much more (approximately 30 times more) sediment than is expected from the slopes above the riprap.

Sediment Estimate

The longest slope was used to estimate the amount of sediment that might be generated from the channel slope above the riprap. This worse case slope is shown on Figure 1 and occurs at Station 13+00.

This slope has approximately 100 feet of slope above the ripraped portion of the channel. An estimate of the maximum amount of sediment that might be expected was made by assuming a total depth of rilling of 2 inches and assuming the rilling occurred over 50% of the slope. This yields a total of approximately 8 cubic feet of sediment per linear foot of channel. It is expected that native vegetation will become established over time and further limit future erosion. Therefore, assuming one-half of the slope will be eroded to a depth of 2 inches is a fairly conservative assumption.

Sediment Capacity in Channel

The design and construction of the diversion channel included provisions for sediment. Additionally, other inherent conservative assumptions led to oversizing the channel, which further enhances the ability of the channel to accommodate sediment. The following quantifies the extra capacity designed and built into the diversion channel.

A sediment transport analysis was performed (WNI, 1995). Applicable portions of this submittal are included as Attachment B. The results of that evaluation indicated that a maximum of approximately 1.6 feet of sediment would accumulate in the northern most confluence. Areas between the confluences, where the rilling has been observed, were predicted to have essentially no accumulated sediment. However, all portions of the diversion channel were designed assuming 2 feet of sediment in the bottom of the channel. Therefore, there is approximately 44 cubic feet per linear foot of channel of capacity that was designed for sediment. This volume is calculated using the 16 feet bottom width, a two foot depth and 3:1 side slopes.

The diversion channel was also designed to have one foot of freeboard. This yields approximately 140 cubic feet per linear foot of channel capacity to accommodate additional sediment. This volume is calculated using a bottom width of 16 feet, 3:1 side slopes and a total depth of flow of 20 feet with the freeboard from 20 to 21 feet.

As documented in the reclamation plan completion report (Table 9 from the Completion Report, which is attached as Attachment B.3), most of the diversion channel cross sections were built bigger than designed. The channel cross sections along the east side of the impoundment have cross sectional areas ranging from 50 to 100 square feet larger than designed. This indicates that at least 50 cubic feet per linear foot of channel capacity is available for sediment due to over-building the diversion channel.

The total extra capacity from these three design and construction features are approximately 235 cubic feet per linear foot of channel.

Results and Conclusions

As evaluated above, the amount of sediment that can be expected from the slopes above the ripraped portion of the diversion channel is approximately 8 cubic feet per linear foot of channel. The extra capacity of the channel to accommodate this sediment has been calculated to 235 cubic feet per linear foot of channel. It is clear that the amount of sediment that could be generated is only a small fraction of the total extra capacity of the channel. Therefore, the minor rilling observed on the slopes above the riprap will not impact the long-term performance of the diversion channel.

ATTACHMENT B.2

1995 SEDIMENT TRANSPORT ANALYSIS

03-317

SHERWOOD PROJECT
RESPONSES TO WDOH COMMENTS ON THE DECEMBER 1994 TAILING RECLAMATION PLAN

Prepared for

Western Nuclear, Inc.
Sherwood Mine
Wellpinit, Washington

Prepared by

Shepherd Miller Inc.
1600 Specht Point Drive, Suite F
Fort Collins, CO 80525

August 1995

SMI
Shepherd Miller, Inc.

1.4 Sediment Transport and Deposition Prediction

The Corps of Engineers' HEC-6 model (1993) is a sediment transport model which considers sediment inflow from tributaries, bed material conditions, and hydraulic conditions to predict on a cross section by cross section basis the change in bed elevation due to either scour or deposition. HEC-6 models changes on a cross section basis and therefore accounts for localized impacts such as sediment deltas. HEC-6 was used to model sediment transport in the diversion channel for the 10-year, 20-year, 50-year, 100-year, 200-year, 500-year and PMP storm events.

Basin sediment yield predicted by SEDCAD+ was input to the diversion channel for each storm event modeled. The grain size distribution of the watershed sands presented in Appendix D, Attachment E of the 12/94 TRP. was also input to the model. Resistance to flow of the diversion channel bed was selected assuming that trees would be present (Manning's n = 0.1). If a Manning's n value of 0.03, corresponding to the riprap condition, were to be used, flow velocities would increase and predicted sediment transport through the diversion channel would be greater. Therefore, the use of Manning's n of 0.1 is conservative.

HEC-6 is a steady state flow model which means that it analyzes a single discharge over a period of time. Since the diversion channel is designed for the peak PMF discharge, which is an instantaneous value, it is necessary to estimate a discharge that will be sustained for a reasonable period of time. The majority of the flood runoff during a PMF occurs during a three hour period. Therefore, the flood discharge used in the model was selected to occur for a three hour period spanning the time of the flood peak, such that the total volume of water is the same as that of the flood hydrograph. This is conservative, because use of a higher discharge would result in greater sediment transport and less deposition through the diversion channel.

HEC-6 allows the user to employ several different sediment transport functions. Seven functions were selected for evaluation under low and high sediment transport conditions. These seven, referred to in the HEC-6 manual and described in Vanoni (1975), were the Toffaleti (1966) function, Yang (1973) function, DuBoys (Brown, 1950) function, Colby (1964) function, Toffaleti (1966) and Schoklitsch (1930) combination function, Meyer-Peter and Műller (1948) function, and Madden's (1985, unpublished) modification of the Laursen (1958) function.

To determine which function to use in this report, analyses for the PMF were performed using all seven functions. The seven functions yielded comparable results with the highest value being only about 4 percent higher than the average of the seven functions. The Colby function yielded a value that was approximately equal to the average of the seven functions; therefore, the Colby function was used in the analysis of all storm events modeled. The function yielding the highest value (Toffaleti) could have been used; however, since it was only 4 percent higher than the the Colby function, the difference in the amount of sediment deposited would have been negligible.

Table 1.4 summarizes the increase in bed elevation for the three stations where the maximum amount of sediment deposition is predicted by HEC-6. Table 1.5 presents the accumulated sediment from all the storms selected to occur in 1000 years, and also includes the PMP sediment. The PMP sediment is included with that from the other storms because it is not known whether the PMP sediment will occur prior to, during, or after the peak water discharge. Inclusion of the PMP sediment conservatively assumes that the sediment accumulates before the peak water discharge occurs. Further conservatism exists because the analysis assumes that the PMP occurs at the end of the 1000-year period, after all the other storms have already occurred.

The results summarized in Table 1.5 indicate that an accumulation of sediment from 50 10-year, 30 20-year, 10 50-year, 5 100-year, 3 200-year and 2 500-year storms would result in no more than 0.12 feet of sediment in the diversion channel. This relatively minor amount of sediment deposition results from the difference between sediment inflows and sediment transported by diversion channel flows. This maximum sediment depth would occur at Cross Section 5000 at the north portion of the diversion channel. Combined with 1.40 feet of sediment deposited at this location during the PMF, a total of 1.52 feet of sediment is predicted by HEC-6 to accumulate at Cross Section 5000. HEC-6 results are included as Attachment 1.

TABLE 1.4 CHANNEL BED ELEVATION INCREASE (ft) AT SIGNIFICANT TRIBUTARY JUNCTIONS

Storm Event	Bed Elevation Increase (ft)		
	Cross Section 2000	Cross Section 4000	Cross Section 5000
10-year	0	0	0
20-year	0	0	0
50-year	0	0	0
100-year	0	0	0.01
200-year	0	0	0.01
500-year	0.01	0	0.02
PMP	0.49	0.27	1.40

TABLE 1.5 ACCUMULATED BED ELEVATION INCREASE AT CROSS SECTION 5000

Storm Event	Number of Events Occurring in 1000 years	Total Sediment Depth at Cross Section 5000 (ft)
10-year	50	0
20-year	30	0
50-year	10	0
100-year	5	0.05
200-year	3	0.03
500-year	2	0.04
PMP		1.40
	Total	1.52

The principal reason sediment settles onto the channel bed is the change in slope from the relatively steep tributaries (approximately 4 to 10 percent) to the relatively flat diversion channel (0.25 to 0.75 percent). All of the tributary water flow is carried within the diversion channel but the flatter slope in the diversion channel results in less sediment transport capacity than exists in the tributaries. HEC-6, like HEC-2, does not model infiltration through the channel bed because this is an insignificant proportion of the total flow amount, especially in large flood analyses.

The following section evaluates the impact on diversion channel capacity of sediment accumulation combined with the impact of vegetation growing in the channel. Modifications to the diversion channel design are presented in Section 5.

adjacent drainage area and possibly over the entire tailing surface area in order to prevent erosion of the radon attenuation barrier.

The adjacent drainage area that would contribute runoff to the tailing surface is about 694 acres. This area plus an additional 145 acres on the tailing impoundment would result in a PMF volume of about 608 acre-feet. This volume of runoff would pond to a maximum elevation of about 2076 feet assuming the impoundment top configuration shown on Figure 10 on Page R.2-41 of the 12/94 TRP. Since the lowest contour shown on Figure 10 on Page R.2-41 of the 12/94 TRP is 2057 feet, ponded water would be a maximum of 19 feet deep on the reclaimed tailing surface.

The duration of this ponding would be a concern as would sedimentation, settlement and groundwater impacts. The mean lake evaporation rate at the site is about 3 feet/year. This means that after the occurrence of a PMF, it would take a maximum of over 6 years to evaporate all of the water assuming no infiltration and no additional runoff from the 694 acre drainage area. Infiltration would reduce this duration but would possibly result in contaminants entering the groundwater in unacceptable amounts especially if the design of the radon cover is revised to an all sand cover to address WDOH's biointrusion and freeze/thaw impacts on the currently proposed clay cover. Another concern would be sediment deposition. Additional storage capacity would have to be provided on the tailing surface to allow for the sediment that would be deposited from the contributing 694 acre drainage area. This would require that the tailing embankment be maintained at a higher elevation than currently proposed in the 12/94 TRP. A higher embankment would result in larger riprap requirements for both the face of the embankment and groin areas at the toe. This alternative would not meet the requirements of Criterion 4 of WAC 246-252-030 which requires that the upstream rainfall catchment areas be minimized to decrease erosion potential and the size of floods which could erode or wash out sections of the tailings disposal area. Considering all of these potential problem areas, it is concluded that the proposed reclamation plan to allow flood waters to pond on the surface is not justified.

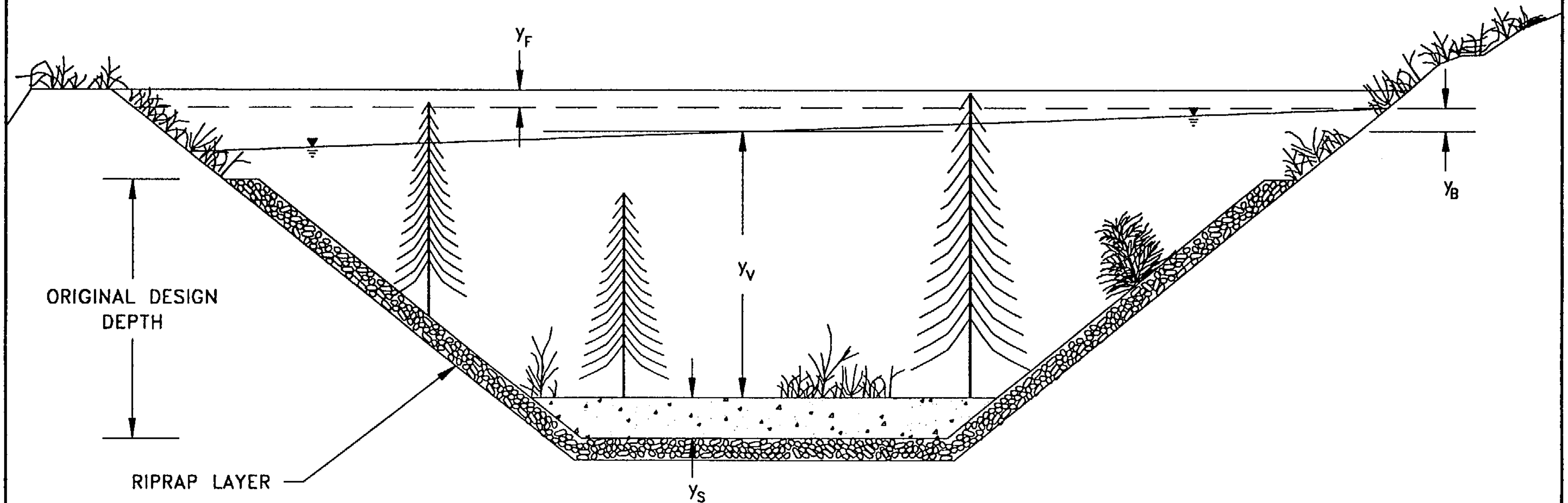
The potential costs of this WDOH proposal for an engineered percolation pond appear, then, to offset any benefits afforded by such a design. Further, other design options including the preferred option proposed in the 12/94 TRP, offer significantly enhanced benefits relative to those of the percolation pond.

5.0 DIVERSION CHANNEL DESIGN MODIFICATION

Since relocation or deletion of the diversion channel are not beneficial alternatives, modification to the diversion channel design in the 12/94 TRP, is proposed to ensure that the channel will contain 1) 2.0 feet of sediment deposited on the bed, 2) PMF flows through a vegetated channel as modeled by HEC-2 with Manning's n equal to

0.10, 3) superelevation, and 4) 1.0 foot of freeboard. The 1.0 foot of freeboard in addition to considerations for sediment, vegetation, and superelevation, is a final degree of conservatism and provides significant cross sectional area to the channel should it be needed. For example, at the downstream end of the channel, the depth is 22 feet and the top width is 140 feet wide. The cross sectional area in the upper 1-foot of channel is about 137 square feet. This area corresponds to a depth of over 5.8 feet at the bottom of the channel. Therefore, there could be as much as 5.8 feet of sediment in the channel and the PMF would still be contained within the channel freeboard.

Figure 5.1 shows the modified channel design schematically. The design of the diversion channel is proposed to be modified by increasing the amount of compacted fill on the berm between the channel and the tailings impoundment. Table 5.1 summarizes the changes in design depth for the channel, comparing channel depth as presented in the 12/94 TRP to the modified channel depth designed for sediment, vegetation and superelevation. Table 5.2 is a more detailed summary of the issues investigated in this response report.



SHEPHERD MILLER INCORPORATED

FIGURE 5.1
DIVERSION CHANNEL
SCHEMATIC

Date:	MAY 1995
Project:	317/31
File:	DETAIL

TABLE 5.1
MODIFIED CHANNEL DEPTHS AND ELEVATIONS

COLUMN NO.	2	3	4	5	6	7	8
		TRP RESULTS, n=0.031 1) (NO SEDIMENT OR VEGETATION)			MODIFIED RESULTS, n=0.1 (2 FT OF SEDIMENT AND VEGETATION)		
STATION	CHANNEL BOTTOM ELEV. (ft)	REQUIRED CHANNEL DEPTH (ft)	MINIMUM CHANNEL DEPTH PROPOSED (ft)	ELEVATION OF TOP OF RIPRAP (ft)	REQUIRED CHANNEL DEPTH 2) (ft)	MINIMUM CHANNEL DEPTH PROPOSED (ft)	PROPOSED ELEVATION OF TOP OF RIPRAP (ft)
0	2087.00	14.42	15.00	2102.00	21.43	22.00	2109.00
200	2087.50	14.42	15.00	2102.50	21.33	22.00	2109.50
400	2088.00	14.42	15.00	2103.00	21.42	22.00	2110.00
600	2088.50	14.42	15.00	2103.50	21.42	22.00	2110.50
800	2089.00	14.42	15.00	2104.00	21.44	22.00	2111.00
1000	2089.50	14.42	15.00	2104.50	21.44	22.00	2111.50
1200	2090.00	14.42	15.00	2105.00	21.53	22.00	2112.00
1400	2090.50	14.43	15.00	2105.50	21.52	22.00	2112.50
1600	2091.00	14.43	15.00	2106.00	21.52	22.00	2113.00
1800	2091.50	14.43	15.00	2106.50	21.44	22.00	2113.50
2000	2092.00	14.44	15.00	2107.00	21.41	22.00	2114.00
2200	2092.50	14.43	15.00	2107.50	21.38	22.00	2114.50
2400	2093.00	14.80	15.00	2108.00	21.31	22.00	2115.00
2600	2093.50	14.57	15.00	2108.50	21.16	22.00	2115.50
2800	2094.00	14.36	15.00	2109.00	21.08	22.00	2116.00
3000	2094.50	14.19	15.00	2109.50	20.95	21.00	2115.50
3200	2095.00	14.03	15.00	2110.00	20.77	21.00	2116.00
3400	2095.50	13.91	15.00	2110.50	20.67	21.00	2116.50
3600	2096.00	13.80	15.00	2111.00	20.58	21.00	2117.00
3800	2096.50	13.71	15.00	2111.50	20.59	21.00	2117.50
4000	2097.00	13.64	15.00	2112.00	20.52	21.00	2118.00
4200	2097.50	13.58	15.00	2112.50	20.33	21.00	2118.50
4400	2098.00	13.78	15.00	2113.00	20.27	21.00	2119.00
4600	2098.50	13.58	15.00	2113.50	20.11	21.00	2119.50
4800	2099.00	13.40	15.00	2114.00	19.97	20.00	2119.00
5000	2099.50	13.26	15.00	2114.50	19.83	20.00	2119.50
5200	2100.00	13.30	15.00	2115.00	19.68	20.00	2120.00
5400	2101.50	12.13	15.00	2116.50	18.51	19.00	2120.50
5600	2103.00	10.95	11.00	2114.00	17.42	18.00	2121.00
5800	2104.50	10.37	11.00	2115.50	16.59	17.00	2121.50
6000	2106.00	10.19	11.00	2117.00	16.08	16.00	2122.00
6200	2107.50	10.16	11.00	2118.50	15.65	16.00	2123.50
6400	2109.00	10.16	11.00	2120.00	15.22	16.00	2125.00
6600	2110.50	10.87	11.00	2121.50	14.71	15.00	2125.50
6800	2112.00	9.51	9.50	2121.50	13.61	14.00	2126.00
7000	2113.50	8.98	9.50	2123.00	12.71	13.00	2126.50
7200	2115.00	7.51	9.50	2124.50	11.30	12.00	2127.00
7400	2116.50	6.13	9.50	2126.00	9.98	10.00	2126.50
7600	2118.00	5.14	9.50	2127.50	8.87	10.00	2128.00
7800	2119.50	4.93	5.00	2124.50	8.15	9.00	2128.50
8000	2121.00	4.99	5.00	2126.00	7.83	8.00	2129.00
8200	2122.50	4.98	5.00	2127.50	7.72	8.00	2130.50
8400	2124.00	4.97	5.00	2129.00	7.56	8.00	2132.00
8600	2125.50	4.65	5.00	2130.50	7.34	8.00	2133.50
8800	2127.00	4.74	5.00	2132.00	6.59	8.00	2135.00

1) REFER TO ATTACHMENT B, APPENDIX D IN THE DECEMBER 1994 TRP.

2) INCLUDES SEDIMENT, VEGETATION, SUPERELEVATION AND 1.0 FOOT OF FREEBOARD. SEE TABLE 5.2.

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TABLE 5.2

REQUIRED CHANNEL DEPTH FOR PMF ALLOWING FOR TREES GROWING IN CHANNEL, SEDIMENT DEPOSITION, AND SUPERELEVATION

STATION	CHANNEL BOTTOM ELEVATION	PMF ELEVATION[1] CHANNEL WITHOUT VEGETATION OR SEDIMENT (ft)	PMF ELEVATION[2] CHANNEL WITH TREES AND 2.0 FT. OF SEDIMENT (ft)	SUPER-ELEVATION (ft)	REQUIRED[3] TOP OF CHANNEL ELEVATION (ft)	MINIMUM CHANNEL DEPTH REQUIRED (ft)	RIGHT OVERBANK VELOCITY (ft/s)	CHANNEL DEPTH PROPOSED IN TRP (ft)	ADDITIONAL CHANNEL DEPTH REQUIRED (ft)	ADDITIONAL CHANNEL DEPTH PROPOSED (ft)
0 +00	2087.00	2100.42	2107.43	0.00	2108.43	21.43		15.0	6.4	7.0
1 +00	2087.25	2100.67	2107.63	0.00	2108.63	21.38		15.0	6.4	7.0
2 +00	2087.50	2100.92	2107.83	0.00	2108.83	21.33	1.5	15.0	6.3	7.0
3 +00	2087.75	2101.17	2108.13	0.00	2109.13	21.38		15.0	6.4	7.0
4 +00	2088.00	2101.42	2108.42	0.00	2109.42	21.42	1.5	15.0	6.4	7.0
5 +00	2088.25	2101.67	2108.67	0.00	2109.67	21.42		15.0	6.4	7.0
6 +00	2088.50	2101.92	2108.92	0.00	2109.92	21.42	1.5	15.0	6.4	7.0
7 +00	2088.75	2102.17	2109.17	0.00	2110.17	21.42	1.5	15.0	6.4	7.0
8 +00	2089.00	2102.42	2109.44	0.00	2110.44	21.44		15.0	6.4	7.0
9 +00	2089.25	2102.67	2109.69	0.00	2110.69	21.44		15.0	6.4	7.0
10 +00	2089.50	2102.92	2109.94	0.00	2110.94	21.44	1.5	15.0	6.4	7.0
11 +00	2089.75	2103.17	2110.19	0.09	2111.28	21.53		15.0	6.5	7.0
12 +00	2090.00	2103.42	2110.44	0.09	2111.53	21.53	1.5	15.0	6.5	7.0
13 +00	2090.25	2103.68	2110.69	0.09	2111.78	21.53		15.0	6.5	7.0
14 +00	2090.50	2103.93	2110.93	0.09	2112.02	21.52	1.5	15.0	6.5	7.0
15 +00	2090.75	2104.18	2111.18	0.09	2112.27	21.52		15.0	6.5	7.0
16 +00	2091.00	2104.43	2111.43	0.09	2112.52	21.52	1.5	15.0	6.5	7.0
17 +00	2091.25	2104.68	2111.69	0.00	2112.69	21.43		15.0	6.4	7.0
18 +00	2091.50	2104.93	2111.94	0.00	2112.94	21.44	1.5	15.0	6.4	7.0
19 +00	2091.75	2105.19	2112.18	0.00	2113.18	21.43		15.0	6.4	7.0
20 +00	2092.00	2105.44	2112.41	0.00	2113.41	21.41	1.0	15.0	6.4	7.0
21 +00	2092.25	2104.69	2112.65	0.00	2113.65	21.40		15.0	6.4	7.0
22 +00	2092.50	2103.93	2112.88	0.00	2113.88	21.38		15.0	6.4	7.0
23 +00	2092.75	2105.37	2113.12	0.00	2114.12	21.37	1.4	15.0	6.4	7.0
24 +00	2093.00	2106.80	2113.31	0.00	2114.31	21.31		15.0	6.3	7.0
25 +00	2093.25	2106.94	2113.50	0.00	2114.50	21.25	1.2	15.0	6.3	7.0
26 +00	2093.50	2107.07	2113.66	0.00	2114.66	21.16		15.0	6.2	7.0
27 +00	2093.75	2107.22	2113.84	0.06	2114.90	21.15		15.0	6.2	7.0
28 +00	2094.00	2107.36	2114.02	0.06	2115.08	21.08	1.3	15.0	6.1	7.0
29 +00	2094.25	2107.53	2114.21	0.06	2115.27	21.01		15.0	6.0	6.0
30 +00	2094.50	2107.69	2114.39	0.06	2115.45	20.95	1.3	15.0	5.9	6.0
31 +00	2094.75	2107.86	2114.58	0.00	2115.58	20.83		15.0	5.8	6.0
32 +00	2095.00	2108.03	2114.77	0.00	2115.77	20.77	1.3	15.0	5.8	6.0
33 +00	2095.25	2108.22	2114.97	0.00	2115.97	20.72		15.0	5.7	6.0
34 +00	2095.50	2108.41	2115.17	0.00	2116.17	20.67	1.3	15.0	5.7	6.0
35 +00	2095.75	2108.36	2115.38	0.00	2116.38	20.63		15.0	5.6	6.0
36 +00	2096.00	2108.30	2115.58	0.00	2116.58	20.58	1.3	15.0	5.6	6.0
37 +00	2096.25	2108.76	2115.79	0.00	2116.79	20.54		15.0	5.5	6.0
38 +00	2096.50	2109.21	2116.00	0.09	2117.09	20.59	1.3	15.0	5.6	6.0
39 +00	2096.75	2109.43	2116.22	0.09	2117.31	20.56		15.0	5.6	6.0
40 +00	2097.00	2109.64	2116.43	0.09	2117.52	20.52	1.2	15.0	5.5	6.0
41 +00	2097.25	2112.08	2116.63	0.09	2117.72	20.47		15.0	5.5	6.0
42 +00	2097.50	2110.08	2116.83	0.00	2117.83	20.33		15.0	5.3	6.0
43 +00	2097.75	2116.95	2117.03	0.00	2118.03	20.28	1.3	15.0	5.3	6.0
44 +00	2098.00	2110.78	2117.27	0.00	2118.27	20.27	1.1	15.0	5.3	6.0

1 PMF ELEVATIONS FROM PAGES D.B-27 TO D.B-29 OF ATTACHMENT B TO APPENDIX D OF THE DECEMBER 1994, TRP.

2 PMF ELEVATIONS FROM HEC-2 ANALYSIS IN ATTACHMENT 1 OF THESE RESPONSES.

3 TOP OF CHANNEL ELEVATION IS EQUAL TO THE SUM OF THE PMF ELEVATION WITH TREE GROWTH, 2.0 FEET OF SEDIMENT, 1 FOOT OF FREEBOARD, AND SUPERELEVATION.

TABLE 5.2 (continued)

REQUIRED CHANNEL DEPTH FOR PMF ALLOWING FOR TREES GROWING IN CHANNEL, SEDIMENT DEPOSITION, AND SUPERELEVATION

STATION	CHANNEL BOTTOM ELEVATION	[1] PMF ELEVATION CHANNEL WITHOUT VEGETATION OR SEDIMENT (ft)	[2] PMF ELEVATION CHANNEL WITH TREES AND 2.0 FT. OF SEDIMENT (ft)	SUPER-ELEVATION (ft)	[3] REQUIRED TOP OF CHANNEL ELEVATION (ft)	MINIMUM CHANNEL DEPTH REQUIRED (ft)	RIGHT OVERBANK VELOCITY (ft/s)	CHANNEL DEPTH PROPOSED IN TRP (ft)	ADDITIONAL CHANNEL DEPTH REQUIRED (ft)	ADDITIONAL CHANNEL DEPTH PROPOSED (ft)
45 +00	2098.25	2110.93	2117.44	0.00	2118.44	20.19		15.0	5.2	6.0
46 +00	2098.50	2111.08	2117.61	0.00	2118.61	20.11	1.1	15.0	5.1	6.0
47 +00	2098.75	2111.24	2117.78	0.00	2118.78	20.03	1.1	15.0	5.0	5.0
48 +00	2099.00	2111.40	2117.97	0.00	2118.97	19.97		15.0	5.0	5.0
49 +00	2099.25	2111.58	2118.15	0.00	2119.15	19.90	1.1	15.0	4.9	5.0
50 +00	2099.50	2111.76	2118.33	0.00	2119.33	19.83		15.0	4.8	5.0
51 +00	2099.75	2112.03	2118.50	0.00	2119.50	19.75		15.0	4.8	5.0
52 +00	2100.00	2112.30	2118.68	0.00	2119.68	19.68	1.0	15.0	4.7	5.0
53 +00	2100.75	2112.47	2118.85	0.00	2119.85	19.10		15.0	4.1	5.0
54 +00	2101.50	2112.63	2119.01	0.00	2120.01	18.51	1.2	15.0	3.5	4.0
55 +00	2102.25	2112.79	2119.22	0.00	2120.22	17.97		15.0	*3.0	4.0
56 +00	2103.00	2112.95	2119.42	0.00	2120.42	17.42	1.1	11.0	6.4	7.0
57 +00	2103.75	2113.41	2119.76	0.00	2120.76	17.01		11.0	6.0	6.0
58 +00	2104.50	2113.87	2120.09	0.00	2121.09	16.59	1.0	11.0	5.6	6.0
59 +00	2105.25	2114.53	2120.53	0.00	2121.53	16.28		11.0	5.3	6.0
60 +00	2106.00	2115.19	2120.97	0.09	2122.06	16.06	1.0	11.0	5.1	6.0
61 +00	2106.75	2115.93	2121.52	0.09	2122.61	15.86		11.0	4.9	5.0
62 +00	2107.50	2116.66	2122.06	0.09	2123.15	15.65	0.9	11.0	4.7	5.0
63 +00	2108.25	2117.41	2122.64	0.09	2123.73	15.48		11.0	4.5	5.0
64 +00	2109.00	2118.16	2123.22	0.00	2124.22	15.22	1.7	11.0	4.2	5.0
65 +00	2109.75	2119.27	2123.72	0.00	2124.72	14.97		11.0	4.0	4.0
66 +00	2110.50	2120.37	2124.21	0.00	2125.21	14.71	0.8	11.0	3.7	4.0
67 +00	2111.25	2120.42	2124.38	0.00	2125.38	14.13	0.9	11.0	3.1	4.0
68 +00	2112.00	2120.51	2124.61	0.00	2125.61	13.61	0.9	9.5	4.1	4.0
69 +00	2112.75	2120.64	2124.90	0.00	2125.90	13.15	0.8	9.5	3.7	4.0
70 +00	2113.50	2121.48	2125.21	0.00	2126.21	12.71	0.2	9.5	3.2	4.0
71 +00	2114.25	2121.49	2125.25	0.00	2126.25	12.00	0.2	9.5	2.5	3.0
72 +00	2115.00	2121.51	2125.30	0.00	2126.30	11.30	N/A	9.5	1.8	2.0
73 +00	2115.75	2121.55	2125.38	0.00	2126.38	10.63	0.3	9.5	1.1	1.0
74 +00	2116.50	2121.63	2125.48	0.00	2126.48	9.98	0.3	9.5	0.5	1.0
75 +00	2117.25	2121.79	2125.63	0.00	2126.63	9.38	N/A	9.5	0.0	0.0
76 +00	2118.00	2122.14	2125.87	0.00	2126.87	8.87	N/A	9.5	0.0	0.0
77 +00	2118.75	2122.79	2126.25	0.00	2127.25	8.50		9.5	0.0	0.0
78 +00	2119.50	2123.43	2126.63	0.02	2127.65	8.15	N/A	5.0	3.2	3.0
79 +00	2120.25	2124.21	2127.22	0.02	2128.24	7.99		5.0	3.0	3.0
80 +00	2121.00	2124.99	2127.81	0.02	2128.83	7.83	N/A	5.0	2.8	3.0
81 +00	2121.75	2125.74	2128.52	0.02	2129.54	7.78		5.0	2.8	3.0
82 +00	2122.50	2126.48	2129.22	0.00	2130.22	7.72	N/A	5.0	2.7	3.0
83 +00	2123.25	2127.23	2129.89	0.00	2130.89	7.64	N/A	5.0	2.6	3.0
84 +00	2124.00	2127.97	2130.56	0.00	2131.56	7.56		5.0	2.6	3.0
85 +00	2124.75	2128.56	2131.20	0.00	2132.20	7.45		5.0	2.4	3.0
86 +00	2125.50	2129.15	2131.84	0.00	2132.84	7.34		5.0	2.3	3.0
87 +00	2126.25	2129.95	2132.22	0.00	2133.22	6.97		5.0	2.0	2.0
88 +00	2127.00	2130.74	2132.59	0.00	2133.59	6.59	1.5	5.0	1.6	2.0

1 PMF ELEVATIONS FROM PAGES D.B-27 TO D.B-29 OF ATTACHMENT B TO APPENDIX D OF THE DECEMBER 1994, TRP.

2 PMF ELEVATIONS FROM HEC-2 ANALYSIS IN ATTACHMENT 1 OF THESE RESPONSES.

3 TOP OF CHANNEL ELEVATION IS EQUAL TO THE SUM OF THE PMF ELEVATION WITH TREE GROWTH, 1.5 FEET OF SEDIMENT, 1 FOOT OF FREEBOARD, AND SUPERELEVATION.

ATTACHMENT B.3

DIVERGENT CHANNEL CROSS SECTION AREA VERIFICATION,

TABLE 9 FROM: SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT.

Prepared For:

WESTERN NUCLEAR, INC.
SHERWOOD PROJECT
Wellpinit, Washington

SHERWOOD TAILING RECLAMATION

CONSTRUCTION COMPLETION REPORT

VOLUME 1 of 3

Prepared By:

SHEPHERD MILLER, INC.
Fort Collins, Colorado

JUNE 1997

Table 9 - DIVERSION CHANNEL CROSS SECTIONAL AREA VERIFICATION

Diversion Channel Station Number	Riprapped Cross-Sectional Area			Total Channel Cross-Sectional Area		
	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)
1+04	Unlimited area due to field fit. Note: riprap installed to required level.					
2+00	791.1	783.0	8.1	1779.6	1615	164.6
3+00	789.6	783.0	6.6	1668.4	1615	53.4
4+00	813.0	783.0	30.0	1692.6	1615	77.6
5+00	813.0	783.0	30.0	1691.4	1615	76.4
6+00	799.4	783.0	16.4	1679.7	1615	64.7
7+00	792.2	783.0	9.2	1667.7	1615	52.7
8+00	784.9	783.0	1.9	1695.4	1615	80.4
9+00	806.8	783.0	23.8	1709.4	1615	94.4
10+00	792.7	783.0	9.7	1680.2	1615	65.2
11+00	807.9	783.0	24.9	1693.4	1615	78.4
12+00	807.5	783.0	24.5	1700.7	1615	85.7
13+00	789.1	783.0	6.1	1685.8	1615	70.8
14+00	792.1	783.0	9.1	1674.5	1615	59.5
15+00	793.0	783.0	10.0	1678.1	1615	63.1
16+00	CONFLUENCE "G", VARIABLE AREAS *					
17+00	CONFLUENCE "G", VARIABLE AREAS *					
18+00	CONFLUENCE "G", VARIABLE AREAS *					
19+00	CONFLUENCE "G", VARIABLE AREAS *					
20+00	800.0	783.0	17.0	1736.2	1615	121.2
21+00	CONFLUENCE "F", VARIABLE AREAS *					
22+00	CONFLUENCE "F", VARIABLE AREAS *					
23+00	CONFLUENCE "F", VARIABLE AREAS *					
24+00	CONFLUENCE "F", VARIABLE AREAS *					
25+00	793.1	783.0	10.1	1696.1	1615	81.1
26+00	820.0	783.0	37.0	1736.3	1615	121.3
27+00	824.1	783.0	41.1	1707.8	1615	92.8
28+00	815.4	783.0	32.4	1701.4	1615	86.4
29+00	808.2	783.0	25.2	1562.8	1478	84.8
30+00	794.4	783.0	11.4	1539.2	1478	61.2
31+00	CONFLUENCE "F2", VARIABLE AREAS *					
32+00	CONFLUENCE "F2", VARIABLE AREAS *					
33+00	CONFLUENCE "F2", VARIABLE AREAS *					
34+00	804.8	783.0	21.8	1543.4	1478	65.4
35+00	787.2	783.0	4.2	1530.4	1478	52.4
36+00	863.2	783.0	80.2	1643.0	1478	165.0
37+00	790.7	783.0	7.7	1524.2	1478	46.2
38+00	842.1	783.0	59.1	1585.1	1478	107.1
39+00		CONFLUENCE "E", VARIABLE AREAS *				
40+00		CONFLUENCE "E", VARIABLE AREAS *				
41+00	806.9	783.0	23.9	1544.2	1478	66.2
42+00	812.6	783.0	29.6	1549.5	1478	71.5

* See section 2.3.2.3 and Figure 4.

Table 9 - DIVERSION CHANNEL CROSS SECTIONAL AREA VERIFICATION

Diversion Channel Station Number	Riprapped Cross-Sectional Area			Total Channel Cross-Sectional Area		
	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)
43+00	802.8	783.0	19.8	1535.2	1478	57.2
44+00	804.0	783.0	21.0	1538.6	1478	60.6
45+00	CONFLUENCE "E1", VARIABLE AREAS *					
46+00	CONFLUENCE "E1", VARIABLE AREAS *					
47+00	CONFLUENCE "E1", VARIABLE AREAS *					
48+00	CONFLUENCE "D", VARIABLE AREAS *					
49+00	CONFLUENCE "D", VARIABLE AREAS *					
50+00	CONFLUENCE "D", VARIABLE AREAS *					
51+00	CONFLUENCE "D", VARIABLE AREAS *					
52+00	CONFLUENCE "D", VARIABLE AREAS *					
53+00	804.5	783.0	21.5	1422.7	1347	75.7
54+00	796.4	783.0	13.4	1272.9	1223	49.9
55+00	821.9	783.0	38.9	1317.9	1223	94.9
56+00	468.7	439.0	29.7	1241.4	1104	137.4
57+00	447.2	439.0	8.2	1202.6	1104	98.6
58+00	454.5	439.0	15.5	1075.8	991	84.8
59+00	442.0	439.0	3.0	1050.1	991	59.1
60+00	448.3	439.0	9.3	939.1	884	55.1
61+00	449.6	439.0	10.6	941.8	884	57.8
62+00	447.8	439.0	8.8	957.3	884	73.3
63+00	481.0	439.0	42.0	996.2	884	112.2
64+00	CONFLUENCE "C", VARIABLE AREAS *					
65+00	CONFLUENCE "C", VARIABLE AREAS *					
66+00	539.6	439.0	100.6	910.3	783	127.3
67+00	488.4	439.0	49.4	882.8	783	99.8
68+00	CONFLUENCE "B", VARIABLE AREAS *					
69+00	CONFLUENCE "B", VARIABLE AREAS *					
70+00	344.2	335.0	9.2	631.6	599	32.6
71+00	338.3	335.0	3.3	628.0	599	29.0
72+00	346.2	335.0	11.2	544.2	516	28.2
73+00	342.9	335.0	7.9	540.6	516	24.6
74+00	340.7	335.0	5.7	377.0	368	9.0
75+00	352.0	335.0	17.0	388.5	368	20.5
76+00	338.6	335.0	3.6	375.8	368	7.8
77+00	373.3	335.0	38.3	411.2	368	43.2
78+00	127.8	104.0	23.8	381.0	304	77.0
79+00	135.8	104.0	31.8	407.0	304	103.0
80+00	122.8	104.0	18.8	304.1	245	59.1
81+00	CONFLUENCE "A", VARIABLE AREAS *					
82+00	CONFLUENCE "A", VARIABLE AREAS *					
83+00	CONFLUENCE "A", VARIABLE AREAS *					
84+00	115.6	104.0	11.6	315.5	245	70.5

* See section 2.3.2.3 and Figure 4.

Table 9 - DIVERSION CHANNEL CROSS SECTIONAL AREA VERIFICATION

Diversion Channel Station Number	Riprapped Cross-Sectional Area			Total Channel Cross-Sectional Area		
	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)	As-Built (ft^2)	Design (ft^2)	Difference (ft^2)
85+00	121.3	104.0	17.3	286.9	245	41.9
86+00	117.9	104.0	13.9	339.6	245	94.6
87+00	197.6	104.0	93.6	509.6	245	264.6
88+00	256.4	104.0	152.4	658.5	245	413.5
89+00	253.7	104.0	149.7	**		
90+00	208.9	104.0	104.9	**		

* See section 2.3.2.3 and Figure 4.

*Area above the riprap is very large due to flat terrain.

ATTACHMENT C

DRAINAGE SWALE OUTLET DESIGN: CONSTRUCTION DOCUMENTATION

C.1 DIVERSION CHANNEL AND SWALE APRON DETAIL (DESIGN DRAWING)

C.2 TAILING COVER SWALE OUTLET DESIGN (APPENDIX G, ATTACHMENT C TO 12/94 TAILINGS RECLAMATION PLAN)

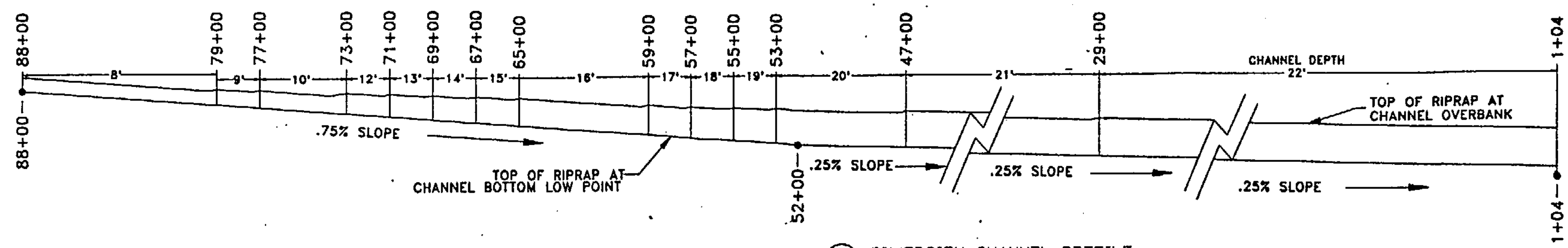
C.3 FIGURES C.1, C.2, C.3 FROM APPENDIX G, ATTACHMENT C TO 12/94 TAILING RECLAMATION PLAN

C.4 SECTION 2.3.5.1 SWALE OUTLET DESIGN REQUIREMENTS FROM SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT.

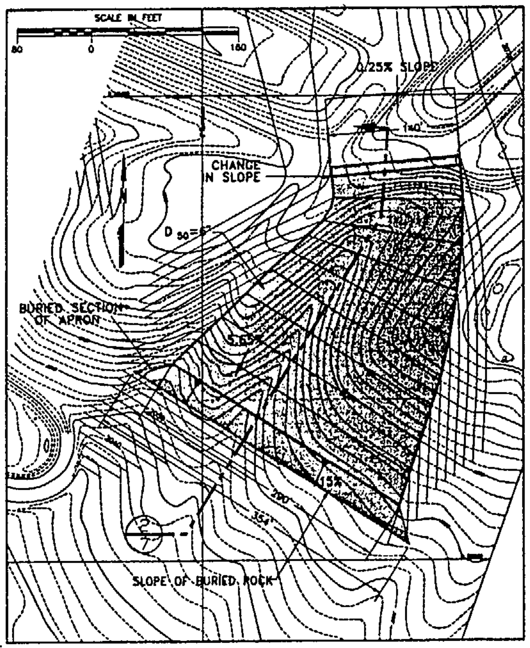
C.5 APPENDIX O, EROSIONAL STABILITY OF TAILING IMPOUNDMENT SWALE FOR THE AS-BUILT CONDITIONS FROM SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT.

ATTACHMENT C.1

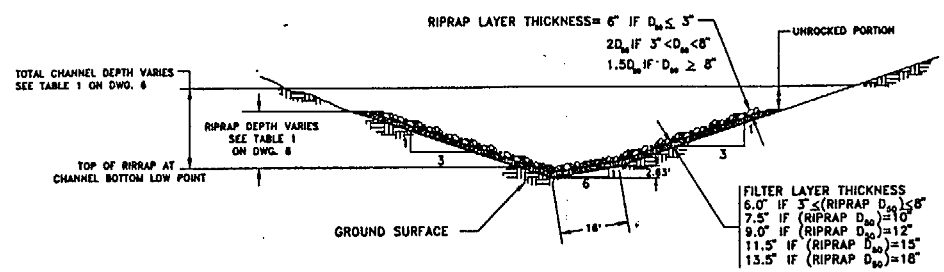
DIVERSION CHANNEL AND SWALE APRON DETAIL (DESIGN DRAWING)



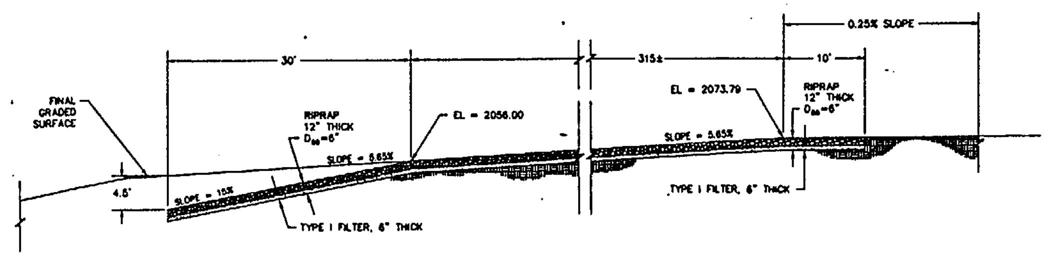
3/7 DIVERSION CHANNEL PROFILE
NOT TO SCALE



1/7 PLAN VIEW OF TAILING COVER SWALE OUTLET
NOT TO SCALE



4/7 DIVERSION CHANNEL TYPICAL CROSS SECTION
NOT TO SCALE



2/7 CROSS-SECTION OF TAILING COVER SWALE OUTLET
NOT TO SCALE

SWA-DET.DWG
11-13-95

NO	DESCRIPTION	BY	CHKD	APPROVED	DATE
	REVISED TO REFLECT REALIGNED CHANNEL	SLS	ROG	LLM	11/95
	UPDATED CHANNEL ALIGNMENT PROFILE	MLC	ROG	LLM	4/94
	MODIFY SWALE ELEVATION	BRJ	ROG	LLM	8/94

DRAWING NO.	DRAWING TITLE

ENGINEERING RECORD	BY	DATE

PREPARED BY
SMI
SHEPHERD MILLER, INC.

PREPARED FOR
WNI
WESTERN NUCLEAR, INC.

DIVERSION CHANNEL AND SWALE APRON DETAILS

317 | DEC, 1994 | 1" = 20' | SWA-DET.DWG | 7

ATTACHMENT C.2

TAILING COVER SWALE OUTLET DESIGN (APPENDIX G, ATTACHMENT C TO 12/94 TAILINGS RECLAMATION PLAN)

ATTACHMENT C
TAILING COVER SWALE OUTLET DESIGN

The tailing cover swale outlet was analyzed as a non-circular culvert, using the Department of Transportation Method (DOT, 1983) for calculating scour as recommended by the NRC STP (1990). The design was a three step process. This process is outlined below.

1. Determine depth and width of scour that could occur at the swale outlet as a result of the PMF.

2. Determine the dimensions of the apron necessary to prevent scour from impacting the erosional stability of the swale.

3. Determine the necessary rock size for the apron.

STEP 1:
This method required the determination of several parameters. The duration of the peak discharge (t) was conservatively estimated to be 15 minutes. This was derived from the hydrograph for the channel outlet using the HEC-1 model. This hydrograph is presented on Figure C.1 of this Attachment.

The swale outlet apron has two regions of different slope. The upper region has a slope of approximately four percent and an initial width of approximately 140 feet. The lower region has an initial width of 290 feet and a slope of 9.7 percent. Both regions were evaluated for scour and appropriate rock size.

The natural soil in the area is assumed to consist of soil represented by the SC-2 soil composite (presented in Appendix A). Based on the grain size curve, SC-2 soil is classified for purposes of determining the maximum gully depth as graded sand. Values (α_e, β, θ) for depth and width of scour are provided in Table V-1 of the DOT (1983) Method for graded sand (see Appendix D, Attachment E). The values used are listed below.

Material Identification: Graded Sand	Depth		
	β	θ	α_e
Depth	0.85	0.07	0.75
Width	0.76	0.06	4.78
Length	0.41	0.04	12.62

Because the outlet of the swale is classified as a noncircular culvert, the diameter D is replaced by an equivalent depth y_e, where y_e is defined as:

$$y_e = \left[\frac{A}{2}\right]^{1/2}$$

where A is the cross-sectional area of flow.

Substituting equivalent depth and the values obtained in Table V-1 (DOT, 1983 pg. V-11) into the dimensionless equations listed below, the depth (h_s), width (W_s), and length (L_s) of scour were determined.

$$\frac{h_s}{y_e} = \alpha_e \left[\frac{Q}{\sqrt{g}\ y_e^{5/2}}\right]^{\beta} \left[\frac{t}{t_o}\right]^{\theta} \qquad \textbf{Depth of Scour}$$

$$\frac{W_s}{y_e} = \alpha_e \left[\frac{Q}{\sqrt{g}\ y_e^{5/2}}\right]^{\beta} \left[\frac{t}{t_o}\right]^{\theta} \qquad \textbf{Width of Scour}$$

$$\frac{L_s}{y_e} = \alpha_e \left[\frac{Q}{\sqrt{g}\ y_e^{5/2}}\right]^{\beta} \left[\frac{t}{t_o}\right]^{\theta} \qquad \textbf{Length of Scour}$$

where:

- Q = Discharge (627 cfs obtained in HEC-1 output)
- g = acceleration of gravity (32.2 ft/s^2)
- y_e = equivalent depth for noncircular culverts (upper apron: 5.84 ft; lower apron: 5.91 ft)
- t = time in minutes of duration of peak discharge (15 min.)
- t_o = experimental time base = 316 min. (DOT, 1983 pg. V-2)
- α, β, θ are obtained in Table V-1 (DOT, 1983 pg. V-11)

The results of these analyses have determined that the maximum depth, width, and length of scour for the upper apron are 4.5 ft, 29.0 ft, and 73.6 feet, respectively. The maximum depth, width, and length of scour for the lower apron were determined to be 4.5 ft., 28.7 ft., and 73.6 ft, respectively. The location of the maximum depth of scour is 0.4(L_s) which is equal to approximately 30 feet from the initiation of the 9.7 percent slope.

STEP 2:

After the depth, width, and length of the largest possible scour hole have been determined, the dimensions of the apron are derived. These dimensions include the width and the angle of flare for the apron. These dimensions were determined as suggested by the Department of Transportation (DOT, 1983 pg. V-6) using the following equations:

$$\theta = \tan^{-1}\left[\frac{1}{3Fr}\right] \qquad \textbf{Angle of Flare}$$

$$W = Wo + 2L\tan\theta \qquad \textbf{Downstream width}$$

Where W_o is the initial width of the channel, L is the length of the apron, and Fr is the Froude Number at the outlet of the channel.

The length the lower apron was determined to be approximately 30 feet based on the estimated location of maximum scour depth. As shown in Figure C.3, the apron will extend from the initiation of the four percent slope to approximately 30 feet below the initiation of the 9.7 percent slope. The riprap will be installed at a 4H:1V slope and backfilled with native materials to the pre-existing 9.7 percent surface slope. This length will prevent erosion from "headcutting" and impacting the erosional stability of the swale under PMF conditions.

The maximum scour into the sand material is calculated to be 4.5 feet under PMF conditions. The depth to top of the riprap apron will be at least 4.5 feet at a distance of 30 feet from the initiation of the 9.7 percent slope or to bedrock, whichever is less.

A plan view and a cross section of the apron are shown on Figures C.2 and C.3.

STEP 3

After the dimensions of the apron were established, the necessary rock size for the apron was determined. The rock was sized using the CSU method (Abt et. al, 1988). This is a procedure developed to determine rock sizes for large flows over slopes ranging up to 20%. The slope of the upper apron is approximately 4 % and the slope of the lower apron is approximately 25 % (4H:1V). A median rock size (D_{50}) of 3.6 inches was calculated for the upper apron and a D_{50} of 5.2 inches was calculated for the lower apron. A D_{50} of 6 inches will be used for both apron regions due to lower cost of producing this rock size. The 6 inch rock will be used downstream of the slope change and a distance of 10 feet upstream from the initiation of the upper apron. Details of the apron are shown on Figures C.2 and C.3. Filter type I, described in Appendix H, will be installed below the riprap at a thickness of one-half the size of the riprap.

REFERENCES:

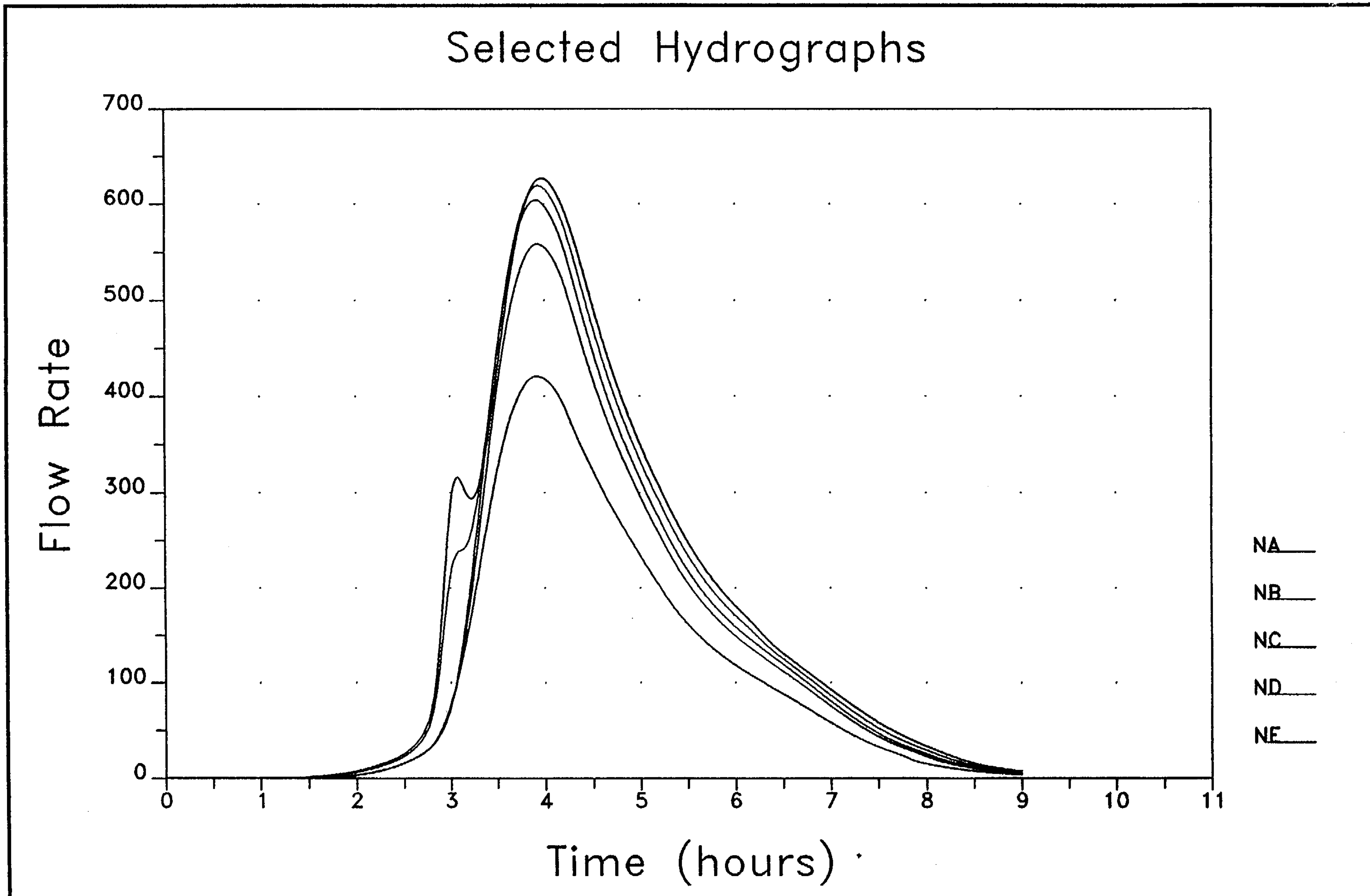
Abt, S.R., et al. "Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase II," NUREG/CR-4651. Vol 2, 1988.

U.S. Department of Transportation (DOT), "Hydraulic Design of Energy Dissipators for Culverts and Channels", Hydraulic Engineering Circular No.14, September 1983.

U.S. Nuclear Regulatory Commission (NRC), "Final Staff Technical Position Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailing Sites," 1990.

ATTACHMENT C.3

FIGURES C.1, C.2, C.3 FROM APPENDIX G, ATTACHMENT C TO 12/94 TAILINGS RECLAMATION PLAN



SMI
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FIGURE C.1
ROUTED HYDROGRAPHS FOR
TAILING COVER SWALE

Date:	DEC., 1994
Project:	317
File:	SURF-1

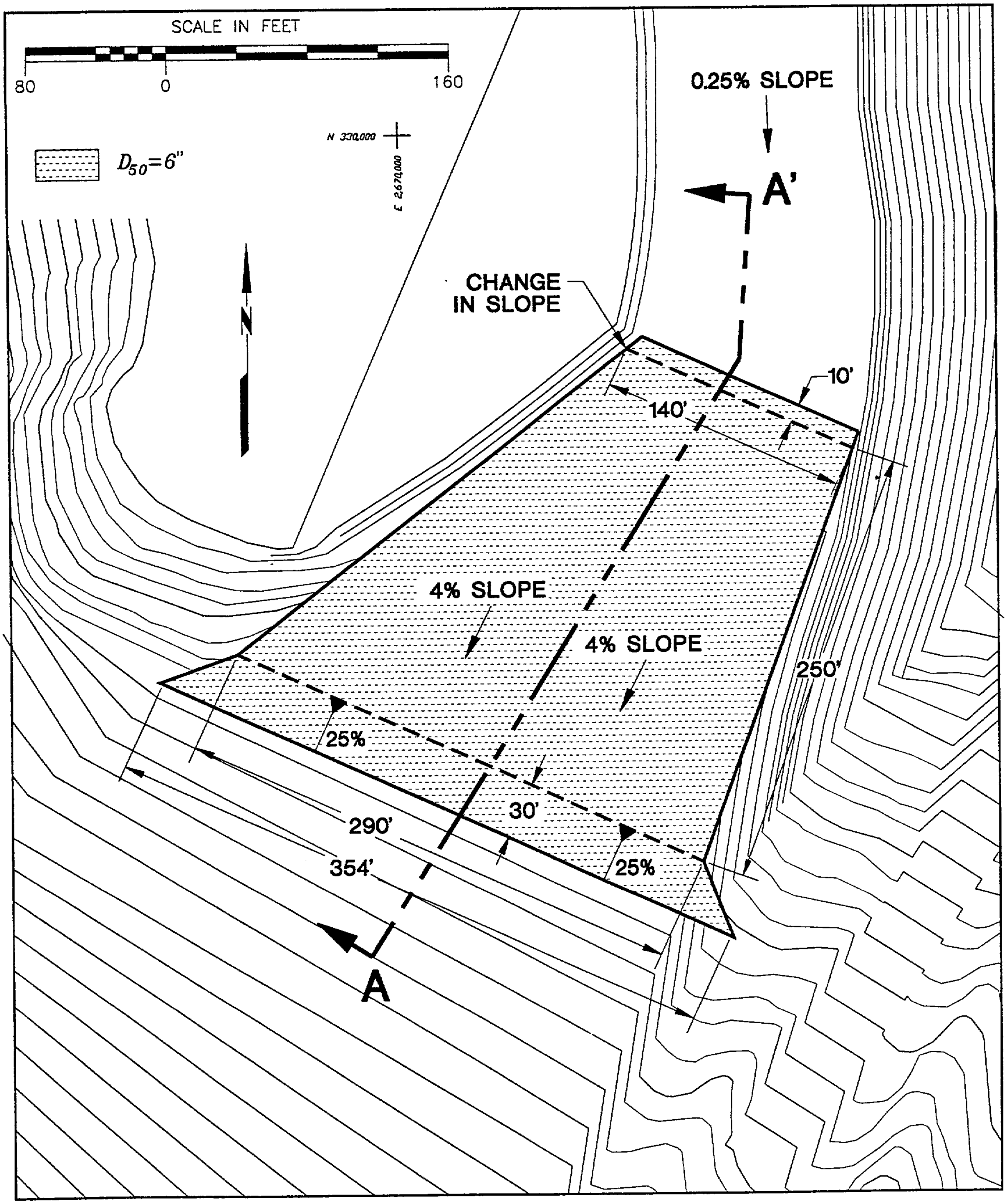

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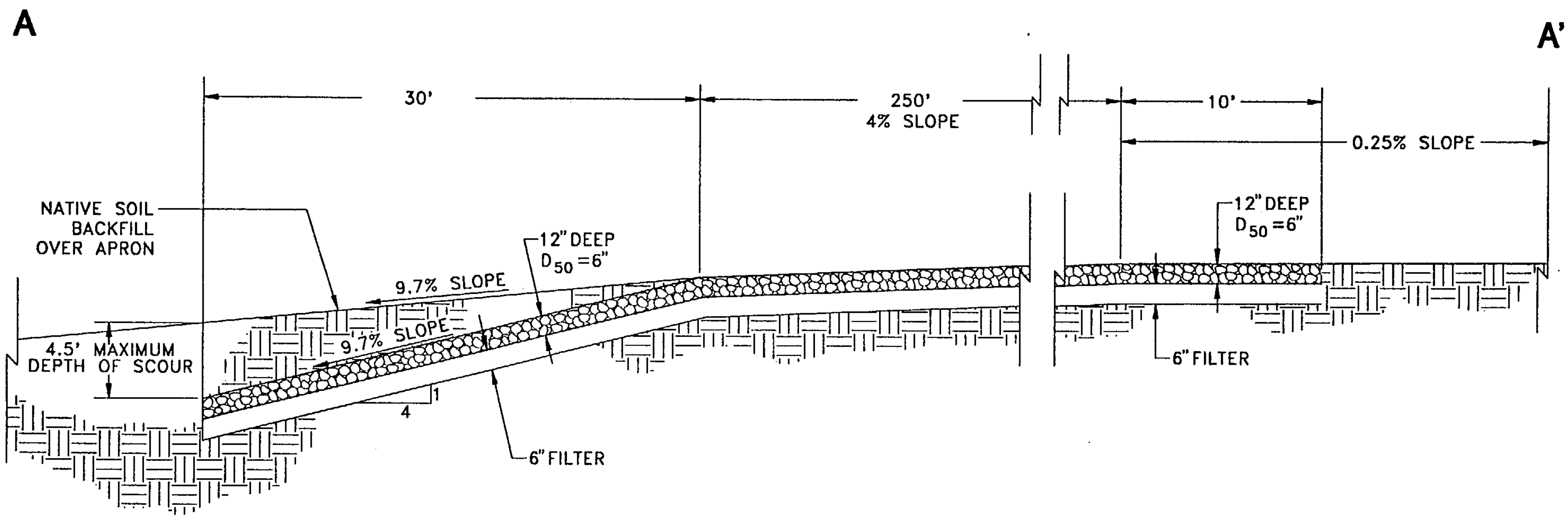
FIGURE C.2
TAILING COVER SWALE
PLAN VIEW OF OUTLET

Date:	DEC., 1994
Project:	317\T31
File:	APRONXS1



SMI
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FIGURE C.3
TAILING COVER SWALE OUTLET
CROSS SECTION A–A'

Date:	DEC., 1994
Project:	317\T31
File:	APRONXS2

G. C-9

ATTACHMENT C.4

SECTION 2.3.5.1 SWALE OUTLET DESIGN REQUIREMENTS FROM SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT.

Section 5.2.1 of the Technical Specifications. Gradation test results also indicated compliance with the Technical Specifications.

2.3.4.4 Embankment Outslope Groin Filter and Riprap

Riprap and filter material was placed along the contact between the west side of the embankment toe and natural ground (groin). The placed riprap size, the filter type, and the thickness of the riprap and filter are presented in Table 17. Table 17 also presents the design requirements for the riprap and filter. As can be seen, the riprap sizes placed are equal to or larger than required. The filter material placed is consistent with the size of overlying riprap, and the thickness of riprap and filter are equal to or greater than required. Rock durability and gradation testing results are presented in Section 2.1.7. All durability tests performed in riprap used in the groin areas indicated a rating of 80 or higher as required in Section 5.2.1 of the Technical Specifications. The gradation test results also indicated compliance with the Technical Specifications.

2.3.5 Swale Outlet

2.3.5.1 Design Requirements

The outlet of the swale shall be protected with riprap and filter material to control erosion. The design requirements for the swale outlet are presented in Section 5, Tables 2A and 2B, and Drawing 7 of the Technical Specifications. Specifically, the design requirements are as follows:

1. The swale outlet shall have the dimensions and slopes as detailed on Drawing 7 of the Technical Specifications.
2. The riprap and filter gradations, thickness, and durability requirements are specified in Section 5.0, Table 2A, Table 2B, and Drawing 7 of the Technical Specifications.

2.3.5.2 Swale Outlet Dimensions and Slopes

The slopes, length, width, and depth of the buried apron portion of the swale outlet were determined by surveying and measuring the swale outlet. The as-built and design dimensions and slopes are presented in Table 18. As can be seen, the swale outlet dimensions and slopes are essentially the same as the design, with the exception of the length and slope of the swale outlet apron.

Analysis shows that the as-built conditions provide the level of erosional protection assumed in the design. Evaluation of the as-built conditions is provided in Appendix O.

2.3.5.3 Swale Outlet Filter and Riprap

Filter and riprap material were placed in accordance with the requirements of the technical specifications. Riprap with a minimum (D_{50}) size of 6 inches and type I Filter were used throughout. Durability test results for these materials are presented in Section 2.1.7. The durability test results indicated that all riprap placed in the swale apron had a rating of 80 or greater. The gradation test results indicated compliance with the Technical Specifications.

The thicknesses of the filter and riprap were measured at four locations. The results of the measurements, along with the required thicknesses, are presented in Table 19. As can be seen, all thickness measurements are equal to or greater than design requirements.

ATTACHMENT C.5

APPENDIX O, EROSIONAL STABILITY OF TAILING IMPOUNDMENT SWALE FOR THE AS-BUILT CONDITIONS FROM SHERWOOD TAILING RECLAMATION CONSTRUCTION COMPLETION REPORT.

APPENDIX O

EROSIONAL STABILITY OF TAILING IMPOUNDMENT SWALE FOR AS-BUILT CONDITIONS

EROSIONAL STABILITY OF AS-BUILT TAILING IMPOUNDMENT SWALE OUTLET

1.0 PURPOSE

Drawing 7 of the WDOH approved Technical Specifications presents plan and profile views of the Tailing Cover Impoundment Swale Outlet. That drawing indicates that the buried apron of the outlet requires a slope of 15%, a scour depth of 4.5 ft and a length of 30 ft. A survey of the finished swale outlet structure has indicated dimensions that vary somewhat from the Drawing 7 dimensions.

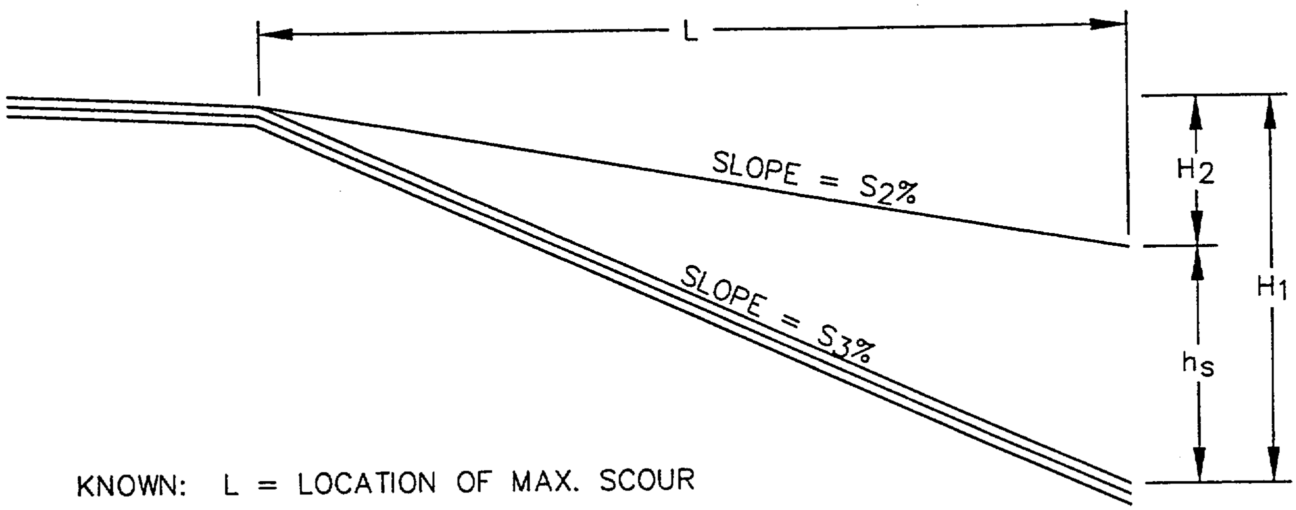
The purpose of this Appendix is to discuss how the design of the swale outlet evolved from the 12/94 TRP to the construction level design and to evaluate the erosional stability of the As-Built tailing swale outlet apron. Table O-1 provides a comparison of the design and the As-Built dimensions for the outlet apron.

Table O-1 Comparison of Design and As-Built Tailing Swale Apron Dimensions

Feature	Design in April 1996 Technical Specifications	Design in WDOH Approved November 1996 Technical Specifications	As-Built
Length (ft)	30	30	23.3
Scour Depth (ft)	4.5	4.5	4.5
Width (ft)	290	290	290.1
Slope of native ground (%)	9.7	5.65	5.65
Slope of buried riprap (%)	25	21[a]	24.8

(a) The design slope in Drawing 7 of the WDOH approved November, 1996 Technical Specifications is shown as 15%. This slope was calculated by dividing the scour depth h_s (4.5 ft) by the length (L)(30 ft). This value is incorrect because as shown in Figure O-1, the slope is equal to the depth H_1 divided by L. As discussed below the correct slope is 21%.

As illustrated in Figure O-1, the slope of the tailing swale apron (S_3) is equal to the depth H_1 divided by the length L. However, since the value of H_1 is not known, it is necessary to derive an equation for S_3 in terms of the ground slope S_2 and the scour depth h_s which are known values. The equation as derived on Figure O-1 is as follows:



KNOWN: L = LOCATION OF MAX. SCOUR

h_s = DEPTH OF MAX. SCOUR = 4.5 FT.

S_2 in% = GROUND SURFACE

$$S_3 \text{ in\%} = \frac{H_1}{L}(100)$$

SOLVE FOR S_3 IN TERMS OF S_2 AND h_s WHICH ARE KNOWN VALUES

$$\frac{H_1}{L}(100) = \frac{S_3 \text{ in\%}}{100}, \quad \text{so } H_1 = \frac{(S_3 \text{ in\%})(L)}{100},$$

$$\frac{H_2}{L}(100) = \frac{S_2 \text{ in\%}}{100}, \quad \text{so } H_2 = \frac{(S_2 \text{ in\%})(L)}{100},$$

$$h_s = H_1 - H_2$$

$$h_s = \frac{(S_3 \text{ in\%})(L)}{100} - \frac{(S_2 \text{ in\%})(L)}{100}$$

$$\frac{100h_s}{L} = (S_3 \text{ in\%}) - (S_2 \text{ in\%})$$

$$\therefore S_3 \text{ in\%} = \frac{100h_s}{L} + S_2 \text{ in\%}$$

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FIGURE O-1
SHERWOOD PROJECT
TAILINGS SWALE OUTLET APRON SLOPE

Date:	JUNE 1997
Project:	03-319
File:	SWALE-1

$$S_3(\%) = \left[\frac{100h_s}{L}\right] + S_2(\%) \qquad \text{Equation 1}$$

The swale apron slope is shown in Drawing 7 of the November 1996 Technical Specifications as 15%. This value is in error because as stated in the footnote in Table O-1, an incorrect depth was used in the slope calculation. Using the equation above results in a correct slope of 21%.

$$S_3(\%) = \left[\frac{(100)(4.5)}{30}\right] + 5.65$$

$$S_3 = 21\%$$

In preparing the Construction Drawings, all three swale apron designs summarized above were reviewed. The decision was made at that time that the apron slope should be as was initially in the April 1996 Technical Specifications (25%). This required a change in the length (L) of the apron. This revised L was calculated by rearranging Equation 1 above to solve for L. The resultant equation was as follows:

$$L = \left[\frac{100h_s}{S_3(\%)-S_2(\%)}\right] \qquad \text{Equation 2}$$

$$L = \left[\frac{(100)(4.5)}{25-5.65}\right]$$

$$L = 23\ feet$$

Based on a comparison of several tailing swale apron designs it is concluded that there are no significant differences between the November 1996 Technical Specification design and the As-Built since the differences in dimensions are within acceptable construction practices. The greatest differences are the apron slope (Technical Specifications [24%] verses As-Built [21%]) and the length (Technical Specifications [30 ft] verses As-Built [23.3]). Based on this comparison, it is further concluded that the As-Built tailing impoundment swale apron is erosionally stable.

1.0 INTRODUCTION

This report presents the results of the post-reclamation stability monitoring for the Western Nuclear, Inc. (WNI) Sherwood Project uranium mill tailing facility performed in accordance with Washington Department of Health (WDOH) Radioactive Materials License WN-I0133-1, Conditions No. 22 and 36A. This monitoring establishes that the reclamation of the Sherwood Project has performed and will continue to perform as designed and that the highly conservative objectives and criteria developed in the Monitoring and Stabilization Plan (MSP; WNI, 1997), which governs the post-reclamation construction monitoring as per the License Conditions noted above, have been satisfied. This report documents the successful demonstration that all aspects of the site reclamation meet the applicable standards and requirements for the protection of public health, safety and the environment in preparation for license termination.

The post reclamation construction monitoring included:

- Ground water monitoring
- Structural stability monitoring of:
  - Tailing impoundment surface cover
  - Drainage diversion channels
  - Tailing impoundment margins
  - Tailing impoundment embankment
  - Additional areas of previous disturbance
- Revegetation of:
  - Tailing impoundment surface
  - Tailing impoundment margins

The MSP details the procedures and criteria to verify reclamation performance.

2.0 GROUND WATER MONITORING

Attachment A to this submittal presents the numerical data for all ground water constituents of regulatory concern and indicator parameters and data plots of data of indicator parameters; static water level (SWL), total dissolved solids (TDS), sulfate (SO_4), chloride (Cl), and the hazardous constituent uranium. Monitoring data is presented for background well MW-2B and compliance wells MW-4 and MW-10. Ground water monitoring data developed in accordance with the MSP and License Conditions 22 and 36A have been submitted to the WDOH as follows:

- April 22, 1997
- May 1, 1997 (Annual GW Report for 1996)
- May 20, 1997 (Transmitting results of confirmation sampling)
- October 22, 1997 (Compliance monitoring notification)
- May 1, 1998 (Annual Report for 1997)
- July 31, 1998 (Evaluation of anomalous ground water quality data)
- August 31, 1999 (1998 Annual Report with data from the first half of 1999)

These data demonstrate that all hazardous constituent concentrations in ground water (Uranium, Ra-226, Ra-226+228, Th-230, As, Ni, Tl) are stable within the range of natural variability and remain below regulatory levels. Fluctuations in SWL and indicator parameter values, observed during post-reclamation construction compliance monitoring, are consistent with anticipated trends and values. Therefore, ground water monitoring requirements have been satisfied and, with the exception of a one-time final confirmation sampling for hazardous constituents at license termination, all ground water monitoring has been completed. It is anticipated that this final sampling will be performed in November or December of 1999.

3.0 STRUCTURAL STABILITY MONITORING

Structural stability monitoring has been performed as per the MSP and License Condition No.s 22 and 36A beginning in the fall of 1997. Monitoring was performed to confirm the structural integrity of the reclaimed tailing impoundment and surrounding facility elements and to confirm reclamation design and construction performance. Structural stability monitoring included monitoring of:

- Tailing impoundment surface cover (including swale and apron)
- Drainage diversion channels (including confluences)
- Tailing impoundment margins (including margin toes)
- Tailing impoundment embankment
- Additional areas of previous disturbance

The monitoring was performed by Ms. Shiela Pachernegg, an independent Professional Engineer licensed in the state of Washington and experienced with the design, construction, and performance evaluation of erosion protection practices, semi-annually in the spring and fall. The areas monitored were modified from the original MSP as approved by the WDOH via License Amendment No. 32 (September 27, 1999). Semi-annual structural stability monitoring reports were submitted to WDOH on the following dates:

- February 12, 1998 (Fall 1997 Inspection Report)
- October 6, 1998 (Spring 1998 Inspection Report)
- January 5, 1999 (Fall, 1998 Inspection Report)
- June 16, 1999 (Spring 1999 Inspection Report)

Additionally, the structural stability monitoring report for fall 1999 is included as Attachment B to this submittal.

All semi-annual inspections have confirmed that no corrective actions were required to maintain reclamation design stability for all elements of the reclaimed facility. The consistent results of structural stability monitoring verify that the reclaimed site is and will continue to perform as designed. Therefore, all applicable standards and requirements for reclamation structural stability performance have been satisfied.

4.0 REVEGETATION MONITORING

The MSP developed sampling methods, sampling frequencies, methods of analysis and criteria for determining successful establishment of vegetation on the tailing impoundment cover and margin outslopes. Impoundment cover and margin outslopes were evaluated independently for comparison to area-specific criteria since vegetative cover established on these areas fulfill different functions within the reclamation design, and were based on different assumptions. Establishment of vegetation on the tailing impoundment margin outslopes provides enhancement of the erosional stability of the margins while establishment of vegetation on the tailing impoundment cover provides enhancement of the surface erosional stability as well as providing reductions of long-term infiltration of precipitation through evapotranspiration by the established plant community. Margin outslope areas with underlying bedrock at or near the surface do not require vegetation to meet performance requirements for erosional stability. Similarly, portions of the impoundment cover where seasonally ponded water precludes the erosion of cover materials or the establishment of vegetation do not require vegetation to meet performance requirements for erosional stability. The areas along the margin outslopes with shallow bedrock and the area of the impoundment cover with seasonal ponding have been requested to be deleted from the vegetation monitoring requirement since they are inherently stable without vegetation . This requests were submitted to WDOH on October 22, 1999 and May 20, 1999. These requests are pending and all results are being evaluated as per letter from WDOH dated September 21, 1999.

Vegetation monitoring was required annually during peak annual plant growth, typically in July. Results of MSP vegetation monitoring were reported to WDOH on the following dates:

- February 12, 1998 (1997 Vegetation Monitoring and Success Evaluation)
- October 6, 1998 (1998 Vegetation Monitoring Program)
- October 22, 1999 (1999 Vegetation Monitoring Program)

Results of MSP vegetation monitoring over the past 3 years have demonstrated the successful establishment of a diverse and self-sustaining plant community which meet the highly conservative assumptions and objectives of the reclamation design for both the impoundment surface and margins. These data are summarized in Attachment C to this submittal. Though the plant coverage for the two impoundment areas are just slightly below the MSP numerical criteria, there are additional means and bases for demonstrating that impoundment reclamation design assumptions and objectives have been met. Attachment C to this submittal includes a discussion of additional data and rationale establishing this point. Based on these data, the relevant and necessary criteria for ensuring successful establishment of vegetation on the appropriate portions of the reclaimed tailing impoundment and margins have been satisfied.

5.0 CONCLUSION

Based on all the data discussed above, it is evident that the Sherwood Project reclamation has met all appropriate performance standards and requirements. Therefore, the Radioactive Materials License WN-I0133-1 may be terminated and the site transferred to the care of the long-term custodian.

6.0 REFERENCES

Pachernegg, 1998. Sherwood Project Fall 1997 Structural Stability Inspection Report. February 12, 1998.

Pachernegg, 1998a. Sherwood Project Spring 1998 Structural Stability Inspection Report. October 6, 1998.

Pachernegg, 1998b. Sherwood Project Fall 1998 Structural Stability Inspection Report. January 5, 1999.

Pachernegg, 1999. Sherwood Project Spring 1999 Structural Stability Inspection Report. June 16, 1999.

WNI, 1997. Sherwood Project Annual Environmental Monitoring Report for 1996. May 1, 1997.

1997a. Sherwood Project Monitoring and Stabilization Plan. September 24, 1997.

1997b. Letter to Gary Robertson, WDOH, Transmitting results of confirmation sampling. May 20, 1997.

1997c. Letter to Gary Robertson, WDOH, Compliance monitoring notification. October 22, 1997.

1998. 1997 Vegetation Monitoring and Success Evaluation Report. February 12, 1998.

1998a. Sherwood Project Annual Environmental Monitoring Report for 1997. May 1, 1998.

1998b. Submittal to WDOH, Evaluation of anomalous ground water quality data. July 31, 1998.

1998c. 1998 Vegetation Monitoring Program. October 6, 1998.

1999. Sherwood Project 1998 Annual Report with data from the first half of 1999. August 31, 1999

1999a. 1999 Vegetation Monitoring Program. November 16, 1999.

ATTACHMENT A

GROUND WATER DATA

Memo

Western Nuclear, Inc.

To: Lou Miller

From: Tom Garrett

Date: 11/05/99

Subject: Sherwood report update

Inclosed are the requested printout and graph updates for Sherwood wells MW2B, MW4 and MW10.

Please give me a call if I have left something out or you need something else run.

Thanks,

Thomas E. Garrett

Thomas E. Garrett

tgarrett@ix.netcom.com

303 973-0546 (home)

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	Calcium (D) mg/l	Magnesium (D) mg/l	Sodium (D) mg/l	Potassium (D) mg/l
11/21/1996	37.0	7.3	6.1	2.6
03/27/1997	32.0	4.6	5.0	2.0
05/22/1997	23.7	3.6	6.0	1.7
06/26/1997	25.5	5.6	7	2.3
07/24/1997	41.8	7.6	8.0	2.6
08/21/1997	38.7	7.1	7.3	2.4
09/25/1997	28.8	5.5	6.6	2.1
10/16/1997	21.7	5.1	7.1	2.1
11/20/1997	23	4	7	2
12/17/1997	20.8	5.2	6.5	1.97
01/22/1998	28.3	6.1	7.3	2.0
02/25/1998	36.3	6.9	7.2	2.2
03/18/1998	31.6	6.2	7.3	2
04/22/1998	28.0	6.0	7.0	2.0
05/28/1998	26.2	6.3	7.4	2.2
06/17/1998	30.0	6.7	7.4	2.2
07/16/1998	28.7	7.1	7.5	2.2
08/19/1998	36.2	7.1	7.8	2.4
09/17/1998	30.5	7.8	8.1	2.5
10/22/1998	40.6	8.0	7.6	2.5
01/27/1999	38.9	8.8	7.2	2.4
05/12/1999	36.0	7.0	9.3	2.7
09/15/1999	33.7	6.8	7.4	2.5

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW2B
Date Range : 01/01/1978 - 12/31/1999

****

Analytes:	Ca	Mg	Na	K
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS **************************				
N of Cases :	23	23	23	23
Average :	3.122E+01	6.365E+00	7.178E+00	2.242E+00
Std. Dev. :	6.190E+00	1.289E+00	8.279E-01	2.569E-01
Variance :	3.832E+01	1.661E+00	6.854E-01	6.600E-02
Std. Err. :	1.291E+00	2.688E-01	1.726E-01	5.357E-02
Maximum :	4.180E+01	8.800E+00	9.300E+00	2.700E+00
Minimum :	2.080E+01	3.600E+00	5.000E+00	1.700E+00
********** STUDENT'S T STATISTIC *********************				
Student T :	-2.267E+00	-2.594E+00	-2.927E+00	-1.842E+00
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	6.392E-02	4.098E-02	2.640E-02	1.151E-01
S.E. Diff :	3.418E+00	9.155E-01	6.321E-01	2.036E-01
95%C.I.Dif :	-1.611E+01	-4.615E+00	-3.397E+00	-8.732E-01
Cat 1 Mean :	2.955E+01	5.275E+00	6.025E+00	2.150E+00
S.D. :	6.114E+00	1.578E+00	8.180E-01	3.873E-01
S.E. Mean :	3.057E+00	7.889E-01	4.090E-01	1.936E-01
Cat 2 Mean :	3.730E+01	7.650E+00	7.875E+00	2.525E+00
S.D. :	3.061E+00	9.292E-01	9.639E-01	1.258E-01
S.E. Mean :	1.530E+00	4.646E-01	4.820E-01	6.292E-02
********** MANN-WHITNEY-U STATISTIC ******************				
U-Stat :	2.000E+00	2.000E+00	0.000E+00	3.000E+00
Signific :	-1.732E+00	-1.732E+00	-2.309E+00	-1.452E+00
P = Val 1T :	4.163E-02	4.163E-02	1.046E-02	7.324E-02
P = Val 2T :	8.326E-02	8.326E-02	2.092E-02	1.465E-01
********** LINEAR REGRESSION *************************				
Slope :	5.753E-03	2.569E-03	2.217E-03	3.905E-04
Intercept :	2.852E+01	5.159E+00	6.137E+00	2.059E+00
R-square :	5.504E-02	2.531E-01	4.569E-01	1.472E-01
r :	2.346E-01	5.031E-01	6.759E-01	3.837E-01
F :	1.223E+00	7.115E+00	1.766E+01	3.626E+00
P :	2.813E-01	1.441E-02	3.999E-04	7.069E-02

****

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	Carbonate mg/l	Bicarbonate mg/l	Sulfate (D) mg/l	Chloride (D) mg/l
11/21/1996	0	160	4.1	3.1
03/27/1997	0	131	4.9	<1.0
05/22/1997	0	101	3.0	<1.0
06/26/1997	0	122	3.7	<1.0
07/24/1997	0	174	3.6	<1.0
08/21/1997	0	160	2.0	<1.0
09/25/1997	0	119	2.7	<1.0
10/16/1997	<0.10	106	2.1	<1.0
11/20/1997	<0.1	104	2.7	1.1
12/17/1997	<1	104	1.2	<1
01/22/1998	<0.10	133	1.9	<1.0
02/25/1998	<0.10	154	2.2	<1.0
03/18/1998	<0.1	148	1.5	<1
04/22/1998	<1.0	138	2.4	<1.0
05/28/1998	<1.0	126	2.6	<1.0
06/17/1998	<1.0	135	2.2	<1.0
07/16/1998	<1.0	141	2.1	<1.0
08/19/1998	<1.0	152	2.1	<1.0
09/17/1998	<1.0	154	1.9	<1.0
10/22/1998	<1.0	166	1.8	<1.0
11/19/1998			1.0	<1.0
12/10/1998			1.5	<1.0
01/27/1999	<1.0	177	3.7	<1.0
02/24/1999			3.0	<1.0
03/24/1999			3.5	<1.0
04/08/1999			4.1	<1.0
05/12/1999	<1.0	155	3.3	<1.0
09/15/1999	<1.0	150	2.3	<1.0

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW2B
Date Range : 01/01/1978 - 12/31/1999

Analytes:	CO3	HCO3	SO4	Cl
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS				
N of Cases	23	23	28	28
Average	5.000E-01	1.396E+02	2.611E+00	1.079E+00
Std. Dev.	4.908E-01	2.268E+01	9.616E-01	3.966E-01
Variance	2.409E-01	5.142E+02	9.247E-01	1.573E-01
Std. Err.	1.023E-01	4.728E+00	1.817E-01	7.495E-02
Maximum	1.000E+00	1.770E+02	4.900E+00	3.100E+00
Minimum	0.000E+00	1.010E+02	1.000E+00	1.000E+00
********** STUDENT'S T STATISTIC				
Student T	.	-2.457E+00	1.146E+00	1.000E+00
Deg. Free	.	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig	.	4.933E-02	2.953E-01	3.559E-01
S.E. Diff	.	1.364E+01	5.452E-01	5.250E-01
95%C.I.Dif	.	-6.686E+01	-7.092E-01	-7.596E-01
Cat 1 Mean	0.000E+00	1.285E+02	3.925E+00	1.525E+00
S.D.	0.000E+00	2.447E+01	7.932E-01	1.050E+00
S.E. Mean	0.000E+00	1.224E+01	3.966E-01	5.250E-01
Cat 2 Mean	1.000E+00	1.620E+02	3.300E+00	1.000E+00
S.D.	0.000E+00	1.203E+01	7.483E-01	0.000E+00
S.E. Mean	0.000E+00	6.014E+00	3.742E-01	0.000E+00
********** MANN-WHITNEY-U STATISTIC				
U-Stat	0.000E+00	2.000E+00	4.500E+00	6.000E+00
Signific	-2.646E+00	-1.732E+00	-1.016E+00	-1.000E+00
P = Val 1T	4.075E-03	4.163E-02	1.547E-01	1.587E-01
P = Val 2T	8.151E-03	8.326E-02	3.094E-01	3.173E-01
********** LINEAR REGRESSION				
Slope	1.556E-03	3.298E-02	-7.977E-04	-5.988E-04
Intercept	-2.308E-01	1.241E+02	3.033E+00	1.396E+00
R-square	6.404E-01	1.348E-01	4.795E-02	1.588E-01
r	8.003E-01	3.671E-01	-2.190E-01	-3.985E-01
F	3.740E+01	3.271E+00	1.309E+00	4.910E+00
P	4.550E-06	8.486E-02	2.629E-01	3.567E-02

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	TDS mg/l	Alk CaCO3 mg/l	SIO2 (D) mg/l	pH Lab s.u.
11/21/1996	209	131	41.0	7.52
03/27/1997	172	107	54.6	7.73
05/22/1997	131	82.8	50.6	7.40
06/26/1997	137	100	47.0	7.75
07/24/1997	192	143	43.0	7.85
08/21/1997	195	131	45.5	7.84
09/25/1997	113	97.9	45.4	7.92
10/16/1997	155	87.1	49.4	7.63
11/20/1997	148	85.5	45	7.55
12/17/1997	118	85.1	47.1	7.74
01/22/1998	166	109	48.0	
02/25/1998	183	126	45.2	
03/18/1998	164	121	43.3	
04/22/1998	162	113	48.0	
05/28/1998	166	103	46.2	
06/17/1998	151	111	46.2	
07/16/1998	157	116	46.6	
08/19/1998	187	124	44.6	
09/17/1998	193	126	46.9	
10/22/1998	217	137	46.9	
11/19/1998	183			7.09
12/10/1998	177			7.46
01/27/1999	190	146	50.3	
02/24/1999	178			7.16
03/24/1999	238			7.19
04/08/1999	187			7.30
05/12/1999	187	127	51.1	
09/15/1999	167	124		7.65

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW2B
Date Range : 01/01/1978 - 12/31/1999

Analytes:	TDS	ALK	SIO2	pH_L
Units:	mg/l	mg/l	mg/l	s.u.
BASIC STATISTICS				
N of Cases :	28	23	22	16
Average :	1.723E+02	1.145E+02	4.690E+01	7.549E+00
Std. Dev. :	2.823E+01	1.869E+01	3.015E+00	2.612E-01
Variance :	7.969E+02	3.491E+02	9.093E+00	6.821E-02
Std. Err. :	5.335E+00	3.896E+00	6.429E-01	6.529E-02
Maximum :	2.380E+02	1.460E+02	5.460E+01	7.920E+00
Minimum :	1.130E+02	8.280E+01	4.100E+01	7.090E+00
STUDENT'S T STATISTIC				
Student T :	-1.380E+00	-2.532E+00	-1.617E-01	1.955E+00
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	2.168E-01	4.454E-02	8.768E-01	9.841E-02
S.E. Diff :	2.355E+01	1.118E+01	3.092E+00	1.407E-01
95%C.I.Dif :	-9.013E+01	-5.565E+01	-8.066E+00	-6.924E-02
Cat 1 Mean :	1.623E+02	1.052E+02	4.830E+01	7.600E+00
S.D. :	3.603E+01	1.998E+01	5.772E+00	1.691E-01
S.E. Mean :	1.802E+01	9.990E+00	2.886E+00	8.456E-02
Cat 2 Mean :	1.948E+02	1.335E+02	4.880E+01	7.325E+00
S.D. :	3.034E+01	1.002E+01	2.218E+00	2.249E-01
S.E. Mean :	1.517E+01	5.008E+00	1.109E+00	1.124E-01
MANN-WHITNEY-U STATISTIC				
U-Stat :	4.000E+00	2.000E+00	7.000E+00	2.000E+00
Signific :	-1.162E+00	-1.732E+00	-2.904E-01	-1.732E+00
P = Val 1T :	1.227E-01	4.163E-02	3.858E-01	4.163E-02
P = Val 2T :	2.454E-01	8.326E-02	7.715E-01	8.326E-02
LINEAR REGRESSION				
Slope :	3.810E-02	2.777E-02	2.435E-03	-4.783E-04
Intercept :	1.521E+02	1.015E+02	4.582E+01	7.773E+00
R-square :	1.269E-01	1.407E-01	3.336E-02	3.412E-01
r :	3.562E-01	3.752E-01	1.827E-01	-5.842E-01
F :	3.779E+00	3.440E+00	6.903E-01	7.252E+00
P :	6.278E-02	7.774E-02	4.159E-01	1.750E-02

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	Arsenic (D) mg/l	Iron (D) mg/l	Nickel (D) mg/l	Zinc (D) mg/l
11/21/1996	0.003	<0.05	<0.05	<0.01
03/27/1997	0.001	<0.10	<0.01	<0.01
05/22/1997	0.003	<0.01	<0.01	<0.01
06/26/1997	0.003	<0.01	<0.01	<0.01
07/24/1997	0.002	<0.01	<0.01	<0.01
08/21/1997	0.003	<0.01	<0.01	<0.01
09/25/1997	0.002	<0.01	<0.01	<0.01
10/16/1997	0.002	<0.01	<0.01	<0.01
11/20/1997	0.004	<0.01	<0.01	<0.01
12/17/1997	0.004	<0.01	<0.01	<0.01
01/22/1998	0.004	<0.01	<0.01	<0.01
02/25/1998	0.004	<0.01	<0.01	<0.01
03/18/1998	0.005	<0.01	<0.01	<0.01
04/22/1998	0.004	<0.01	<0.01	<0.01
05/28/1998	0.004	<0.01	<0.01	<0.01
06/17/1998	0.005	<0.01	<0.01	<0.01
07/16/1998	0.004	<0.01	<0.01	<0.01
08/19/1998	0.004	<0.01	<0.01	<0.01
09/17/1998	0.004	<0.01	<0.01	<0.01
10/22/1998	0.004	<0.01	<0.01	<0.01
11/19/1998			<0.05	
12/10/1998			<0.05	
01/27/1999	0.004	<0.01	<0.01	<0.01
02/24/1999			<0.01	
03/24/1999			<0.01	
04/08/1999			<0.01	
05/12/1999	0.005	<0.01	<0.01	<0.01
09/15/1999	0.004	<0.01	<0.01	<0.01

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW2B
Date Range : 01/01/1978 - 12/31/1999

Analytes:	As_D	Fe_D	Ni_D	Zn_D
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS **********				
N of Cases :	23	23	28	23
Average :	3.565E-03	1.565E-02	1.429E-02	1.000E-02
Std. Dev. :	1.037E-03	2.019E-02	1.260E-02	1.122E-18
Variance :	1.075E-06	4.075E-04	1.587E-04	1.259E-36
Std. Err. :	2.162E-04	4.209E-03	2.381E-03	2.340E-19
Maximum :	5.000E-03	1.000E-01	5.000E-02	1.000E-02
Minimum :	1.000E-03	1.000E-02	1.000E-02	1.000E-02
********** STUDENT'S T STATISTIC **********				
Student T :	-3.130E+00	1.522E+00	1.000E+00	.
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	.
2-Tail Sig :	2.031E-02	1.789E-01	3.559E-01	.
S.E. Diff :	5.590E-04	2.136E-02	1.000E-02	.
95%C.I.Dif :	-3.118E-03	-1.977E-02	-1.447E-02	.
Cat 1 Mean :	2.500E-03	4.250E-02	2.000E-02	1.000E-02
S.D. :	1.000E-03	4.272E-02	2.000E-02	0.000E+00
S.E. Mean :	5.000E-04	2.136E-02	1.000E-02	0.000E+00
Cat 2 Mean :	4.250E-03	1.000E-02	1.000E-02	1.000E-02
S.D. :	5.000E-04	0.000E+00	0.000E+00	0.000E+00
S.E. Mean :	2.500E-04	0.000E+00	0.000E+00	0.000E+00
********** MANN-WHITNEY-U STATISTIC **********				
U-Stat :	0.000E+00	4.000E+00	6.000E+00	8.000E+00
Signific :	-2.428E+00	-1.512E+00	-1.000E+00	.
P = Val 1T :	7.593E-03	6.529E-02	1.587E-01	.
P = Val 2T :	1.519E-02	1.306E-01	3.173E-01	.
********** LINEAR REGRESSION **********				
Slope :	2.732E-06	-3.537E-05	-2.314E-06	-1.014E-20
Intercept :	2.282E-03	3.226E-02	1.551E-02	1.000E-02
R-square :	4.422E-01	1.956E-01	2.350E-03	.
r :	6.650E-01	-4.423E-01	-4.848E-02	.
F :	1.665E+01	5.106E+00	6.125E-02	-1.744E-15
P :	5.362E-04	3.459E-02	8.065E-01	1.000E+00

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
11/21/1996	<0.0004	<0.2	0.4#0.2	<1.0
03/27/1997	<0.0004	2.03	0.4#0.1	<1.0
05/22/1997	<0.0004	<0.2	<0.2	<1.0
06/26/1997	<0.0004	<0.2	<0.2	<1.0
07/24/1997	<0.0004	<0.2	<0.2	<1.0
08/21/1997	<0.0004	<0.203	<0.2	<1.0
09/25/1997	<0.0004	0.677	<0.2	<1.0
10/16/1997	<0.0004	<0.203	<0.2	<1.0
11/20/1997	<0.0004	<0.2	<0.2	<1
12/17/1997	<0.0004	<0.2	<0.2	<1
01/22/1998	<0.0004	0.203	0.5#0.2	<1.0
02/25/1998	<0.0004	0.271	<0.2	<1.0
03/18/1998	<0.0004	0.271	<0.2	<1
04/22/1998	<0.0004	<0.203	0.6#0.2	<1.0
05/28/1998	<0.0004	<0.203	<0.2	2.2#1.1
06/17/1998	<0.0004	0.677	0.8#0.1	<1.0
07/16/1998	<0.0004	0.339	<0.2	<1.0
08/19/1998	<0.0004	1.286	<0.2	<1.0
09/17/1998	<0.0004	0.271	<0.2	<1.0
10/22/1998	<0.0004	0.474	<0.2	<1.0
11/19/1998		0.474		
12/10/1998		0.542		
01/27/1999	<0.0004	0.474	0.3#0.1	<1.0
02/24/1999		0.677		
03/24/1999		0.880		
04/08/1999		0.271		
05/12/1999	<0.0004	0.203	<0.2	<1.0
09/15/1999	<0.0004	0.203	<0.2	<1.0

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW2B
Date Range : 01/01/1978 - 12/31/1999

Analytes:	Tl_D	URD	Ra_226_D	Ra_228_D
Units:	mg/l	pCi/l	pCi/l	pCi/l

BASIC STATISTICS

	Tl_D	URD	Ra_226_D	Ra_228_D
N of Cases	23	28	23	23
Average	4.000E-04	4.370E-01	2.783E-01	1.052E+00
Std. Dev.	7.109E-20	4.075E-01	1.594E-01	2.502E-01
Variance	5.054E-39	1.660E-01	2.542E-02	6.261E-02
Std. Err.	1.482E-20	7.700E-02	3.324E-02	5.217E-02
Maximum	4.000E-04	2.030E+00	8.000E-01	2.200E+00
Minimum	4.000E-04	2.000E-01	2.000E-01	1.000E+00

STUDENT'S T STATISTIC

	Tl_D	URD	Ra_226_D	Ra_228_D
Student T	.	5.518E-01	1.192E+00	.
Deg. Free	.	6.000E+00	6.000E+00	.
2-Tail Sig	.	6.010E-01	2.782E-01	.
S.E. Diff	.	4.861E-01	6.292E-02	.
95%C.I.Dif	.	-9.213E-01	-7.895E-02	.
Cat 1 Mean	4.000E-04	6.575E-01	3.000E-01	1.000E+00
S.D.	0.000E+00	9.150E-01	1.155E-01	0.000E+00
S.E. Mean	0.000E+00	4.575E-01	5.774E-02	0.000E+00
Cat 2 Mean	4.000E-04	3.893E-01	2.250E-01	1.000E+00
S.D.	0.000E+00	3.287E-01	5.000E-02	0.000E+00
S.E. Mean	0.000E+00	1.644E-01	2.500E-02	0.000E+00

MANN-WHITNEY-U STATISTIC

	Tl_D	URD	Ra_226_D	Ra_228_D
U-Stat	8.000E+00	4.000E+00	5.000E+00	8.000E+00
Signific	.	-1.191E+00	-1.000E+00	.
P = Val 1T	.	1.169E-01	1.587E-01	.
P = Val 2T	.	2.338E-01	3.173E-01	.

LINEAR REGRESSION

	Tl_D	URD	Ra_226_D	Ra_228_D
Slope	0.000E+00	-2.916E-05	-4.273E-05	7.224E-05
Intercept	4.000E-04	4.524E-01	2.983E-01	1.018E+00
R-square	0.000E+00	3.569E-04	4.577E-03	5.312E-03
r	0.000E+00	-1.889E-02	-6.765E-02	7.288E-02
F	0.000E+00	9.283E-03	9.656E-02	1.121E-01
P	1.000E+00	9.240E-01	7.591E-01	7.410E-01

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	Thorium-230 (D) pCi/l
11/21/1996	<0.2
03/27/1997	<0.2
05/22/1997	<0.2
06/26/1997	<0.2
07/24/1997	<0.2
08/21/1997	<0.2
09/25/1997	<0.2
10/16/1997	<0.2
11/20/1997	<0.2
12/17/1997	<0.2
01/22/1998	<0.2
02/25/1998	<0.2
03/18/1998	<0.2
04/22/1998	<0.2
05/28/1998	<0.2
06/17/1998	<0.2
07/16/1998	<0.2
08/19/1998	<0.2
09/17/1998	<0.2
10/22/1998	<0.2
01/27/1999	<0.2
05/12/1999	<0.2
09/15/1999	<0.2

```
Site            :  SHERWOOD
Sample Type     :  MONITOR WELLS
Sample Location:  MW2B
Date Range      :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:      Th_230_D
Units:            pCi/l
********** BASIC STATISTICS ***************************
N of Cases :        23
Average    : 2.000E-01
Std. Dev.  : 2.708E-17
Variance   : 7.335E-34
Std. Err.  : 5.647E-18
Maximum    : 2.000E-01
Minimum    : 2.000E-01

********** STUDENT'S T STATISTIC **********************
Student T  :  .
Deg. Free  :  .
2-Tail Sig :  .
S.E. Diff  :  .
95%C.I.Dif :  .
Cat 1 Mean : 2.000E-01
      S.D. : 0.000E+00
 S.E. Mean : 0.000E+00
Cat 2 Mean : 2.000E-01
      S.D. : 0.000E+00
 S.E. Mean : 0.000E+00

********** MANN-WHITNEY-U STATISTIC *******************
U-Stat     : 8.000E+00
Signific   :  .
P = Val 1T :  .
P = Val 2T :  .

********** LINEAR REGRESSION **************************
Slope      :-3.244E-19
Intercept  : 2.000E-01
R-square   :  .
r          :  .
F          :-2.790E-14
P          : 1.000E+00
*******************************************************
```

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	SWL ft.
10/07/1996	2064.24
10/30/1996	2064.09
11/18/1996	2063.99
12/11/1996	2064.09
01/09/1997	2064.04
02/05/1997	2064.14
03/24/1997	2080.89
03/25/1997	2081.29
03/26/1997	2082.29
03/27/1997	2082.59
04/22/1997	2077.89
05/01/1997	2071.59
05/06/1997	2070.19
05/19/1997	2068.04
05/29/1997	2066.39
06/02/1997	2065.79
06/12/1997	2065.29
06/18/1997	2065.04
06/24/1997	2064.99
06/26/1997	2064.94
07/03/1997	2064.94
07/07/1997	2064.89
07/16/1997	2064.79
07/22/1997	2064.74
08/01/1997	2064.74
08/07/1997	2064.74
08/13/1997	2064.69
08/20/1997	2064.69
08/26/1997	2064.59
09/03/1997	2064.54
09/10/1997	2064.49
09/18/1997	2064.49
09/23/1997	2064.44
09/29/1997	2064.34
10/08/1997	2064.29
10/14/1997	2064.24
10/21/1997	2064.14
10/28/1997	2064.09
11/03/1997	2064.09
11/10/1997	2064.04
11/18/1997	2063.99
11/24/1997	2063.89
12/02/1997	2063.84
12/10/1997	2063.84
12/15/1997	2063.74
12/22/1997	2063.74
12/30/1997	2063.69
01/05/1998	2063.69
01/15/1998	2063.54
01/20/1998	2063.49
01/22/1998	2063.49
01/29/1998	2063.49
02/04/1998	2063.44
02/09/1998	2063.39
02/19/1998	2063.39
02/23/1998	2063.34
02/25/1998	2063.29
03/05/1998	2063.49
03/11/1998	2063.44
03/16/1998	2063.44
03/18/1998	2063.49

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

Sample Date	SWL ft.
03/23/1998	2063.49
03/30/1998	2063.70
04/07/1998	2063.69
04/13/1998	2063.72
04/22/1998	2063.64
05/13/1998	2063.64
05/20/1998	2063.64
05/26/1998	2063.64
05/28/1998	2063.54
06/03/1998	2063.54
06/10/1998	2063.54
06/15/1998	2063.54
06/17/1998	2063.44
06/22/1998	2063.54
06/29/1998	2063.49
07/09/1998	2063.44
07/16/1998	2063.44
07/22/1998	2063.39
07/28/1998	2063.34
08/06/1998	2063.29
08/13/1998	2063.24
08/17/1998	2063.29
08/19/1998	2063.24
08/26/1998	2063.29
08/31/1998	2063.24
09/08/1998	2063.24
09/15/1998	2063.19
09/23/1998	2063.19
09/30/1998	2063.14
10/07/1998	2063.14
10/15/1998	2063.09
10/20/1998	2063.04
11/03/1998	2062.99
11/18/1998	2062.84
11/24/1998	2062.89
12/01/1998	2062.89
12/08/1998	2062.84
12/17/1998	2062.84
12/30/1998	2062.74
01/05/1999	2062.69
01/11/1999	2062.54
01/19/1999	2062.49
01/25/1999	2062.49
02/03/1999	2062.34
02/09/1999	2062.29
02/18/1999	2062.24
02/22/1999	2062.24
03/02/1999	2062.29
03/08/1999	2062.39
03/15/1999	2063.19
03/22/1999	2064.19
03/30/1999	2066.84
04/05/1999	2067.54
04/14/1999	2067.44
04/22/1999	2067.59
04/26/1999	2066.79
05/04/1999	2066.24
05/10/1999	2065.74
05/18/1999	2065.29
05/26/1999	2065.14
06/03/1999	2065.04

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW2B

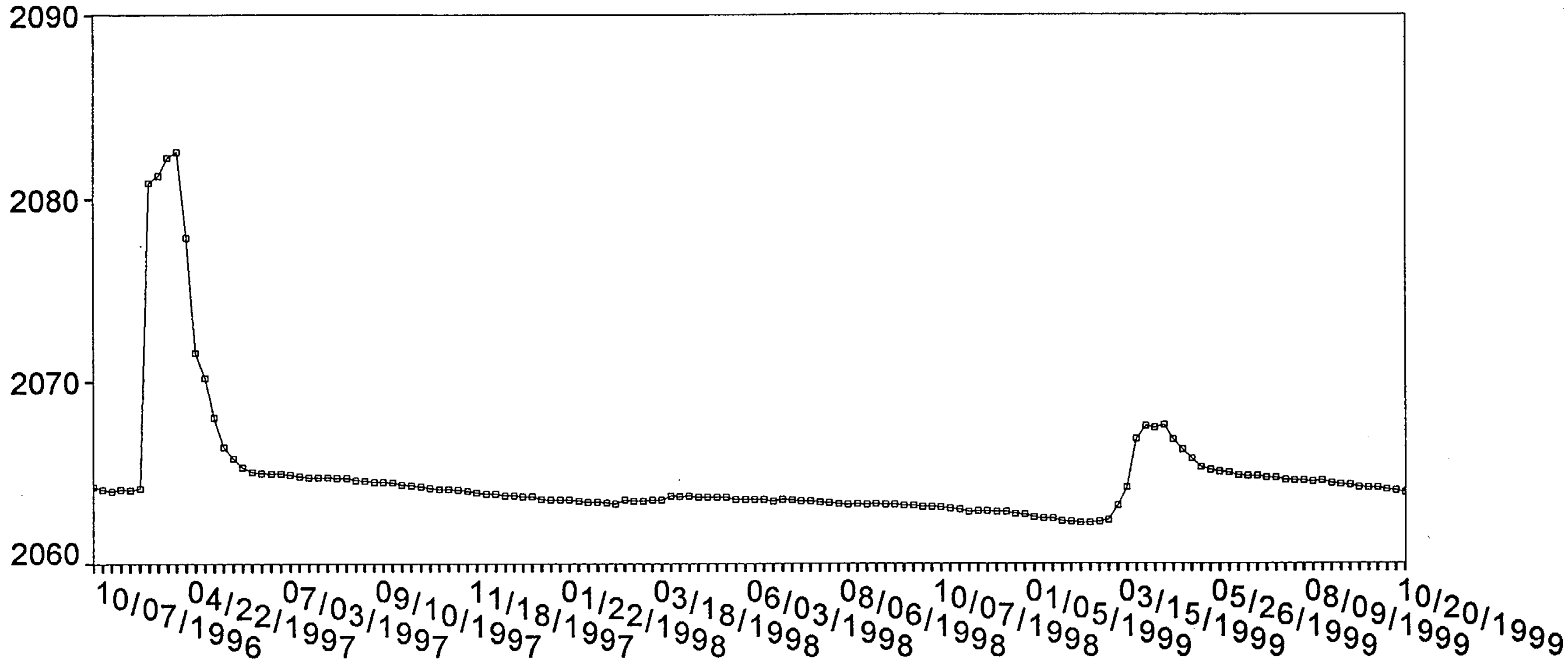
Sample Date	SWL ft.
06/07/1999	2064.99
06/17/1999	2064.84
06/21/1999	2064.79
07/06/1999	2064.79
07/14/1999	2064.69
07/19/1999	2064.69
07/26/1999	2064.59
08/02/1999	2064.54
08/09/1999	2064.54
08/17/1999	2064.49
08/23/1999	2064.54
09/02/1999	2064.39
09/08/1999	2064.34
09/13/1999	2064.29
09/20/1999	2064.19
09/28/1999	2064.14
10/04/1999	2064.14
10/13/1999	2064.04
10/20/1999	2063.99
11/02/1999	2063.89

```
Site           :  SHERWOOD
Sample Type    :  MONITOR WELLS
Sample Location:  MW2B
Date Range     :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:          SWL
Units:             ft.
********** BASIC STATISTICS ***************************
N of Cases :       142
Average    : 2.065E+03
Std. Dev.  : 3.411E+00
Variance   : 1.163E+01
Std. Err.  : 2.862E-01
Maximum    : 2.083E+03
Minimum    : 2.062E+03

********** STUDENT'S T STATISTIC *********************
Student T  : 1.195E+00
Deg. Free  : 6.000E+00
2-Tail Sig : 2.773E-01
S.E. Diff  : 7.324E-02
95%C.I.Dif :-9.172E-02
Cat 1 Mean : 2.064E+03
      S.D. : 1.031E-01
 S.E. Mean : 5.154E-02
Cat 2 Mean : 2.064E+03
      S.D. : 1.041E-01
 S.E. Mean : 5.204E-02

********** MANN-WHITNEY-U STATISTIC ******************
U-Stat     : 4.500E+00
Signific   :-1.023E+00
P = Val 1T : 1.532E-01
P = Val 2T : 3.065E-01

********** LINEAR REGRESSION *************************
Slope      :-3.705E-03
Intercept  : 2.067E+03
R-square   : 1.009E-01
r          :-3.176E-01
F          : 1.571E+01
P          : 1.173E-04
*******************************************************
```

MONITOR WELLS

SHERWOOD : MW2B

ANALYTE: SWL (ft)

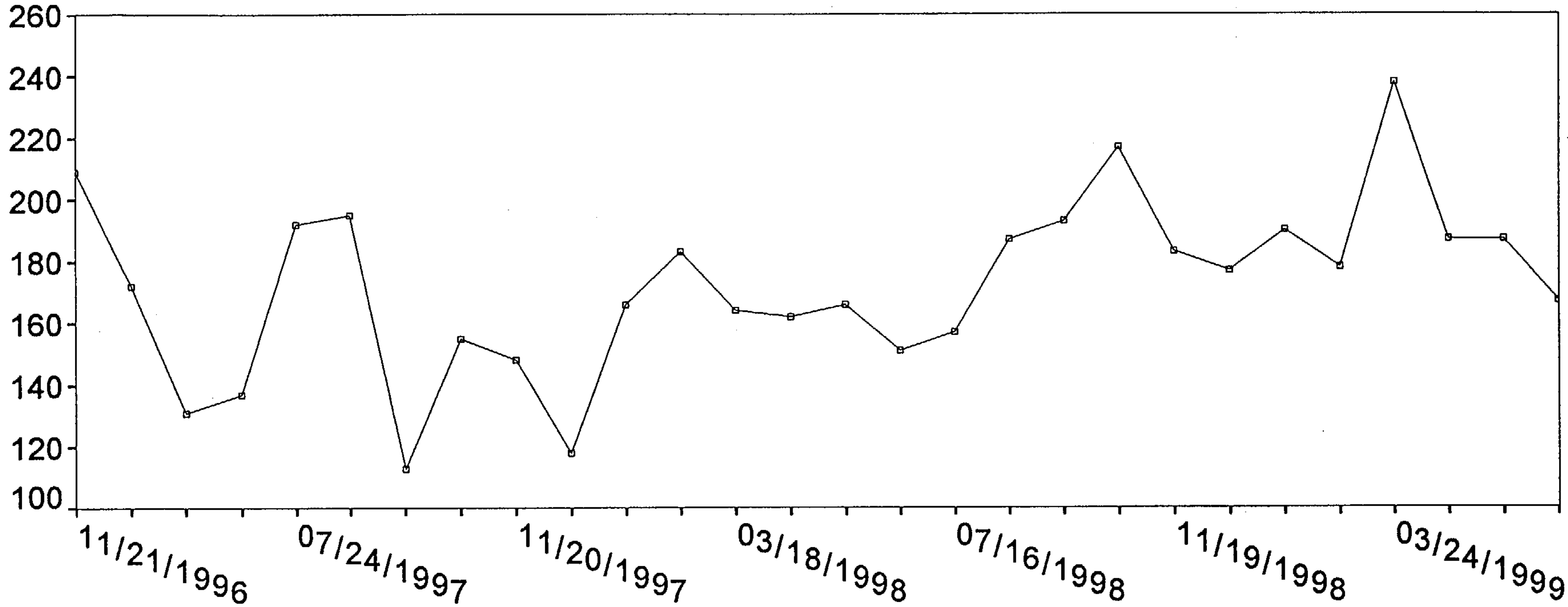


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW2B

ANALYTE: TDS (mg/l)



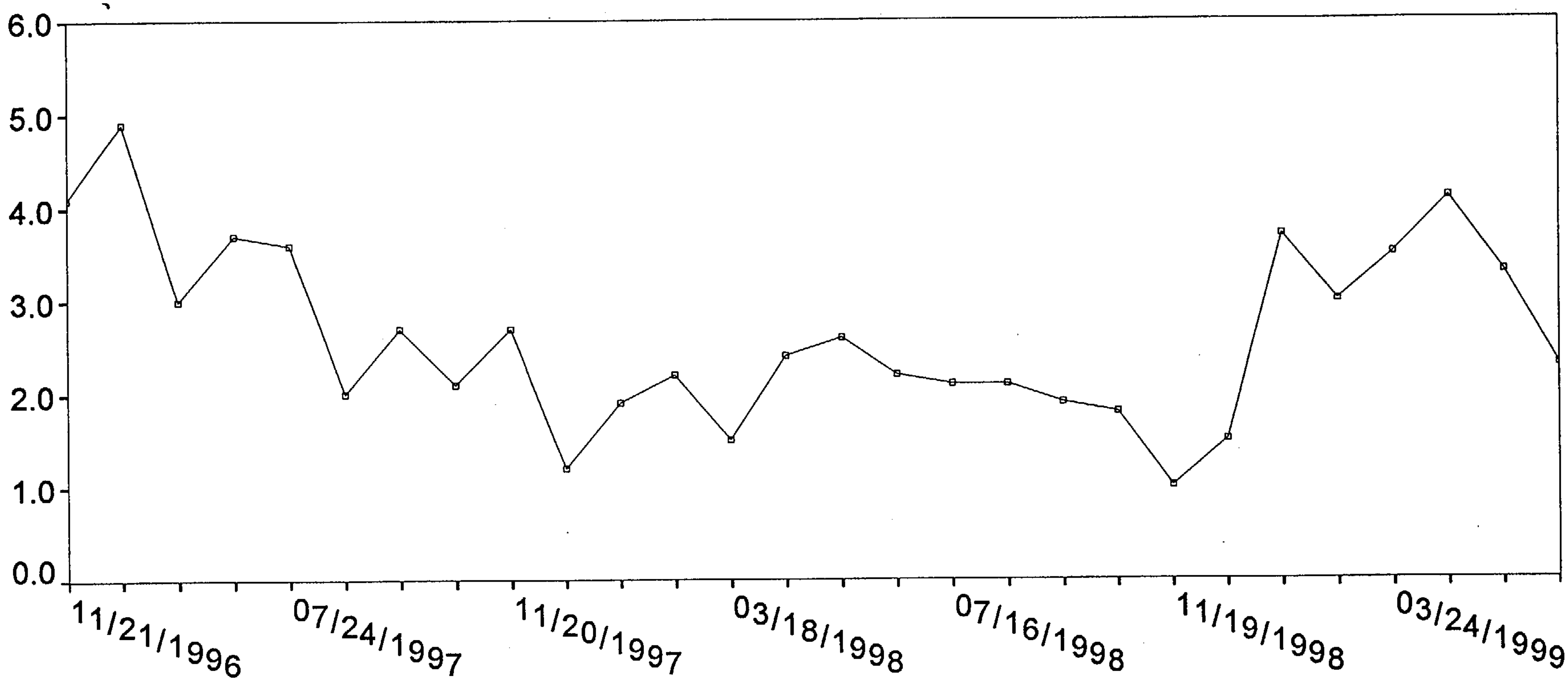
SPDATE

Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW2B

ANALYTE: SO4 (mg/l)

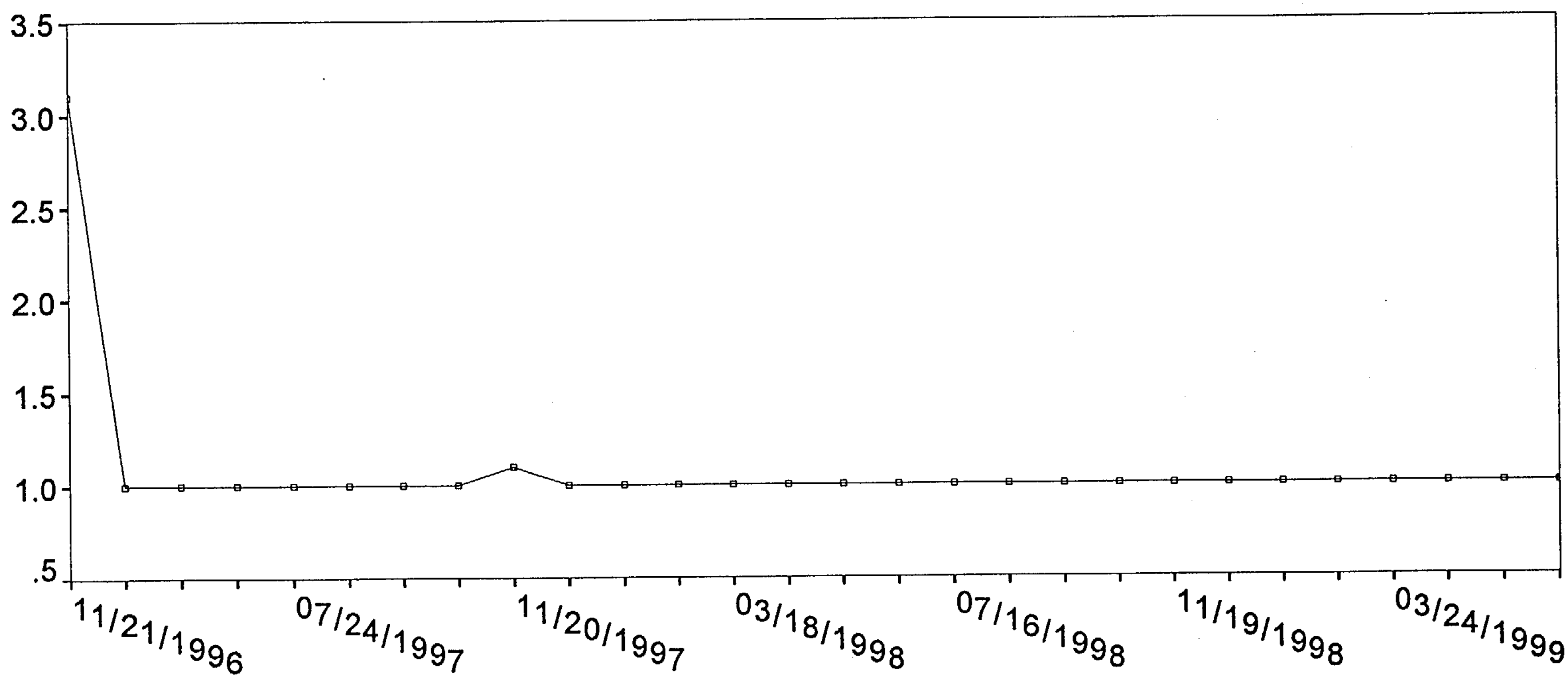


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW2B

ANALYTE: Cl (mg/l)

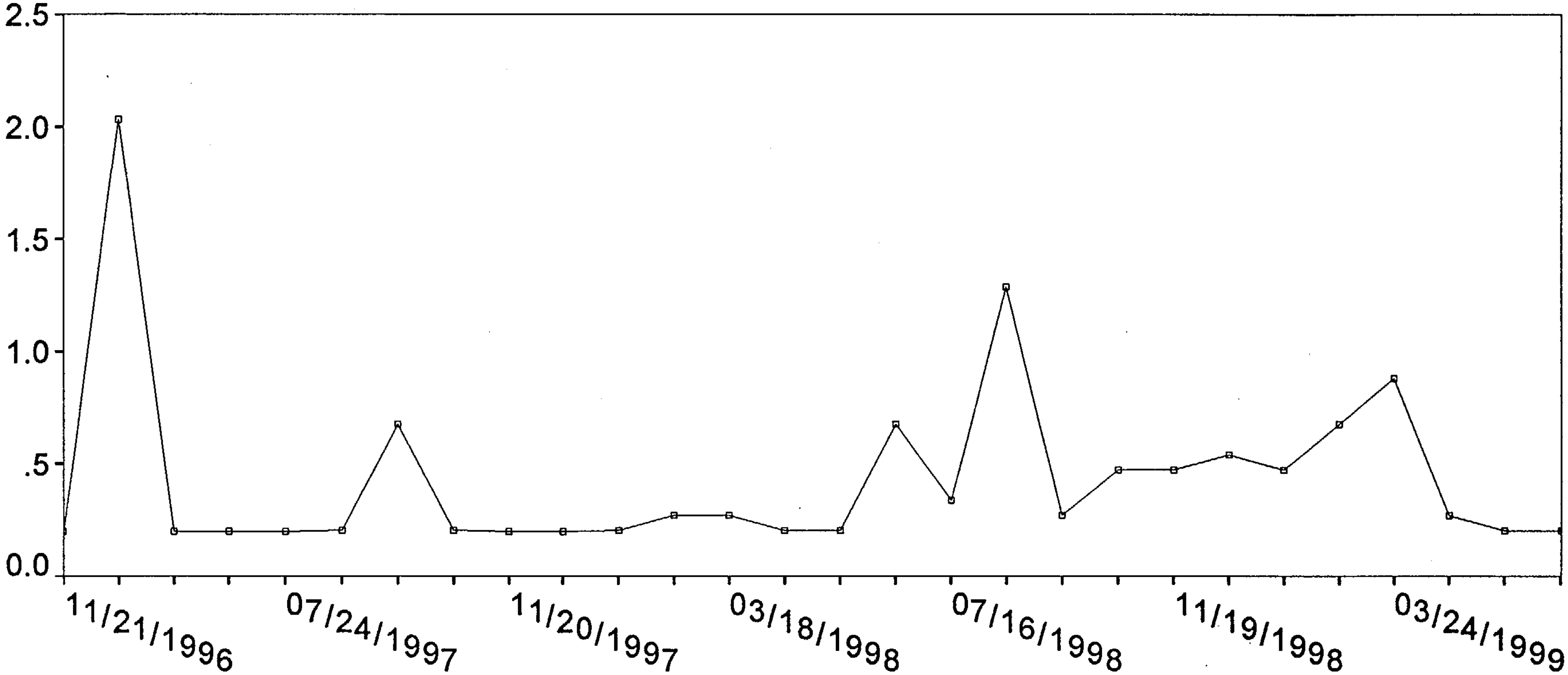


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW2B

ANALYTE: URD (pCi/l)



Run Chart - Raw Data

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Calcium (D) mg/l	Magnesium (D) mg/l	Sodium (D) mg/l	Potassium (D) mg/l
05/15/1978	56.5	22.2	6.79	
06/15/1978	155	54.0	8.5	
07/27/1978	36.9	30.0	7.53	
08/30/1978	44.3	20.0	5.4	
09/29/1978	42.85	26.0	4.30	
10/31/1978	46.40	20.95	4.75	
11/03/1978	45.20	19.55	4.2	
01/16/1979	42.6	11.4	5.6	
02/22/1979	50.4	19.6	5.4	
03/19/1979	47.2	9.7	6.0	
04/13/1979	31	8	7	
05/29/1979	37	18.3	6.7	
06/21/1979	37	30	12	
07/31/1979	60	42	6	
08/22/1979	48	10	8	
09/25/1979	35.4	36.5	27.4	
10/31/1979	37	19	10	
11/30/1979	41	25	7	
03/25/1980	42	12	7	
04/28/1980	41	21	4	
08/06/1980	24	13	4	
10/30/1980	26	11	5	
01/28/1981	40.6	18.6	4.6	
04/30/1981	39.0	18.3	7.3	
07/30/1981	43.5	6.0	4.6	
10/14/1981	46	9	7	
03/15/1982	42.5	15.9	3.9	
05/27/1982	44.0	20	3.9	
07/14/1982	41.4	19.2	3.9	
10/20/1982	41.0	19.6	4.7	
05/16/1983	60	26	6.4	
08/04/1983	61.5	34.5	9.3	
10/13/1983	42	27.5	7.2	
11/05/1983	38	18.5	7	
03/13/1984	42	20	5	
05/10/1984	44	38	7	
07/12/1984	84	48	9	
07/17/1984	83	53	9	
09/11/1984	57	27	13	
09/11/1984	57	27	13	
10/11/1984	62	33	10	
11/27/1984	54	29	6	
12/18/1984	49	26	5	
01/10/1985	49	27	5	
03/13/1985	46	20	5	
06/11/1985	32.6	18.8	6.3	
09/26/1985	46	24	5.4	
12/10/1985	50	23	5.4	
02/05/1986	40	23.0	5.7	
03/11/1986	48	23	4.8	
05/08/1986	51	27	6	
09/25/1986	36	23	7	
12/16/1986	50	25	6	
03/24/1987	46	28	6	
05/12/1987	56	27	6	
09/23/1987	49	26	7	
12/09/1987	54	26	6	
03/22/1988	62	28	6	
05/25/1988	54	27	6	
09/28/1988	63	29	7	
12/21/1988	69	20	5	

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Calcium (D) mg/l	Magnesium (D) mg/l	Sodium (D) mg/l	Potassium (D) mg/l
03/22/1989	66	13	3.9	
05/24/1989	64	19	11	
09/27/1989	64	21	3	
11/14/1989	56	28	4	
03/06/1990	59	24	7	6
05/01/1990	58	20	7	4
09/26/1990	71	21	6	4.7
12/20/1990	72	15	9	3.4
03/21/1991	54	21	7	3
05/22/1991	51.9	25.0	2.59	4.08
09/19/1991	54.5	25.5	8.9	4.30
12/18/1991	52	23	4	4
03/19/1992	59.6	31.2	6.7	5.5
05/27/1992	44.4	21.7	6.6	5.40
09/29/1992	67.0	27.0	6.0	6.0
12/29/1992	62.6	27.8	9.1	6.5
03/31/1993	56.0	26.0	6.0	4.0
05/26/1993	54.5	27.3	6.3	3.6
09/30/1993	57.5	28.2	6.0	3.8
10/27/1993	60.6	27.1	4.4	3.6
11/17/1993	64.1	22.5	5.7	3.7
12/14/1993	50.7	28.6	4.6	3.6
01/19/1994	56.2	25.6	4.3	3.4
02/16/1994	60.1	26.0	4.2	3.5
03/22/1994	64.9	24.7	5.1	5.9
04/19/1994	65.9	23.0	5.1	3.7
05/17/1994	60.9	23.6	3.7	3.8
06/29/1994	57.3	22.4	3.7	3.4
07/20/1994	75.3	20.9	3.9	4.7
08/24/1994	64.8	30.7	4.5	3.9
09/21/1994	73.6	30.6	5.9	4.5
10/19/1994	69.4	28.3	6.4	4.6
11/22/1994	79.2	31.8	6.3	4.9
12/20/1994	79.0	29.0	6.2	4.2
01/26/1995	80.0	38.0	6.4	4.8
02/28/1995	78.0	38.0	6.2	4.8
03/29/1995	73.4	36.4	6.4	4.5
04/20/1995	77.0	35.0	6.0	4.7
05/02/1995	76.8	37.8	6.1	4.6
06/06/1995	68.0	37.0	6.8	4.4
07/06/1995	43.5	41.4	9.5	5.0
08/24/1995	50.1	39.3	10.4	4.8
09/27/1995	67.1	36.1	7.5	4.5
10/25/1995	64.9	34.3	6.5	4.4
11/21/1995	71.0	33.9	6.4	4.4
02/21/1996	67.4	33.0	6.1	4.5
05/01/1996	70.2	35.4	7.3	4.7
09/25/1996	69.1	35.7	10.9	4.5
11/21/1996	63.5	35.8	8.8	5.6
12/17/1996	68.1	35.9	7.7	5.2
03/27/1997	139	67.0	18.6	5.7
04/16/1997	125	66.1	15.6	6.2
06/05/1997	117	67.2	9.4	5.9
06/26/1997	100	61.4	12.5	6.1
07/24/1997	97.0	58.1	13.3	6.1
08/21/1997	118	62.2	13.9	6.3
09/25/1997	109	58.0	13.0	6.2
10/16/1997	100	50.1	13.1	6.0
11/20/1997	112	49	16	6
12/17/1997	85	43.3	12.5	4.9
01/22/1998	78.7	40.6	10.5	4.8

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Calcium (D) mg/l	Magnesium (D) mg/l	Sodium (D) mg/l	Potassium (D) mg/l
02/25/1998	79.0	39.5	9.0	5.0
03/18/1998	76	37.8	8.8	4.8
04/22/1998	64.3	36.8	9.4	4.7
05/28/1998	86.8	44.4	11.0	5.1
06/17/1998	80.9	42.0	10.0	5.0
07/16/1998	77.2	40.7	9.8	5.0
08/19/1998	75.4	39.8	9.0	5.2
09/17/1998	72.2	38.8	9.3	5.2
10/22/1998	57.6	32.9	6.9	4.3
01/27/1999	61.9	36.6	7.5	4.8
05/12/1999	116	60.0	15.0	5.9
09/15/1999	90.9	45.0	15.2	4.8

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW4
Date Range : 01/01/1978 - 12/31/1999

Analytes:	Ca	Mg	Na	K
Units:	mg/l	mg/l	mg/l	mg/l
BASIC STATISTICS				
N of Cases	134	134	134	69
Average	6.204E+01	2.984E+01	7.443E+00	4.769E+00
Std. Dev.	2.205E+01	1.255E+01	3.456E+00	8.535E-01
Variance	4.861E+02	1.576E+02	1.195E+01	7.284E-01
Std. Err.	1.905E+00	1.084E+00	2.986E-01	1.027E-01
Maximum	1.550E+02	6.720E+01	2.740E+01	6.500E+00
Minimum	2.400E+01	6.000E+00	2.590E+00	3.000E+00
STUDENT'S T STATISTIC				
Student T	-2.739E-01	-1.227E+00	-1.724E+00	-6.508E-01
Deg. Free	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig	7.934E-01	2.657E-01	1.355E-01	5.393E-01
S.E. Diff	3.076E+01	9.839E+00	2.376E+00	6.530E-01
95%C.I.Dif	-8.370E+01	-3.615E+01	-9.908E+00	-2.023E+00
Cat 1 Mean	7.318E+01	3.155E+01	7.055E+00	4.525E+00
S.D.	5.515E+01	1.557E+01	1.307E+00	1.118E+00
S.E. Mean	2.757E+01	7.785E+00	6.534E-01	5.588E-01
Cat 2 Mean	8.160E+01	4.363E+01	1.115E+01	4.950E+00
S.D.	2.729E+01	1.203E+01	4.568E+00	6.758E-01
S.E. Mean	1.364E+01	6.017E+00	2.284E+00	3.379E-01
MANN-WHITNEY-U STATISTIC				
U-Stat	4.000E+00	3.000E+00	4.000E+00	5.000E+00
Signific	-1.155E+00	-1.443E+00	-1.155E+00	-8.712E-01
P = Val 1T	1.241E-01	7.446E-02	1.241E-01	1.918E-01
P = Val 2T	2.482E-01	1.489E-01	2.482E-01	3.836E-01
LINEAR REGRESSION				
Slope	5.442E-03	3.003E-03	3.692E-04	3.966E-04
Intercept	3.969E+01	1.750E+01	5.927E+00	4.004E+00
R-square	3.711E-01	3.486E-01	6.949E-02	1.743E-01
r	6.091E-01	5.904E-01	2.636E-01	4.175E-01
F	7.788E+01	7.063E+01	9.857E+00	1.414E+01
P	1.887E-15	3.053E-14	2.088E-03	3.588E-04

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Carbonate mg/l	Bicarbonate mg/l	Sulfate (D) mg/l	Chloride (D) mg/l
05/15/1978			10	<2
06/15/1978			5	<2
07/27/1978			13	3
08/30/1978			8.2	1
09/29/1978			13.0	0.1
10/31/1978			8.1	0.4
11/03/1978			8.5	0.3
01/16/1979			10.0	0.3
02/22/1979			8.5	0.1
03/19/1979			11.2	0.4
04/13/1979			18	2
05/29/1979			12.4	1.2
06/21/1979			11	2
07/31/1979			12	1
08/22/1979			16	1
09/25/1979			9	6.4
10/31/1979			10	1.5
11/30/1979			6	0.8
03/25/1980			13.0	2.6
04/28/1980			10	1.5
08/06/1980			9	1.9
10/30/1980			4	1.1
01/28/1981			16.7	0.7
04/30/1981			14	0.6
07/30/1981			11.7	1.0
10/14/1981			1	1.2
03/15/1982			18	1.2
05/27/1982			11	1.0
07/14/1982			11	3.7
10/20/1982			12	1.0
05/16/1983			3	6
08/04/1983			62	29
10/13/1983			29	12
11/05/1983			15	3
03/13/1984			10.5	1
05/10/1984			45	4.6
07/12/1984			122	17.5
07/17/1984			107	18.0
09/11/1984			63	7.5
09/11/1984			63	7.5
10/11/1984			40.1	6.7
11/27/1984			21.5	3.5
12/18/1984			17.2	2.1
01/10/1985			9.0	1.8
02/19/1985			8.5	1.6
03/13/1985			9.7	1.3
04/17/1985			8.9	1.5
05/23/1985			0.574	5.71
06/11/1985			0.382	5.71
07/16/1985			0.04	5.6
08/09/1985			11	7
09/26/1985			8	7
10/17/1985			4	6
11/21/1985			6	7
12/10/1985			8	8
01/14/1986			9	7
02/05/1986			6.3	2.9
03/11/1986			8.5	1.59
04/09/1986			6.7	1.2
05/08/1986			12	2.1
06/05/1986			24	5

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Carbonate mg/l	Bicarbonate mg/l	Sulfate (D) mg/l	Chloride (D) mg/l
07/02/1986			39	7
08/07/1986			24	9
09/25/1986			5	4
10/16/1986			10	2
11/18/1986			10	2
12/16/1986			13	3
01/15/1987			11	2
03/24/1987			4	2
05/12/1987			7	2
09/23/1987			6	2
12/09/1987			5	4
03/22/1988			4	2
05/25/1988			5	2
09/28/1988			12	1
12/21/1988			11	11
03/22/1989			11	18
05/24/1989			11	14
09/27/1989			14	60
11/14/1989			11	9
03/06/1990	0	274	12	12
05/01/1990	0	200	11	15
09/26/1990	0	229	10	1.8
12/20/1990	0	225	13	8
03/21/1991	0	229	14	7
05/22/1991	0	235	14.1	3.61
09/19/1991	0	244	16.5	3.70
12/18/1991	0	232	15	6
03/19/1992	0	257	14.6	2.6
05/27/1992	0	247	15.3	2.40
09/29/1992	0	274	13.7	3.0
12/29/1992	0	322	14.9	4.0
03/31/1993	0	311	13.1	4.1
05/26/1993	0	270	16.6	0.7
09/30/1993	0	298	15.2	<1.0
10/27/1993	0	310	14.3	2.8
11/17/1993	0	296	16.7	2.2
12/14/1993	0	283	13.9	<1.0
01/19/1994	0	295	16.2	<1.0
02/16/1994	0	288	18.7	1.3
03/22/1994	0	301	13.9	1.9
04/19/1994	0	293	13.1	<1.0
05/17/1994	0	298	13.5	3.7
06/29/1994	0	270	15.5	<1.0
07/20/1994	0	331	12.7	1.68
08/24/1994	0	350	13.0	<1.0
09/21/1994		357	14.5	<1.0
10/19/1994	0	348	13.6	<1.0
11/22/1994	0	409	13.5	<1.0
12/20/1994	0	362	13.7	<1.0
01/26/1995	0	361	13.5	1.9
02/28/1995	0	436	14.5	0.30
03/29/1995	0	373	13.7	2.0
04/20/1995	0	398	13.8	1.9
05/02/1995	0	417	15.7	2.6
06/06/1995			25.2	4.1
07/06/1995	0	318	34.4	9.4
08/24/1995	0	317	37.2	8.0
09/27/1995	0	370	17.1	2.8
10/25/1995	0	346	13.4	<1.0
11/21/1995	0	362	13.8	<1.0
02/21/1996	0	340	13.0	2.4

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Carbonate mg/l	Bicarbonate mg/l	Sulfate (D) mg/l	Chloride (D) mg/l
05/01/1996	0	344	26.9	5.3
09/25/1996	0	355	36.1	9.8
11/21/1996	0	345	20.4	6.4
12/17/1996	0	361	15.1	3.6
03/27/1997	0	367	235	92.6
04/16/1997	0	454	154	49.6
06/05/1997	0	411	167	22.4
06/26/1997	0	414	145	28.8
07/24/1997	0	416	119	27.0
08/21/1997	0	405	137	45.6
09/25/1997	0	395	147	52.3
10/16/1997	<0.10	390	105	36.2
11/20/1997	<0.1	379	115	44.4
12/17/1997	<1	393	62.2	20.1
01/22/1998	<0.10	373	41.1	12.1
02/25/1998	<0.10	406	24.3	5.3
03/18/1998	<0.1	409	25.2	5
04/22/1998	<1.0	343	27.4	6.4
05/28/1998	<1.0	<1.0	56.6	19.9
06/17/1998	<1.0	421	35.5	9.2
07/16/1998	<1.0	437	24.5	5.7
08/19/1998	<1.0	432	21.9	4.1
09/17/1998	<1.0	392	21.3	14.8
10/22/1998	<1.0	326	16.6	3.0
11/19/1998			16.1	1.7
12/10/1998			16.8	2.7
01/27/1999	<1.0	368	20.0	1.4
02/24/1999			17.3	2.7
03/24/1999			22.6	4.5
04/08/1999			80.8	25.7
05/12/1999	<1.0	398	128	46.2
09/15/1999	<1.0	391	61.1	17.4

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW4
Date Range : 01/01/1978 - 12/31/1999

Analytes:	CO3	HCO3	SO4	Cl
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS **********				
N of Cases :	67	68	154	154
Average :	1.716E-01	3.353E+02	2.640E+01	7.547E+00
Std. Dev. :	3.708E-01	7.466E+01	3.688E+01	1.276E+01
Variance :	1.375E-01	5.574E+03	1.360E+03	1.629E+02
Std. Err. :	4.530E-02	9.054E+00	2.972E+00	1.028E+00
Maximum :	1.000E+00	4.540E+02	2.350E+02	9.260E+01
Minimum :	0.000E+00	1.000E+00	4.000E-02	1.000E-01
********** STUDENT'S T STATISTIC **********				
Student T :	.	-6.201E+00	-2.914E+00	-2.449E+00
Deg. Free :	.	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	.	8.111E-04	2.683E-02	4.984E-02
S.E. Diff :	.	2.238E+01	2.199E+01	8.758E+00
95%C.I.Dif :	.	-1.935E+02	-1.179E+02	-4.288E+01
Cat 1 Mean :	0.000E+00	2.320E+02	9.050E+00	2.000E+00
S.D. :	0.000E+00	3.080E+01	3.348E+00	8.165E-01
S.E. Mean :	0.000E+00	1.540E+01	1.674E+00	4.082E-01
Cat 2 Mean :	1.000E+00	3.708E+02	7.313E+01	2.345E+01
S.D. :	0.000E+00	3.247E+01	4.385E+01	1.750E+01
S.E. Mean :	0.000E+00	1.623E+01	2.192E+01	8.748E+00
********** MANN-WHITNEY-U STATISTIC **********				
U-Stat :	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Signific :	-2.646E+00	-2.309E+00	-2.309E+00	-2.323E+00
P = Val 1T :	4.075E-03	1.046E-02	1.046E-02	1.008E-02
P = Val 2T :	8.151E-03	2.092E-02	2.092E-02	2.016E-02
********** LINEAR REGRESSION **********				
Slope :	2.470E-04	5.043E-02	5.605E-03	1.748E-03
Intercept :	-3.060E-01	2.380E+02	3.459E+00	3.892E-01
R-square :	3.683E-01	3.738E-01	1.352E-01	1.099E-01
r :	6.069E-01	6.114E-01	3.677E-01	3.314E-01
F :	3.790E+01	3.939E+01	2.376E+01	1.876E+01
P :	5.092E-08	2.956E-08	2.715E-06	2.682E-05

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	TDS mg/l	Alk CaCO3 mg/l	SIO2 (D) mg/l	pH Lab s.u.
05/15/1978	225			8.10
06/15/1978	234			7.65
07/27/1978	234			7.90
08/30/1978	222			7.80
09/29/1978	236.1			8.2
10/31/1978	226.4			7.9
11/03/1978	217.6			8.0
01/16/1979	184.4			7.75
02/22/1979	197.8			7.70
03/19/1979	204			8.1
04/13/1979	211			7.7
05/29/1979	215.8			7.5
06/21/1979	218			7.4
07/31/1979	216.2			8.10
08/22/1979	259			7.35
09/25/1979	360			6.15
10/31/1979	209			8.0
11/30/1979	219			7.98
03/25/1980	201.8			8.40
04/28/1980	471			7.9
08/06/1980	321			7.8
10/30/1980	453			7.75
01/28/1981	286.2			7.85
04/30/1981	457			7.8
07/30/1981	463			7.7
10/14/1981	146			8.2
03/15/1982	204.9			8.0
05/27/1982	207.1			8.0
07/14/1982	204			8.4
10/20/1982	206			8.4
05/16/1983	303			8.4
08/04/1983	425			7.6
10/13/1983	301			7.7
11/05/1983	226			7.6
03/13/1984	218			8.1
05/10/1984	310			7.8
07/12/1984	519			7.9
07/17/1984	582			7.6
09/11/1984	430			7.75
09/11/1984	430			7.8
10/11/1984	339.2			7.6
11/27/1984	283			7.7
12/18/1984	248			7.8
01/10/1985	307			7.8
02/19/1985	232			7.90
03/13/1985	242			8.0
04/17/1985	250			7.9
05/23/1985	264			7.70
06/11/1985	254			7.90
07/16/1985	248			7.6
08/09/1985	266			7.5
09/26/1985	265			7.8
10/17/1985	256			7.6
11/21/1985	225			7.5
12/10/1985	255			7.7
01/14/1986	256			7.6
02/05/1986	252			7.6
03/11/1986	267			7.82
04/09/1986	259			7.7
05/08/1986	279			7.8
06/05/1986	318			7.8

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	TDS mg/l	Alk CaCO3 mg/l	SIO2 (D) mg/l	pH Lab s.u.
05/01/1996	336	282	17.8	7.82
09/25/1996	421	291	23.8	7.79
11/21/1996	365	283	19.7	7.93
12/17/1996	313	296	19.2	7.93
03/27/1997	783	301	23.3	7.95
04/16/1997	705	372	19.9	7.81
06/05/1997	624	337	20.9	7.88
06/26/1997	617	339	20.3	7.95
07/24/1997	615	341	20.8	8.01
08/21/1997	664	332	24.8	7.97
09/25/1997	638	324	23.8	8.02
10/16/1997	583	320	23.4	7.99
11/20/1997	589	311	22	7.92
12/17/1997	440	322	21.9	7.95
01/22/1998	403	306	20.7	
02/25/1998	391	333	19.0	
03/18/1998	387	335	18.3	
04/22/1998	386	281	19.0	
05/28/1998	808	<1.0	19.8	
06/17/1998	410	345	19.4	
07/16/1998	410	353	18.9	
08/19/1998	411	354	18.0	
09/17/1998	374	321	18.3	
10/22/1998	361	267	18.0	
11/19/1998	343			7.60
12/10/1998	363			7.87
01/27/1999	357	302	19.3	
02/24/1999	348			7.67
03/24/1999	390			7.72
04/08/1999	527			7.44
05/12/1999	653	327	19.0	
09/15/1999	479	321		8.05

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	TDS mg/l	Alk CaCO3 mg/l	SIO2 (D) mg/l	pH Lab s.u.
07/02/1986	361			7.6
08/07/1986	329			7.3
09/25/1986	315			7.7
10/16/1986	286			7.8
11/18/1986	277			7.7
12/16/1986	280			7.8
01/15/1987	280			7.8
03/24/1987	298			8.0
05/12/1987	309			7.4
09/23/1987	307			7.8
12/09/1987	290			7.7
03/22/1988	306			7.9
05/25/1988	303			7.8
09/28/1988	324			7.7
12/21/1988	260			8.0
03/22/1989	255			7.9
05/24/1989	148			8.1
09/27/1989	281			
11/14/1989	284			7.8
03/06/1990	286			7.8
05/01/1990	240			
09/26/1990	339			
12/20/1990	209			8.0
03/21/1991	249			7.7
05/22/1991	292			7.4
09/19/1991	295			7.4
12/18/1991	241			7.8
03/19/1992	305			
05/27/1992	232			7.54
09/29/1992	353			8.26
12/29/1992	288			7.76
03/31/1993	258			
05/26/1993	290			
09/30/1993	284	244		7.78
10/27/1993	286	254		7.45
11/17/1993	289	243		8.15
12/14/1993	273	232	19.9	7.85
01/19/1994	282	242	19.4	7.8
02/16/1994	259	237	18.0	
03/22/1994	283	247	18.5	8.30
04/19/1994	298	240	20.2	7.5
05/17/1994	295	244	19.6	7.84
06/29/1994	254	221	19.7	
07/20/1994	298	271	18.7	
08/24/1994	300	287	19.5	8.06
09/21/1994	336	293	18.2	7.88
10/19/1994	329	285	18.0	8.02
11/22/1994	349	335	18.5	8.07
12/20/1994	342	297	18.7	8.02
01/26/1995	356	326	17.7	7.93
02/28/1995	378	357	18.1	7.93
03/29/1995	342	306	17.0	7.88
04/20/1995	352	326	16.1	8.03
05/02/1995	374	342	17.8	7.97
06/06/1995	363	291	17.4	8.29
07/06/1995	356	261	21.1	8.19
08/24/1995	341	260	21.9	7.47
09/27/1995	370	303	19.2	7.73
10/25/1995	316	284	17.2	8.09
11/21/1995	333	297	18.1	7.86
02/21/1996	325	279	16.0	7.80

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW4
Date Range : 01/01/1978 - 12/31/1999

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Analytes:	TDS	ALK	SIO2	pH_L
Units:	mg/l	mg/l	mg/l	s.u.
********** BASIC STATISTICS **********				
N of Cases :	154	55	51	133
Average :	3.302E+02	2.927E+02	1.949E+01	7.825E+00
Std. Dev. :	1.202E+02	5.474E+01	1.963E+00	2.690E-01
Variance :	1.445E+04	2.997E+03	3.853E+00	7.235E-02
Std. Err. :	9.686E+00	7.381E+00	2.749E-01	2.332E-02
Maximum :	8.080E+02	3.720E+02	2.480E+01	8.400E+00
Minimum :	1.460E+02	1.000E+00	1.600E+01	6.150E+00
********** STUDENT'S T STATISTIC **********				
Student T :	-5.162E+00	-4.284E+00	5.721E-01	9.063E-01
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	2.090E-03	5.185E-03	5.880E-01	3.997E-01
S.E. Diff :	5.492E+01	1.424E+01	5.244E-01	1.572E-01
95%C.I.Dif :	-4.179E+02	-9.585E+01	-9.832E-01	-2.422E-01
Cat 1 Mean :	2.288E+02	2.433E+02	1.895E+01	7.863E+00
S.D. :	6.185E+00	8.995E+00	8.583E-01	1.887E-01
S.E. Mean :	3.092E+00	4.498E+00	4.291E-01	9.437E-02
Cat 2 Mean :	5.123E+02	3.043E+02	1.865E+01	7.720E+00
S.D. :	1.097E+02	2.702E+01	6.028E-01	2.515E-01
S.E. Mean :	5.483E+01	1.351E+01	3.014E-01	1.258E-01
********** MANN-WHITNEY-U STATISTIC **********				
U-Stat :	0.000E+00	0.000E+00	5.500E+00	5.000E+00
Signific :	-2.323E+00	-2.309E+00	-7.260E-01	-8.660E-01
P = Val 1T :	1.008E-02	1.046E-02	2.339E-01	1.932E-01
P = Val 2T :	2.016E-02	2.092E-02	4.678E-01	3.865E-01
********** LINEAR REGRESSION **********				
Slope :	2.636E-02	2.663E-02	9.351E-04	1.240E-05
Intercept :	2.222E+02	2.671E+02	1.863E+01	7.778E+00
R-square :	2.816E-01	9.611E-02	8.064E-02	1.181E-02
r :	5.307E-01	3.100E-01	2.840E-01	1.087E-01
F :	5.959E+01	5.635E+00	4.298E+00	1.566E+00
P :	1.219E-12	2.126E-02	4.344E-02	2.130E-01

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Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Arsenic (D) mg/l	Iron (D) mg/l	Nickel (D) mg/l	Zinc (D) mg/l
09/30/1993		<0.05	<0.05	
10/27/1993		<0.05	0.05	
11/17/1993		<0.05	<0.05	
12/14/1993		<0.05	<0.05	
01/19/1994	<0.001	<0.05	<0.05	0.02
02/16/1994	0.001	<0.05	<0.05	0.02
03/22/1994	0.001	<0.05	<0.05	<0.01
04/19/1994	<0.001	<0.05	<0.05	<0.01
05/17/1994	<0.001	<0.05	<0.05	<0.01
06/29/1994	<0.001	<0.05	<0.05	<0.01
07/20/1994	0.001	<0.05	<0.05	<0.01
08/24/1994	<0.001	<0.05	<0.01	<0.01
09/21/1994	0.001	<0.05	<0.01	<0.01
10/19/1994	0.002	<0.05	<0.01	<0.01
11/22/1994	0.001	<0.05	<0.05	<0.01
12/20/1994	<0.001	<0.05	<0.05	<0.01
01/26/1995	<0.001	<0.01	<0.01	<0.01
02/28/1995	<0.001	<0.01	<0.01	<0.01
03/29/1995	0.002	<0.01	<0.01	<0.01
04/20/1995	<0.001	<0.01	<0.01	<0.01
05/02/1995	<0.001	<0.01	<0.01	<0.01
06/06/1995	<0.001	<0.01	<0.01	<0.01
07/06/1995	<0.001	<0.01	<0.01	<0.01
08/24/1995	<0.001	<0.05	<0.05	<0.01
09/27/1995	0.002	<0.01	<0.01	<0.01
10/25/1995	<0.001	<0.01	<0.01	<0.01
11/21/1995	<0.001	<0.01	<0.01	<0.01
02/21/1996	0.002	0.08	<0.01	<0.01
05/01/1996	<0.001	<0.01	<0.01	<0.01
09/25/1996	<0.001	0.02	<0.01	<0.01
11/21/1996	<0.001	<0.05	<0.05	<0.01
12/17/1996	0.001	<0.05	<0.05	<0.01
03/27/1997	<0.001	<0.10	<0.01	<0.01
04/16/1997	<0.001	<0.05	<0.05	<0.01
06/05/1997	0.001	0.01	<0.01	<0.01
06/26/1997	<0.001	<0.01	<0.01	<0.01
07/24/1997	<0.001	<0.01	<0.01	<0.01
08/21/1997	<0.001	<0.01	<0.01	<0.01
09/25/1997	<0.001	<0.01	<0.01	<0.01
10/16/1997	<0.001	<0.01	<0.01	<0.01
11/20/1997	0.002	0.01	<0.01	<0.01
12/17/1997	0.002	<0.01	<0.01	<0.01
01/22/1998	0.001	<0.01	<0.01	<0.01
02/25/1998	0.001	<0.01	<0.01	0.01
03/18/1998	0.002	<0.01	<0.01	<0.01
04/22/1998	0.002	0.04	<0.01	<0.01
05/28/1998	0.002	<0.01	<0.01	<0.01
06/17/1998	0.002	<0.01	<0.01	<0.01
07/16/1998	<0.001	<0.01	<0.01	<0.01
08/19/1998	0.001	<0.01	<0.01	<0.01
09/17/1998	0.002	<0.01	<0.01	<0.01
10/22/1998	0.002	<0.01	<0.01	<0.01
11/19/1998			<0.05	
12/10/1998			<0.05	
01/27/1999	0.001	<0.01	<0.01	<0.01
02/24/1999			<0.01	
03/24/1999			<0.01	
04/08/1999			<0.01	
05/12/1999	0.002	<0.01	<0.01	<0.01
09/15/1999	0.001	<0.01	<0.01	<0.01

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW4
Date Range : 01/01/1978 - 12/31/1999

Analytes:	As_D	Fe_D	Ni_D	Zn_D
Units:	mg/l	mg/l	mg/l	mg/l
BASIC STATISTICS				
N of Cases	51	55	60	51
Average	1.255E-03	2.818E-02	2.267E-02	1.039E-02
Std. Dev.	4.401E-04	2.270E-02	1.876E-02	1.960E-03
Variance	1.937E-07	5.152E-04	3.521E-04	3.843E-06
Std. Err.	6.163E-05	3.060E-03	2.422E-03	2.745E-04
Maximum	2.000E-03	1.000E-01	5.000E-02	2.000E-02
Minimum	1.000E-03	1.000E-02	1.000E-02	1.000E-02
STUDENT'S T STATISTIC				
Student T	-1.732E+00	.	.	1.732E+00
Deg. Free	6.000E+00	.	.	6.000E+00
2-Tail Sig	1.340E-01	.	.	1.340E-01
S.E. Diff	2.887E-04	.	.	2.887E-03
95%C.I.Dif	-1.206E-03	.	.	-2.064E-03
Cat 1 Mean	1.000E-03	5.000E-02	5.000E-02	1.500E-02
S.D.	0.000E+00	0.000E+00	0.000E+00	5.774E-03
S.E. Mean	0.000E+00	0.000E+00	0.000E+00	2.887E-03
Cat 2 Mean	1.500E-03	1.000E-02	1.000E-02	1.000E-02
S.D.	5.774E-04	0.000E+00	0.000E+00	0.000E+00
S.E. Mean	2.887E-04	0.000E+00	0.000E+00	0.000E+00
MANN-WHITNEY-U STATISTIC				
U-Stat	4.000E+00	0.000E+00	0.000E+00	4.000E+00
Signific	-1.528E+00	-2.646E+00	-2.646E+00	-1.528E+00
P = Val 1T	6.332E-02	4.075E-03	4.075E-03	6.332E-02
P = Val 2T	1.266E-01	8.151E-03	8.151E-03	1.266E-01
LINEAR REGRESSION				
Slope	2.492E-07	-1.889E-05	-1.416E-05	-9.993E-07
Intercept	1.024E-03	4.639E-02	3.748E-02	1.132E-02
R-square	1.169E-01	2.812E-01	2.550E-01	9.474E-02
r	3.419E-01	-5.303E-01	-5.049E-01	-3.078E-01
F	6.485E+00	2.073E+01	1.985E+01	5.128E+00
P	1.407E-02	3.127E-05	3.882E-05	2.800E-02

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
05/15/1978		5.4	0.2#0.3	
06/15/1978		12.9	0.0#0.7	
07/27/1978		<6.8	0.2#0.8	
08/30/1978		6.8	0.6#1.0	
09/29/1978		5.4	0.1#0.9	
12/15/1978		4.7	0.6	
01/16/1979		<14		
02/22/1979		47.4		
03/19/1979		<14	177#7	
04/13/1979		<14		
05/29/1979		<14		
06/21/1979		<6.8	0.4#0.9	
07/31/1979		2.7		
08/22/1979		7.4		
09/25/1979		5.4	0.3#0.7	
10/31/1979		5.7		
11/30/1979		6.3	0.1#0.03	
03/25/1980		9.5	1.4#0.7	
04/28/1980		6.3	1.5#0.6	
08/06/1980		4.7	1.0#0.5	
10/30/1980		10.2	0.33#0.05	
01/28/1981		4.6	0.33#0.05	
04/30/1981		3	1.2#0.6	
07/30/1981		6	1.4#0.6	
10/14/1981		10	0.81#0.5	
03/15/1982		26	0.9#0.5	
05/27/1982		19.8	0.6#0.5	
07/14/1982		6.2	0.70#0.35	
10/20/1982		7.5	0.81#0.06	
05/16/1983		13#2	0#0.4	
08/04/1983		25#5	0.4#0.4	
10/13/1983		92#19.6	1.7#0.6	
11/05/1983		18.9#6.8		
03/13/1984		15#5	0.7#0.5	
05/10/1984		19#3	1.4#0.3	
05/10/1984			0.35#0.04	
07/12/1984		22.0#2.4	1.5#0.4	
07/17/1984		26.3#2.5	1.2#0.3	
09/11/1984		23#3	3#0.5	
10/11/1984		13#2	3.2#0.6	
03/13/1985		11#3	0.7#0.3	
06/11/1985		5.38#0.40	0.62#0.19	
09/26/1985		6.1#2.1	0.7#0.3	
12/10/1985		5#1.3	1.4#0.4	
02/05/1986		4.1#1.6	0.46#0.16	
03/11/1986		3.1#1.3	0.92#0.20	
05/08/1986		13#5	1.2#0.2	
09/25/1986		14#3	1.8#0.3	
12/16/1986		8#2	1.6#0.4	
03/24/1987		5#7	0.4#0.3	
05/12/1987		10#3	3#1	
09/23/1987		5#3	3#0.5	
12/09/1987		7#3	4#0.5	
03/22/1988		3#4	2#0.4	
05/25/1988		9#4	1#0.2	
09/28/1988		10#4	2#0.4	
12/21/1988		4.0#0.9	0.9#0.3	
03/22/1989		3.9#0.7	0.8#0.3	
05/24/1989		4.0#0.6	0.8#0.2	
09/27/1989		<0.2#0.2	2.3#0.6	
11/14/1989		4.6#0.6	0.4#0.2	

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
03/06/1990		0.9#0.3	1.4#0.4	
05/01/1990		5.7#0.8	1.6#0.4	
09/26/1990		8.8#0.8	1.4#0.4	
12/20/1990		5.5#0.6	1.1#0.3	
03/21/1991		5.0#0.6	1.0#0.3	
05/22/1991		4.2	0.4#0.3	
09/19/1991		6.77	0.7#0.2	
12/18/1991		7.6#0.8	1.1#0.3	
03/19/1992		4.06	<0.2	
05/27/1992		7.45	0.3#0.2	
09/29/1992		4.7	0.4#0.2	
12/29/1992		4.1	0.2#0.1	
03/31/1993		8.8	1.0#0.2	
05/26/1993		5.42	0.6#0.2	
09/30/1993		6.09	1.0#0.3	2.1#0.5
10/27/1993		10.8	0.4#0.3	4.9#0.9
11/17/1993		5.42	0.7#0.4	1.2#0.7
12/14/1993		5.42	0.9#0.2	<1.0
01/19/1994		5.42	0.8#0.2	3.0#2.9
02/16/1994		6.09	1.3#0.5	<1.0
03/22/1994		62.96	1.5#0.6	2.0#2.0
04/19/1994		7.45	1.1#0.6	1.5#1.3
05/17/1994		9.48	0.8#0.4	2.4#0.9
06/29/1994	<0.01	6.77	0.3#0.2	3.1#2.9
07/20/1994	<0.01	6.77	1.0#0.6	2.0#1.6
07/20/1994	<0.0004			
08/24/1994	<0.01	8.12	1.4#0.5	<1.0
08/24/1994	<0.0004			
09/21/1994	<0.01	6.77	<0.2	<1.0
10/19/1994	<0.01	9.48	0.9#0.4	1.0#0.5
10/19/1994	<0.0004			
11/22/1994	<0.01	8.12	0.8#0.5	2.2#1.4
11/22/1994	<0.0004			
12/20/1994	<0.01	8.80	1.0#0.4	<1.0
12/20/1994	<0.0004			
01/26/1995	<0.01	8.12	1.0#0.3	<1.0
01/26/1995	<0.0004			
02/28/1995	<0.01	8.12	0.7#0.4	1.3#0.8
02/28/1995	<0.0004			
03/29/1995	<0.01	8.12	<0.2	<1.0
03/29/1995	<0.0004			
04/20/1995	<0.0004	8.80	0.8#0.4	<1.0
05/02/1995	<0.0004	8.12	0.8#0.4	1.5#0.7
06/06/1995	<0.0004	15.6	0.8#0.5	<1.0
07/06/1995	<0.0004	16.9	1.1#0.7	3.5#1.3
08/24/1995	<0.0004	19.0	0.9#0.3	1.7#1.2
09/27/1995	<0.0004	14.9	1.8#0.7	<1.0
10/25/1995	<0.0004	11.4	1.2#0.4	1.1#0.8
11/21/1995	<0.0004	9.75	0.6#0.5	1.7#1.1
02/21/1996	<0.0004	8.12	1.0#0.3	<1.0
05/01/1996	<0.0004	19.0	0.9#0.2	<1.0
09/25/1996	<0.0004	16.2	0.7#0.3	<1.0
11/21/1996	<0.0004	12.3	0.7#0.2	<1.0
12/17/1996	<0.015	1.22	1.0#0.2	<1.0
03/27/1997	<0.0004	37.24	2.4#0.2	2.2#0.3
04/16/1997	<0.0004	48.07	1.4#0.2	<1.0
06/05/1997	<0.0004	25.05	1.0#0.2	1.5#0.7
06/26/1997	<0.0004	20.99	1.5#0.2	<1.0
07/24/1997	<0.0004	34.53	1.8#0.3	2.4#0.2
08/21/1997	<0.0004	41.97	1.6#0.2	<1.0
09/25/1997	<0.0004	49.42	1.4#0.2	3.2#0.9

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
10/16/1997	<0.0004	63.64	2.1#0.3	<1.0
11/20/1997	<0.0004	43.53	1.7#0.30	1.8#0.20
12/17/1997	<0.0004	32.63	0.9#0.20	<1
01/22/1998	<0.0004	24.9	0.9#0.2	<1.0
02/25/1998	<0.0004	21.3	1.4#0.2	<1.0
03/18/1998	<0.0004	18.8	1.3#0.20	<1
04/22/1998	<0.0004	21.258	1.2#0.2	<1.0
05/28/1998	<0.0004	20.919	1.0#0.2	<1.0
06/17/1998	<0.0004	15.165	1.1#0.1	<1.0
07/16/1998	<0.0004	19.36	1.0#0.2	1.7#1.5
08/19/1998	<0.0004	18.55	1.0#0.2	<1.0
09/17/1998	<0.0004	15.57	<0.2	<1.0
10/22/1998	<0.0004	12.80	0.9#0.2	<1.0
11/19/1998		13.00		
12/10/1998		12.32		
01/27/1999	<0.0004	9.749	1.4#0.1	1.9#0.2
02/24/1999		10.63		
03/24/1999		15.84		
04/08/1999		28.44		
05/12/1999	<0.0004	37.91	1.4#0.2	1.6#0.2
09/15/1999	<0.0004	35.2	0.7#0.2	3.0#0.3

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW4
Date Range : 01/01/1978 - 12/31/1999

Analytes:	Tl_D	URD	Ra_226_D	Ra_228_D
Units:	mg/l	pCi/l	pCi/l	pCi/l
********** BASIC STATISTICS **********				
N of Cases :	54	134	122	55
Average :	2.448E-03	1.406E+01	2.483E+00	1.536E+00
Std. Dev. :	4.140E-03	1.367E+01	1.595E+01	8.285E-01
Variance :	1.714E-05	1.868E+02	2.542E+02	6.864E-01
Std. Err. :	5.633E-04	1.181E+00	1.444E+00	1.117E-01
Maximum :	1.500E-02	9.200E+01	1.770E+02	4.900E+00
Minimum :	4.000E-04	2.000E-01	0.000E+00	1.000E+00
********** STUDENT'S T STATISTIC **********				
Student T :	3.000E+00	-4.110E+00	-3.900E+00	4.285E-01
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	2.401E-02	6.286E-03	7.983E-03	6.833E-01
S.E. Diff :	2.400E-03	5.200E+00	2.179E-01	9.919E-01
95%C.I.Dif :	1.327E-03	-3.410E+01	-1.383E+00	-2.002E+00
Cat 1 Mean :	7.600E-03	7.975E+00	2.500E-01	2.300E+00
S.D. :	4.800E-03	3.349E+00	2.517E-01	1.798E+00
S.E. Mean :	2.400E-03	1.675E+00	1.258E-01	8.991E-01
Cat 2 Mean :	4.000E-04	2.935E+01	1.100E+00	1.875E+00
S.D. :	0.000E+00	9.846E+00	3.559E-01	8.382E-01
S.E. Mean :	0.000E+00	4.923E+00	1.780E-01	4.191E-01
********** MANN-WHITNEY-U STATISTIC **********				
U-Stat :	2.000E+00	0.000E+00	0.000E+00	7.500E+00
Signific :	-2.049E+00	-2.323E+00	-2.337E+00	-1.452E-01
P = Val 1T :	2.021E-02	1.008E-02	9.709E-03	4.423E-01
P = Val 2T :	4.042E-02	2.016E-02	1.942E-02	8.845E-01
********** LINEAR REGRESSION **********				
Slope :	-3.287E-06	1.269E-03	-1.038E-03	-2.661E-04
Intercept :	4.929E-03	8.576E+00	7.063E+00	1.793E+00
R-square :	2.081E-01	5.423E-02	2.359E-02	4.189E-02
r :	-4.562E-01	2.329E-01	-1.536E-01	-2.047E-01
F :	1.367E+01	7.569E+00	2.900E+00	2.317E+00
P :	5.261E-04	6.771E-03	9.119E-02	1.339E-01

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Thorium-230 (D) pCi/l
05/15/1978	0.3#0.4
06/15/1978	0.0#0.4
07/27/1978	0.3#0.4
08/30/1978	0.4#0.4
09/29/1978	0.2#0.6
12/15/1978	0.9
03/19/1979	151#2
06/21/1979	0.6#0.6
09/25/1979	0.0#0.8
11/30/1979	0.0#0.2
03/25/1980	0.0#0.2
04/28/1980	0.0#0.2
10/30/1980	0#0.2
01/28/1981	0.4#0.2
04/30/1981	0#0.2
07/30/1981	0#0.2
10/14/1981	0#0.2
03/15/1982	0.5#0.2
05/27/1982	3.4#0.2
07/14/1982	0#0.2
10/20/1982	0#0.2
05/16/1983	0#0.2
08/04/1983	0#0.2
10/13/1983	0#0.2
06/11/1985	0.00#0.1
09/26/1985	2.1#1.0
12/10/1985	0.7#0.8
03/11/1986	0.3#0.6
05/08/1986	1.2#1.1
09/25/1986	1.1#1.0
12/16/1986	2.1#1.3
03/24/1987	2.3#1.2
05/12/1987	0.8#0.9
09/23/1987	0.7#0.8
12/09/1987	0.6#0.5
03/22/1988	0.8#0.5
05/25/1988	1.1#0.6
09/28/1988	0.3#0.4
12/21/1988	0.7#0.5
03/22/1989	0.0#0.4
05/24/1989	1.0#0.5
09/27/1989	0.1#0.4
11/14/1989	1.4#0.6
03/06/1990	1.3#0.4
05/01/1990	0.8#0.4
09/26/1990	0.4#0.8
12/20/1990	0.2#0.5
03/21/1991	0.4#0.5
05/22/1991	<0.4
09/19/1991	<0.4
12/18/1991	0.4#0.3
03/19/1992	<0.4
05/27/1992	<0.2
09/29/1992	<0.2
12/29/1992	<0.2
03/31/1993	<0.2
05/26/1993	<1.0
09/30/1993	<1.0
10/27/1993	<1.0
11/17/1993	<1.0
12/14/1993	<1.0

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	Thorium-230 (D) pCi/l
01/19/1994	<1.0
02/16/1994	<0.2
03/22/1994	<0.2
04/19/1994	<0.2
05/17/1994	<0.2
06/29/1994	<1.0
07/20/1994	<1.0
08/24/1994	<1.0
09/21/1994	<0.2
10/19/1994	<0.2
11/22/1994	<0.2
12/20/1994	<0.2
01/26/1995	<0.2
02/28/1995	<0.2
03/29/1995	<0.2
04/20/1995	<0.2
05/02/1995	1.2#0.5
06/06/1995	<0.2
07/06/1995	<0.2
08/24/1995	<0.2
09/27/1995	<0.2
10/25/1995	<0.2
11/21/1995	<0.2
02/21/1996	<0.2
05/01/1996	<0.2
09/25/1996	<0.2
11/21/1996	<0.2
12/17/1996	<0.2
03/27/1997	<0.2
04/16/1997	<0.2
06/05/1997	<0.2
06/26/1997	<0.2
07/24/1997	<0.2
08/21/1997	<0.2
09/25/1997	<0.2
10/16/1997	<0.2
11/20/1997	<0.2
12/17/1997	<0.2
01/22/1998	<0.2
02/25/1998	<0.2
03/18/1998	<0.2
04/22/1998	<0.2
05/28/1998	<0.2
06/17/1998	<0.2
07/16/1998	<0.2
08/19/1998	<0.2
09/17/1998	<0.2
10/22/1998	<0.2
01/27/1999	<0.2
05/12/1999	<0.2
09/15/1999	<0.2

```
Site            :  SHERWOOD
Sample Type     :  MONITOR WELLS
Sample Location:  MW4
Date Range      :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:      Th_230_D
Units:           pCi/l
********** BASIC STATISTICS ***************************
N of Cases :       112
Average    : 1.787E+00
Std. Dev.  : 1.424E+01
Variance   : 2.027E+02
Std. Err.  : 1.345E+00
Maximum    : 1.510E+02
Minimum    : 0.000E+00

********** STUDENT'S T STATISTIC **********************
Student T  : 5.774E-01
Deg. Free  : 6.000E+00
2-Tail Sig : 5.847E-01
S.E. Diff  : 8.660E-02
95%C.I.Dif :-1.619E-01
Cat 1 Mean : 2.500E-01
      S.D. : 1.732E-01
 S.E. Mean : 8.660E-02
Cat 2 Mean : 2.000E-01
      S.D. : 0.000E+00
 S.E. Mean : 0.000E+00

********** MANN-WHITNEY-U STATISTIC *******************
U-Stat     : 4.000E+00
Signific   :-1.239E+00
P = Val 1T : 1.077E-01
P = Val 2T : 2.155E-01

********** LINEAR REGRESSION **************************
Slope      :-1.079E-03
Intercept  : 6.763E+00
R-square   : 3.192E-02
r          :-1.787E-01
F          : 3.627E+00
P          : 5.947E-02
*******************************************************
```

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
07/30/1984	1787.3
08/06/1984	1787.25
08/14/1984	1786.2
08/20/1984	1784.4
08/27/1984	1784.9
09/04/1984	1784.2
09/11/1984	1783.7
09/17/1984	1783.2
09/26/1984	1782.0
10/03/1984	1781.0
10/09/1984	1780.0
10/15/1984	1778.8
10/22/1984	1783.7
10/31/1984	1776.6
11/12/1984	1775.7
11/27/1984	1775.3
12/18/1984	1775.2
01/02/1985	1775.0
01/09/1985	1774.9
01/16/1985	1774.9
01/21/1985	1775.0
01/28/1985	1774.9
02/05/1985	1774.7
02/13/1985	1774.9
02/21/1985	1774.9
02/28/1985	1775.0
03/06/1985	1774.9
03/14/1985	1774.8
03/19/1985	1774.6
03/28/1985	1774.6
04/04/1985	1774.8
04/25/1985	1774.9
05/16/1985	1775.0
06/06/1985	1775.0
07/24/1985	1775.1
08/05/1985	1775.0
08/28/1985	1774.9
09/11/1985	1774.7
09/25/1985	1774.7
10/14/1985	1773.6
11/04/1985	1773.6
11/21/1985	1773.8
12/09/1985	1774.7
01/07/1986	1774.8
01/29/1986	1774.8
02/04/1986	1774.7
02/20/1986	1774.5
03/03/1986	1774.7
03/19/1986	1774.70
03/31/1986	1774.70
04/14/1986	1774.25
04/28/1986	1776.85
05/06/1986	1778.15
05/13/1986	1779.10
05/29/1986	1777.15
06/09/1986	1781.85
06/12/1986	1781.90
06/18/1986	1782.10
06/24/1986	1782.45
07/06/1986	1782.55
07/21/1986	1782.32

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
08/04/1986	1781.60
08/11/1986	1781.05
08/27/1986	1779.25
09/08/1986	1777.50
09/16/1986	1776.45
09/29/1986	1775.05
10/13/1986	1774.60
10/27/1986	1774.60
11/03/1986	1774.65
11/20/1986	1774.65
12/02/1986	1774.65
12/11/1986	1774.70
12/29/1986	1774.80
01/14/1987	1774.80
01/21/1987	1774.90
02/04/1987	1774.95
02/18/1987	1775.00
03/05/1987	1775.05
03/16/1987	1775.05
03/31/1987	1775.05
04/13/1987	1775.10
04/27/1987	1775.15
05/11/1987	1775.05
05/28/1987	1775.15
06/09/1987	1775.10
06/23/1987	1774.95
07/09/1987	1774.90
07/15/1987	1774.85
07/27/1987	1774.85
08/10/1987	1774.80
08/24/1987	1774.80
09/10/1987	1774.75
09/21/1987	1774.70
10/07/1987	1774.85
10/22/1987	1774.75
11/05/1987	1774.75
11/09/1987	1774.70
11/24/1987	1774.65
12/07/1987	1774.65
12/21/1987	1774.65
01/07/1988	1774.70
01/19/1988	1774.75
02/09/1988	1774.65
02/18/1988	1774.65
03/01/1988	1774.75
03/17/1988	1774.80
03/31/1988	1774.75
04/11/1988	1774.85
04/27/1988	1774.75
05/09/1988	1774.70
05/23/1988	1774.75
06/07/1988	1774.70
06/20/1988	1774.75
06/29/1988	1774.65
07/12/1988	1774.70
07/18/1988	1774.60
08/02/1988	1774.65
08/16/1988	1774.70
08/29/1988	1774.80
09/13/1988	1774.75
09/26/1988	1774.75

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
10/10/1988	1774.80
10/27/1988	1774.75
11/07/1988	1774.70
11/22/1988	1774.75
12/08/1988	1774.65
12/20/1988	1774.65
01/05/1989	1774.65
01/16/1989	1774.70
01/31/1989	1774.65
02/14/1989	1774.60
02/28/1989	1774.60
03/14/1989	1774.65
03/27/1989	1774.65
04/04/1989	1774.70
04/20/1989	1774.70
05/04/1989	1774.70
05/17/1989	1774.65
05/31/1989	1774.70
06/15/1989	1774.70
06/27/1989	1774.65
07/13/1989	1774.75
07/17/1989	1774.70
07/31/1989	1774.75
08/15/1989	1774.80
08/28/1989	1774.70
09/13/1989	1774.40
09/25/1989	1774.80
10/12/1989	1774.50
10/24/1989	1774.50
11/07/1989	1774.60
11/21/1989	1774.50
12/05/1989	1774.55
01/04/1990	1774.91
01/17/1990	1774.73
02/01/1990	1774.65
02/13/1990	1774.67
02/27/1990	1774.75
03/14/1990	1774.62
03/27/1990	1774.75
04/09/1990	1774.65
04/25/1990	1774.65
05/08/1990	1774.59
05/15/1990	1774.74
05/22/1990	1774.74
05/31/1990	1774.22
06/05/1990	1774.67
06/12/1990	1774.75
06/20/1990	1774.75
07/10/1990	1774.65
07/24/1990	1774.75
08/02/1990	1774.72
08/09/1990	1774.70
08/14/1990	1774.70
08/30/1990	1774.65
09/17/1990	1774.72
10/04/1990	1774.73
10/18/1990	1774.62
10/30/1990	1774.73
11/14/1990	1774.70
11/30/1990	1774.80
12/11/1990	1774.75

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
12/27/1990	1774.80
01/09/1991	1774.80
01/23/1991	1774.85
02/07/1991	1774.80
02/20/1991	1774.75
03/07/1991	1774.85
03/19/1991	1774.80
04/04/1991	1774.80
04/15/1991	1774.80
04/30/1991	1774.75
05/14/1991	1774.70
05/30/1991	1774.70
06/11/1991	1774.80
06/24/1991	1774.80
07/09/1991	1774.80
07/24/1991	1774.75
08/06/1991	1774.75
08/19/1991	1774.80
08/29/1991	1774.75
09/10/1991	1774.75
09/23/1991	1774.75
10/09/1991	1774.70
10/21/1991	1774.85
11/04/1991	1774.80
11/19/1991	1774.80
12/02/1991	1774.75
12/17/1991	1774.80
12/30/1991	1774.75
01/13/1992	1774.8
01/27/1992	1774.9
02/10/1992	1774.8
02/24/1992	1774.8
03/10/1992	1775.0
03/27/1992	1774.9
04/06/1992	1774.8
04/20/1992	1774.9
05/04/1992	1774.9
05/20/1992	1774.7
06/02/1992	1774.7
06/18/1992	1774.7
07/02/1992	1774.8
07/16/1992	1774.8
07/27/1992	1774.8
08/10/1992	1774.7
08/25/1992	1774.8
09/08/1992	1774.7
09/21/1992	1774.7
10/09/1992	1774.6
10/20/1992	1774.6
10/27/1992	1774.9
11/04/1992	1774.8
11/10/1992	1774.7
11/16/1992	1774.7
12/04/1992	1774.7
12/16/1992	1774.8
12/28/1992	1774.8
01/15/1993	1774.34
01/28/1993	1774.44
02/12/1993	1774.34
02/26/1993	1774.34
03/10/1993	1774.44

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
03/24/1993	1774.39
04/08/1993	1774.44
04/20/1993	1774.39
05/06/1993	1774.39
05/20/1993	1774.44
06/02/1993	1774.39
06/14/1993	1774.44
06/22/1993	1773.79
07/06/1993	1773.84
07/20/1993	1773.84
08/02/1993	1773.84
08/16/1993	1773.74
08/30/1993	1773.94
09/08/1993	1773.89
09/20/1993	1773.74
09/30/1993	1773.74
10/13/1993	1774.19
10/25/1993	1774.14
11/09/1993	1773.69
11/15/1993	1774.24
12/02/1993	1774.04
12/08/1993	1774.19
12/13/1993	1774.19
12/30/1993	1774.34
01/12/1994	1774.14
01/17/1994	1774.19
02/10/1994	1774.19
02/14/1994	1774.19
03/02/1994	1774.29
03/16/1994	1774.24
03/21/1994	1774.29
04/08/1994	1774.19
04/13/1994	1774.24
04/18/1994	1774.19
05/05/1994	1774.29
05/11/1994	1774.19
05/16/1994	1774.19
06/01/1994	1774.39
06/15/1994	1774.29
06/22/1994	1774.14
06/28/1994	1774.39
07/13/1994	1774.24
07/18/1994	1774.19
08/04/1994	1774.29
08/17/1994	1774.19
08/22/1994	1774.29
09/14/1994	1774.24
09/20/1994	1774.29
10/06/1994	1774.29
10/12/1994	1774.29
10/18/1994	1774.39
11/07/1994	1774.29
11/17/1994	1774.24
12/06/1994	1774.29
12/14/1994	1774.29
12/19/1994	1774.34
01/05/1995	1774.29
01/18/1995	1775.34
01/24/1995	1774.34
01/26/1995	1774.29
02/06/1995	1774.29

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
02/21/1995	1774.29
02/28/1995	1774.34
03/14/1995	1774.29
03/22/1995	1774.29
03/27/1995	1774.29
03/29/1995	1774.34
04/13/1995	1774.29
04/17/1995	1774.29
04/20/1995	1774.24
04/26/1995	1774.44
05/01/1995	1774.49
05/16/1995	1774.54
05/31/1995	1777.14
06/05/1995	1777.59
06/13/1995	1778.39
06/22/1995	1779.14
06/29/1995	1779.79
07/17/1995	1780.69
07/25/1995	1780.79
08/08/1995	1780.19
08/16/1995	1779.69
08/22/1995	1778.99
09/06/1995	1776.74
09/20/1995	1775.04
09/26/1995	1774.69
10/03/1995	1774.54
10/17/1995	1774.44
10/24/1995	1774.44
11/09/1995	1774.09
11/15/1995	1774.49
11/20/1995	1774.49
12/29/1995	1774.49
01/10/1996	1774.50
02/15/1996	1774.60
02/20/1996	1774.55
03/25/1996	1774.70
04/11/1996	1775.40
04/24/1996	1776.90
04/30/1996	1777.90
05/06/1996	1778.75
06/25/1996	1780.50
07/18/1996	1780.50
08/28/1996	1778.70
09/19/1996	1776.45
09/23/1996	1776.05
10/30/1996	1774.40
11/18/1996	1772.89
12/11/1996	1772.29
12/16/1996	1772.49
01/09/1997	1772.29
02/05/1997	1772.39
03/24/1997	1780.79
03/25/1997	1780.99
03/26/1997	1781.19
03/27/1997	1781.14
03/31/1997	1781.89
04/03/1997	1782.69
04/07/1997	1783.19
04/08/1997	1783.64
04/15/1997	1785.37
04/16/1997	1785.72

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
04/22/1997	1786.87
05/01/1997	1788.57
05/06/1997	1789.02
05/19/1997	1789.27
05/20/1997	1789.12
05/21/1997	1789.07
05/29/1997	1789.02
06/02/1997	1788.92
06/04/1997	1788.92
06/05/1997	1788.67
06/12/1997	1788.52
06/18/1997	1788.47
06/24/1997	1788.47
06/26/1997	1788.32
07/03/1997	1788.22
07/07/1997	1788.22
07/16/1997	1788.02
07/22/1997	1787.87
08/01/1997	1787.47
08/07/1997	1787.12
08/13/1997	1786.72
08/20/1997	1786.42
08/21/1997	1786.27
08/26/1997	1785.92
09/03/1997	1785.47
09/10/1997	1785.17
09/18/1997	1784.72
09/23/1997	1784.17
09/29/1997	1783.87
10/08/1997	1783.22
10/14/1997	1782.72
10/21/1997	1782.12
10/28/1997	1781.42
11/03/1997	1780.82
11/10/1997	1779.82
11/18/1997	1778.72
11/24/1997	1778.72
12/02/1997	1776.42
12/10/1997	1775.52
12/15/1997	1774.52
12/22/1997	1773.82
12/30/1997	1773.47
01/05/1998	1773.12
01/15/1998	1772.72
01/20/1998	1772.67
01/22/1998	1772.67
01/29/1998	1772.67
02/04/1998	1772.52
02/09/1998	1772.42
02/19/1998	1772.62
02/23/1998	1772.57
02/25/1998	1772.67
03/05/1998	1772.67
03/11/1998	1772.77
03/16/1998	1773.12
03/18/1998	1773.17
03/23/1998	1773.42
03/30/1998	1773.92
04/07/1998	1774.30
04/13/1998	1774.67
04/22/1998	1775.07

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

Sample Date	SWL ft.
05/13/1998	1775.37
05/20/1998	1775.32
05/26/1998	1775.22
05/28/1998	1775.07
06/03/1998	1774.92
06/15/1998	1774.57
06/17/1998	1774.37
06/22/1998	1774.27
06/29/1998	1773.92
07/09/1998	1773.72
07/16/1998	1773.52
07/22/1998	1773.37
07/28/1998	1773.32
08/06/1998	1773.17
08/13/1998	1772.92
08/17/1998	1772.62
08/19/1998	1772.52
08/26/1998	1772.57
08/31/1998	1772.47
09/08/1998	1772.42
09/15/1998	1772.42
09/23/1998	1772.42
09/30/1998	1772.47
10/07/1998	1772.42
10/15/1998	1772.47
10/20/1998	1772.32
11/03/1998	1772.37
11/24/1998	1772.27
12/01/1998	1772.52
12/08/1998	1772.27
12/17/1998	1772.47
12/30/1998	1772.42
01/05/1999	1772.47
01/11/1999	1772.47
01/19/1999	1772.47
01/25/1999	1772.42
02/03/1999	1772.47
02/09/1999	1772.52
02/18/1999	1772.47
02/22/1999	1772.52
03/02/1999	1772.62
03/08/1999	1773.12
03/15/1999	1773.92
03/22/1999	1774.97
03/30/1999	1776.62
04/05/1999	1777.62
04/14/1999	1779.07
04/22/1999	1780.17
04/26/1999	1780.67
05/04/1999	1781.32
05/10/1999	1781.82
05/18/1999	1782.22
05/26/1999	1782.37
06/03/1999	1782.37
06/07/1999	1782.32
06/17/1999	1782.07
06/21/1999	1781.87
07/06/1999	1781.35
07/14/1999	1780.77
07/19/1999	1780.22
07/26/1999	1779.82

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW4

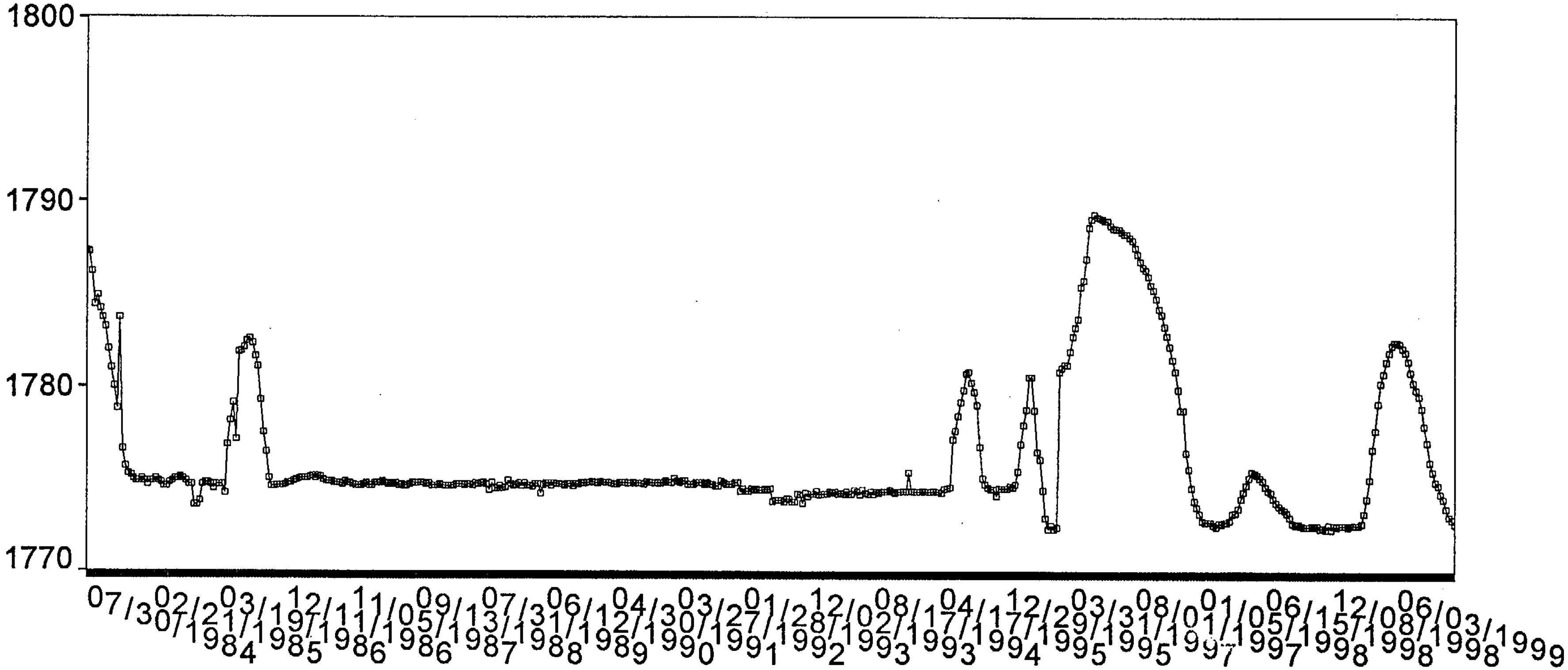
Sample Date	SWL ft.
08/02/1999	1779.47
08/09/1999	1778.82
08/17/1999	1777.87
08/23/1999	1776.97
09/02/1999	1775.92
09/08/1999	1775.42
09/13/1999	1774.87
09/15/1999	1774.67
09/20/1999	1774.22
09/28/1999	1773.92
10/04/1999	1773.42
10/13/1999	1772.97
10/20/1999	1772.82
11/02/1999	1772.57

```
Site            :  SHERWOOD
Sample Type     :  MONITOR WELLS
Sample Location:  MW4
Date Range      :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:            SWL
Units:               ft.
********** BASIC STATISTICS ***************************
N of Cases :         502
Average     : 1.776E+03
Std. Dev.   : 3.907E+00
Variance    : 1.526E+01
Std. Err.   : 1.744E-01
Maximum     : 1.789E+03
Minimum     : 1.772E+03

********** STUDENT'S T STATISTIC *********************
Student T   : 1.902E+01
Deg. Free   : 6.000E+00
2-Tail Sig  : 1.365E-06
S.E. Diff   : 7.014E-01
95%C.I.Dif  : 1.163E+01
Cat 1 Mean  : 1.786E+03
      S.D.  : 1.357E+00
 S.E. Mean  : 6.783E-01
Cat 2 Mean  : 1.773E+03
      S.D.  : 3.571E-01
 S.E. Mean  : 1.785E-01

********** MANN-WHITNEY-U STATISTIC ******************
U-Stat      : 0.000E+00
Signific    :-2.309E+00
P = Val 1T  : 1.046E-02
P = Val 2T  : 2.092E-02

********** LINEAR REGRESSION *************************
Slope       : 2.560E-04
Intercept   : 1.775E+03
R-square    : 1.244E-02
r           : 1.115E-01
F           : 6.297E+00
P           : 1.241E-02
*******************************************************
```

MONITOR WELLS

SHERWOOD : MW4

ANALYTE: SWL (ft)

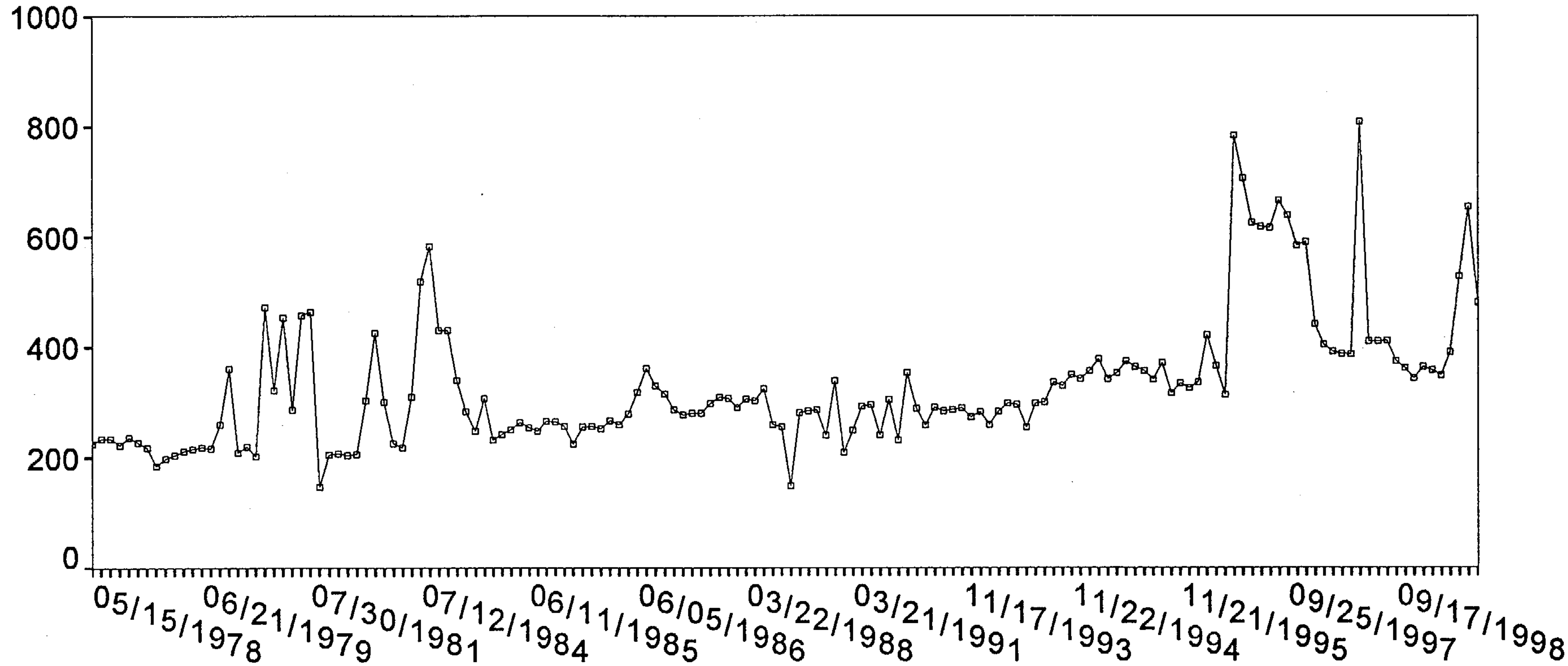


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW4

ANALYTE: TDS (mg/l)

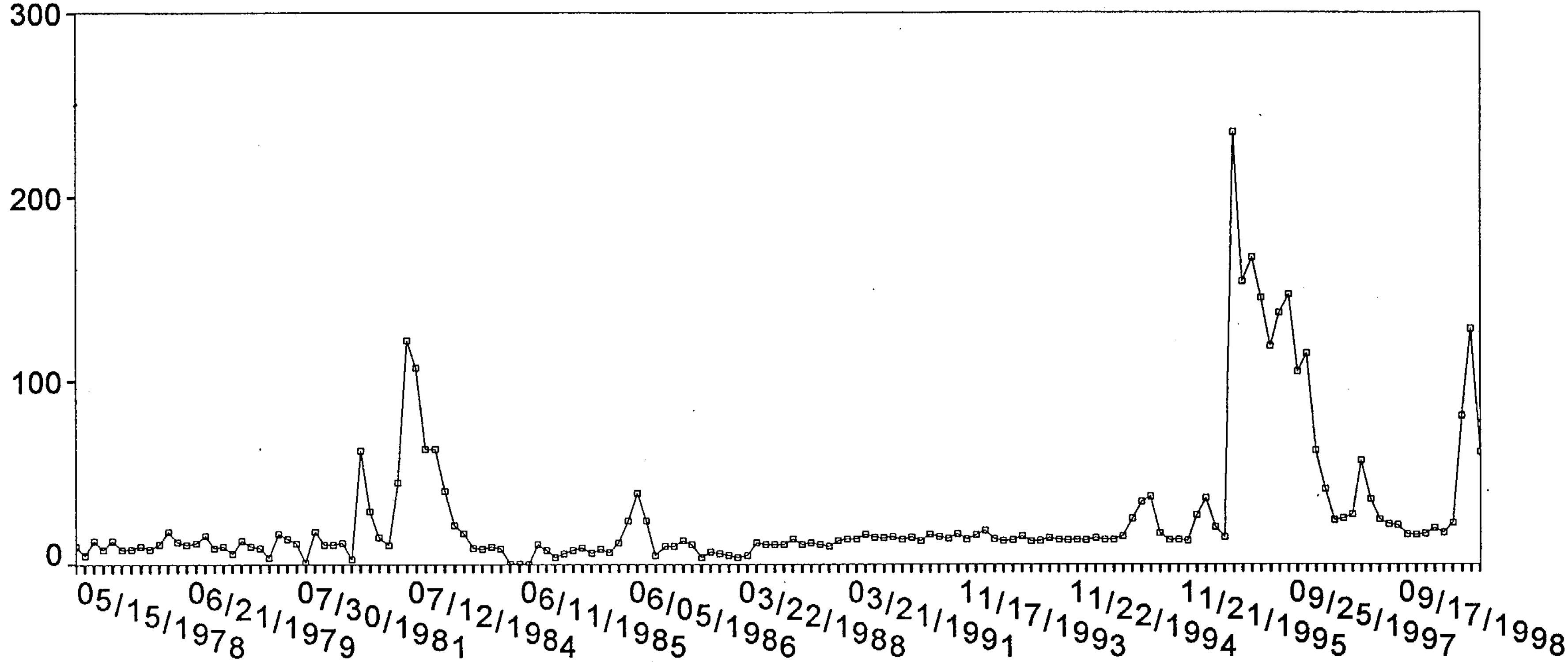


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW4

ANALYTE: SO4 (mg/l)

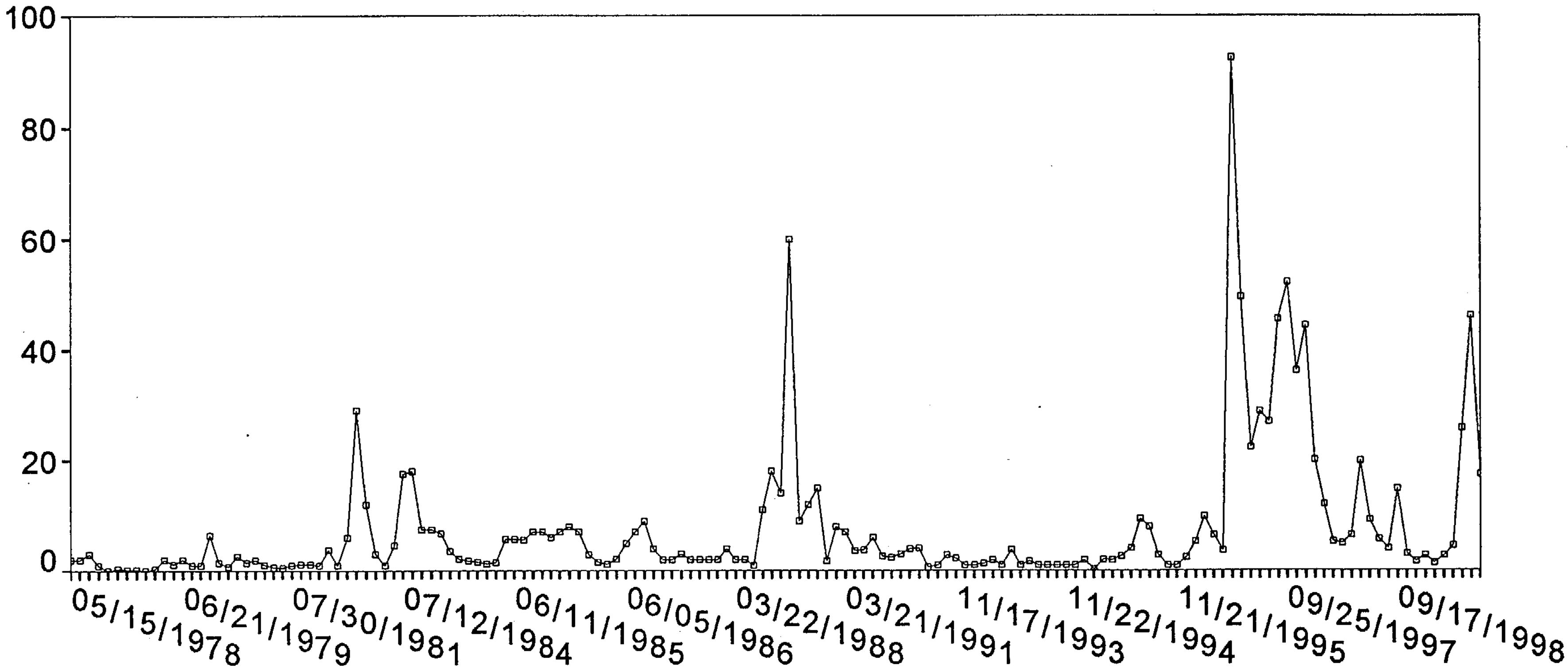


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW4

ANALYTE: Cl (mg/l)

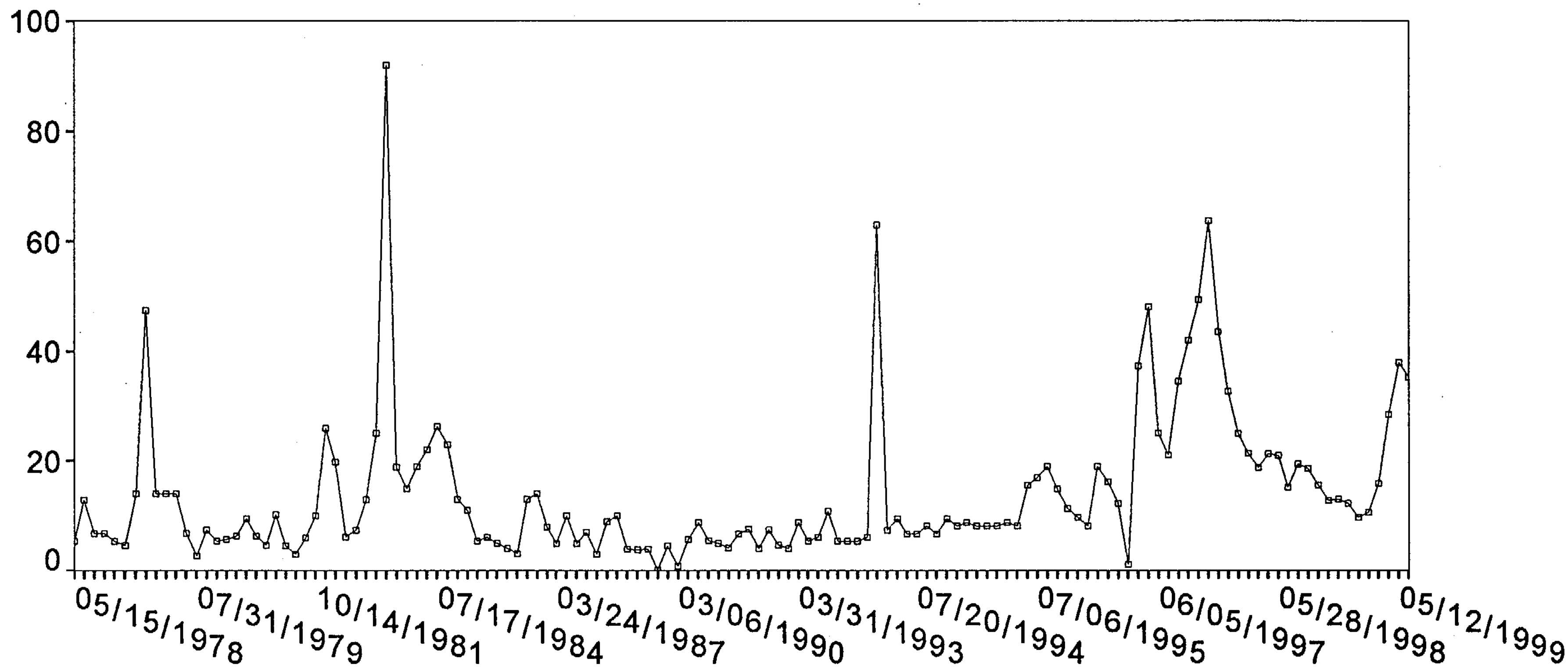


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW4

ANALYTE: URD (pCi/l)



Run Chart - Raw Data

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Calcium (D) mg/l	Magnesium (D) mg/l	Sodium (D) mg/l	Potassium (D) mg/l
09/29/1993	128	84.5	22.0	6.8
10/27/1993	129	87.8	23.4	6.8
11/17/1993	129	87.0	20.0	6.9
12/14/1993	110	92.5	22.1	6.8
01/19/1994	119	82.0	22.4	6.4
02/16/1994	128	90.1	22.8	6.6
03/22/1994	126	79.3	23.0	6.5
04/19/1994	125	83.1	23.7	6.1
05/17/1994	122	96.4	20.3	6.7
06/29/1994	109	85.1	19.2	5.8
07/20/1994	119	89.7	20.4	7.6
08/24/1994	123	92.4	20.7	6.7
09/21/1994	132	96.3	23.6	7.4
10/19/1994	128	91.8	23.9	7.4
11/22/1994	137	82.0	23.0	7.7
12/20/1994	139	80.0	23.0	7.1
01/26/1995	143	101	23.6	8.0
02/28/1995	137	101	23.0	7.7
03/29/1995	131	99.0	23.0	7.7
04/20/1995	142	98.0	23.0	7.8
05/02/1995	133	101	23.0	7.7
06/06/1995	130	98.0	22.4	7.7
07/06/1995	126	96.0	23.0	8.0
08/24/1995	131	91.0	23.0	7.6
09/27/1995	126	93.9	22.1	7.7
10/25/1995	121	89.3	21.5	7.4
11/21/1995	141	97.0	21.9	7.5
02/21/1996	132	98.0	22.6	8.0
05/01/1996	134	96.4	23.5	8.0
09/25/1996	124	90.4	22.9	8.2
11/21/1996	125	96.1	23.2	8.0
03/27/1997	130	93.4	22.1	7.5
05/22/1997	132	94.4	23.5	8.1
06/26/1997	130	94.3	22.9	8.1
07/24/1997	129	92.4	24.2	8.0
08/21/1997	137	96.2	23.4	8.2
09/25/1997	128	90.3	22.0	7.6
10/16/1997	133	92.2	22.6	7.7
11/20/1997	135	93	23	8
12/17/1997	135	96	22.9	7.9
01/22/1998	134	93.8	23.5	7.8
02/25/1998	140	97.0	22.5	7.9
03/18/1998	128	93.2	23.4	7.9
04/22/1998	123	89.0	24.0	8.0
05/28/1998	133	97.1	24.0	8.2
06/17/1998	129	95.4	22.7	8.2
07/16/1998	135	95.2	23.5	8.1
08/19/1998	124	90.6	22.7	8.1
09/17/1998	128	94.4	24.0	8.3
10/22/1998	126	94.6	22.7	8.5
01/27/1999	127	92.7	22.1	8.1
05/12/1999	132	95.0	23.0	8.0
09/15/1999	122	93.4	22.6	7.7

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW10
Date Range : 01/01/1978 - 12/31/1999

Analytes:	Ca	Mg	Na	K
Units:	mg/l	mg/l	mg/l	mg/l
BASIC STATISTICS				
N of Cases	53	53	53	53
Average	1.292E+02	9.264E+01	2.269E+01	7.589E+00
Std. Dev.	6.927E+00	5.210E+00	1.039E+00	6.110E-01
Variance	4.799E+01	2.715E+01	1.079E+00	3.733E-01
Std. Err.	9.515E-01	7.157E-01	1.427E-01	8.393E-02
Maximum	1.430E+02	1.010E+02	2.420E+01	8.500E+00
Minimum	1.090E+02	7.930E+01	1.920E+01	5.800E+00
STUDENT'S T STATISTIC				
Student T	-5.387E-01	-3.407E+00	-9.984E-01	-7.481E+00
Deg. Free	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig	6.095E-01	1.438E-02	3.566E-01	2.946E-04
S.E. Diff	5.105E+00	1.754E+00	7.261E-01	1.671E-01
95%C.I.Dif	-1.524E+01	-1.027E+01	-2.502E+00	-1.659E+00
Cat 1 Mean	1.240E+02	8.795E+01	2.188E+01	6.825E+00
S.D.	9.345E+00	3.343E+00	1.403E+00	5.000E-02
S.E. Mean	4.673E+00	1.672E+00	7.016E-01	2.500E-02
Cat 2 Mean	1.268E+02	9.393E+01	2.260E+01	8.075E+00
S.D.	4.113E+00	1.063E+00	3.742E-01	3.304E-01
S.E. Mean	2.056E+00	5.313E-01	1.871E-01	1.652E-01
MANN-WHITNEY-U STATISTIC				
U-Stat	7.000E+00	0.000E+00	4.500E+00	0.000E+00
Signific	-2.904E-01	-2.309E+00	-1.016E+00	-2.366E+00
P = Val 1T	3.858E-01	1.046E-02	1.547E-01	8.980E-03
P = Val 2T	7.715E-01	2.092E-02	3.094E-01	1.796E-02
LINEAR REGRESSION				
Slope	2.025E-03	2.787E-03	5.679E-04	7.080E-04
Intercept	1.273E+02	8.998E+01	2.215E+01	6.913E+00
R-square	3.578E-02	1.197E-01	1.251E-01	5.619E-01
r	1.891E-01	3.460E-01	3.537E-01	7.496E-01
F	1.892E+00	6.937E+00	7.291E+00	6.540E+01
P	1.750E-01	1.115E-02	9.380E-03	1.362E-11

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Carbonate mg/l	Bicarbonate mg/l	Sulfate (D) mg/l	Chloride (D) mg/l
09/29/1993	0	861	17.4	1.3
10/27/1993	0	916	16.0	2.18
11/17/1993	0	883	18.7	1.9
12/14/1993	0	859	16.6	<1.0
01/19/1994	0	865	18.6	<1.0
02/16/1994	0	827	19.3	0.7
03/22/1994	0	869	16.6	1.3
04/19/1994	0	803	15.4	<1.0
05/17/1994	0	816	15.4	1.7
06/29/1994	0	817	16.9	<1.0
07/20/1994	0	863	15.5	1.35
08/24/1994	0	858	15.6	<1.0
09/21/1994		903	16.2	<1.0
10/19/1994	0	888	16.0	<1.0
11/22/1994	0	899	16.3	<1.0
12/20/1994	0	910	16.3	<1.0
01/26/1995	0	903	18.4	1.9
02/28/1995	0	895	17.2	0.30
03/29/1995	0	905	16.7	1.7
04/20/1995	0	932	16.6	1.4
05/02/1995	0	906	19.9	2.0
06/06/1995			17.6	2.4
07/06/1995	0	914	18.0	3.0
08/24/1995	0	932	18.7	<1.0
09/27/1995	0	932	17.9	<1.0
10/25/1995	0	925	17.8	<1.0
11/21/1995	0	925	18.6	<1.0
02/21/1996	0	927	21.3	1.8
05/01/1996	0	919	18.8	<1.0
09/25/1996	0	902	20.4	3.4
11/21/1996	0	915	18.8	2.3
03/27/1997	0	925	22.9	2.0
05/22/1997	0	920	20.1	<1.0
06/26/1997	0	924	22.2	<1.0
07/24/1997	0	921	23.1	2.5
08/21/1997	0	911	21.4	<1.0
09/25/1997	0	913	22.0	<1.0
10/16/1997	<0.10	915	22.0	<1.0
11/20/1997	<0.1	915	21.7	2.5
12/17/1997	<1	900	21.9	<1
01/22/1998	<0.10	900	22.1	<1.0
02/25/1998	<0.10	897	22.6	<1.0
03/18/1998	<0.1	893	22.5	<1
04/22/1998	<1.0	892	22.9	<1.0
05/28/1998	<1.0	895	23.2	<1.0
06/17/1998	<1.0	893	24.0	<1.0
07/16/1998	<1.0	878	24.0	1.4
08/19/1998	<1.0	896	23.0	<1.0
09/17/1998	<1.0	899	23.4	<1.0
10/22/1998	<1.0	889	22.9	<1.0
11/19/1998			23.4	<1.0
12/10/1998			23.0	<1.0
01/27/1999	<1.0	856	23.7	<1.0
02/24/1999			25.1	1.4
03/24/1999			24.2	1.0
04/08/1999			24.3	1.0
05/12/1999	<1.0	874	24.9	<1.0
09/15/1999	<1.0	827	25.4	1.7

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW10
Date Range : 01/01/1978 - 12/31/1999

Analytes:	CO3	HCO3	SO4	Cl
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS				
N of Cases	51	52	58	58
Average	2.255E-01	8.923E+02	2.009E+01	1.330E+00
Std. Dev.	4.113E-01	3.206E+01	3.092E+00	5.936E-01
Variance	1.691E-01	1.028E+03	9.562E+00	3.524E-01
Std. Err.	5.759E-02	4.446E+00	4.060E-01	7.794E-02
Maximum	1.000E+00	9.320E+02	2.540E+01	3.400E+00
Minimum	0.000E+00	8.030E+02	1.540E+01	3.000E-01
********** STUDENT'S T STATISTIC				
Student T	.	9.709E-01	-1.163E+01	1.305E+00
Deg. Free	.	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig	.	3.691E-01	2.439E-05	2.398E-01
S.E. Diff	.	1.880E+01	6.473E-01	3.219E-01
95%C.I.Dif	.	-2.774E+01	-9.109E+00	-3.678E-01
Cat 1 Mean	0.000E+00	8.798E+02	1.717E+01	1.595E+00
S.D.	0.000E+00	2.650E+01	1.167E+00	5.405E-01
S.E. Mean	0.000E+00	1.325E+01	5.836E-01	2.702E-01
Cat 2 Mean	1.000E+00	8.615E+02	2.470E+01	1.175E+00
S.D.	0.000E+00	2.666E+01	5.598E-01	3.500E-01
S.E. Mean	0.000E+00	1.333E+01	2.799E-01	1.750E-01
********** MANN-WHITNEY-U STATISTIC				
U-Stat	0.000E+00	5.000E+00	0.000E+00	3.500E+00
Signific	-2.646E+00	-8.660E-01	-2.309E+00	-1.384E+00
P = Val 1T	4.075E-03	1.932E-01	1.046E-02	8.317E-02
P = Val 2T	8.151E-03	3.865E-01	2.092E-02	1.663E-01
********** LINEAR REGRESSION				
Slope	4.515E-04	1.085E-02	4.246E-03	-1.011E-04
Intercept	-2.139E-01	8.819E+02	1.567E+01	1.435E+00
R-square	5.128E-01	4.859E-02	8.715E-01	1.342E-02
r	7.161E-01	2.204E-01	9.335E-01	-1.158E-01
F	5.157E+01	2.553E+00	3.797E+02	7.617E-01
P	1.794E-09	1.164E-01	0.000E+00	3.865E-01

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	TDS mg/l	Alk CaCO3 mg/l	SIO2 (D) mg/l	pH Lab s.u.
09/29/1993	740	706		7.86
10/27/1993	740	751		7.54
11/17/1993	727	724		7.45
12/14/1993	711	704	30.6	7.46
01/19/1994	718	709	31.9	7.5
02/16/1994	642	678	28.2	
03/22/1994	707	712	30.0	7.52
04/19/1994	664	658	33.2	7.4
05/17/1994	634	669	33.0	7.52
06/29/1994	638	670	30.2	
07/20/1994	654	707	29.8	
08/24/1994	684	703	30.3	7.53
09/21/1994	737	740	29.0	7.70
10/19/1994	718	728	28.0	7.88
11/22/1994	693	737	28.7	7.83
12/20/1994	708	746	29.0	7.83
01/26/1995	710	740	29.5	7.39
02/28/1995	722	734	27.5	7.66
03/29/1995	754	742	27.0	7.57
04/20/1995	711	764	25.9	7.81
05/02/1995	776	743	27.6	7.72
06/06/1995	770	719	27.7	7.83
07/06/1995	763	749	27.3	7.92
08/24/1995	742	764	25.5	7.33
09/27/1995	777	764	27.1	7.46
10/25/1995	753	758	26.5	7.74
11/21/1995	757	758	27.0	7.85
02/21/1996	716	760	25.6	7.65
05/01/1996	741	753	26.9	7.73
09/25/1996	786	739	26.4	8.02
11/21/1996	753	750	26.6	7.97
03/27/1997	681	758	25.1	7.77
05/22/1997	788	754	28.6	7.81
06/26/1997	736	757	26.1	7.90
07/24/1997	754	755	25.6	7.92
08/21/1997	760	747	27.0	8.00
09/25/1997	740	748	26.3	8.00
10/16/1997	775	750	27.4	7.99
11/20/1997	759	750	26	7.86
12/17/1997	737	738	27.6	7.79
01/22/1998	750	738	27.3	
02/25/1998	736	735	25.6	
03/18/1998	722	732	25.8	
04/22/1998	744	731	27.0	
05/28/1998	759	734	26.7	
06/17/1998	735	732	26.6	
07/16/1998	758	720	27.0	
08/19/1998	757	734	25.0	
09/17/1998	767	737	26.4	
10/22/1998	740	729	26.2	
11/19/1998	718			7.33
12/10/1998	710			7.68
01/27/1999	717	702	28.7	
02/24/1999	686			7.27
03/24/1999	690			7.40
04/08/1999	724			7.40
05/12/1999	741	717	25.5	
09/15/1999	706	678		7.98

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW10
Date Range : 01/01/1978 - 12/31/1999

Analytes:	TDS	ALK	SIO2	pH_L
Units:	mg/l	mg/l	mg/l	s.u.
BASIC STATISTICS				
N of Cases :	58	53	49	43
Average :	7.282E+02	7.312E+02	2.762E+01	7.692E+00
Std. Dev. :	3.613E+01	2.605E+01	1.948E+00	2.200E-01
Variance :	1.305E+03	6.784E+02	3.796E+00	4.838E-02
Std. Err. :	4.744E+00	3.578E+00	2.783E-01	3.354E-02
Maximum :	7.880E+02	7.640E+02	3.320E+01	8.020E+00
Minimum :	6.340E+02	6.580E+02	2.500E+01	7.270E+00
STUDENT'S T STATISTIC				
Student T :	1.095E+00	9.535E-01	3.356E+00	3.500E-01
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	3.155E-01	3.772E-01	1.531E-02	7.383E-01
S.E. Diff :	1.301E+01	1.547E+01	1.036E+00	1.857E-01
95%C.I.Dif :	-1.759E+01	-2.310E+01	9.412E-01	-3.895E-01
Cat 1 Mean :	7.295E+02	7.213E+02	3.018E+01	7.578E+00
S.D. :	1.377E+01	2.178E+01	1.537E+00	1.926E-01
S.E. Mean :	6.886E+00	1.089E+01	7.685E-01	9.630E-02
Cat 2 Mean :	7.153E+02	7.065E+02	2.670E+01	7.513E+00
S.D. :	2.208E+01	2.198E+01	1.388E+00	3.176E-01
S.E. Mean :	1.104E+01	1.099E+01	6.940E-01	1.588E-01
MANN-WHITNEY-U STATISTIC				
U-Stat :	5.000E+00	5.000E+00	1.000E+00	4.000E+00
Signific :	-8.712E-01	-8.660E-01	-2.021E+00	-1.162E+00
P = Val 1T :	1.918E-01	1.932E-01	2.165E-02	1.227E-01
P = Val 2T :	3.836E-01	3.865E-01	4.331E-02	2.454E-01
LINEAR REGRESSION				
Slope :	1.610E-02	9.088E-03	-2.140E-03	5.601E-05
Intercept :	7.115E+02	7.225E+02	2.957E+01	7.642E+00
R-square :	9.177E-02	5.095E-02	4.431E-01	2.637E-02
r :	3.029E-01	2.257E-01	-6.657E-01	1.624E-01
F :	5.658E+00	2.738E+00	3.740E+01	1.110E+00
P :	2.081E-02	1.041E-01	1.727E-07	2.982E-01

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Arsenic (D) mg/l	Iron (D) mg/l	Nickel (D) mg/l	Zinc (D) mg/l
09/29/1993		<0.05	<0.05	
10/27/1993		<0.05	<0.05	
11/17/1993		<0.05	<0.05	
12/14/1993		<0.05	<0.05	
01/19/1994	<0.001	<0.05	<0.05	0.10
02/16/1994	0.001	<0.05	<0.05	0.07
03/22/1994	<0.001	<0.05	<0.05	0.06
04/19/1994	<0.001	<0.05	<0.05	0.03
05/17/1994	<0.001	<0.05	<0.05	0.04
06/29/1994	0.001	<0.05	<0.05	0.03
07/20/1994	0.001	<0.05	<0.05	0.04
08/24/1994	<0.001	<0.05	<0.01	0.03
09/21/1994	<0.001	<0.05	<0.01	0.03
10/19/1994	0.001	<0.05	<0.01	<0.01
11/22/1994	<0.001	<0.05	<0.05	0.03
12/20/1994	<0.001	<0.05	<0.05	0.04
01/26/1995	0.001	<0.01	<0.01	<0.01
02/28/1995	<0.001	<0.01	<0.01	<0.01
03/29/1995	<0.001	<0.01	<0.01	0.02
04/20/1995	<0.001	<0.01	<0.01	0.03
05/02/1995	0.001	<0.01	<0.01	0.02
06/06/1995	<0.001	<0.01	<0.01	0.03
07/06/1995	0.001	<0.01	<0.01	0.02
08/24/1995	<0.001	<0.05	<0.05	0.01
09/27/1995	0.001	0.01	<0.01	0.02
10/25/1995	<0.001	<0.01	<0.01	0.01
11/21/1995	<0.001	<0.01	<0.01	0.02
02/21/1996	0.002	0.01	<0.01	<0.01
05/01/1996	<0.001	<0.01	<0.01	0.02
09/25/1996	<0.001	0.01	<0.01	<0.01
11/21/1996	<0.001	<0.05	<0.05	0.01
03/27/1997	<0.001	<0.10	<0.01	0.01
05/22/1997	0.002	<0.01	<0.01	<0.01
06/26/1997	0.001	<0.01	<0.01	0.02
07/24/1997	<0.001	<0.01	<0.01	<0.01
08/21/1997	<0.001	<0.01	<0.01	0.02
09/25/1997	<0.001	0.01	<0.01	0.02
10/16/1997	<0.001	<0.01	<0.01	0.01
11/20/1997	<0.001	<0.01	<0.01	0.02
12/17/1997	0.002	<0.01	<0.01	<0.01
01/22/1998	0.002	<0.01	<0.01	<0.01
02/25/1998	0.002	<0.01	<0.01	0.02
03/18/1998	0.002	<0.01	<0.01	<0.01
04/22/1998	0.002	<0.01	<0.01	<0.01
05/28/1998	0.002	<0.01	<0.01	<0.01
06/17/1998	0.002	<0.01	<0.01	0.01
07/16/1998	0.001	<0.01	<0.01	0.02
08/19/1998	0.002	<0.01	<0.01	0.02
09/17/1998	0.002	<0.01	<0.01	0.01
10/22/1998	0.002	<0.01	<0.01	<0.01
11/19/1998			<0.05	
12/10/1998			<0.05	
01/27/1999	0.002	<0.01	<0.01	0.02
02/24/1999			<0.01	
03/24/1999			<0.01	
04/08/1999			<0.01	
05/12/1999	0.002	<0.01	<0.01	0.01
09/15/1999	0.002	<0.01	<0.01	0.02

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW10
Date Range : 01/01/1978 - 12/31/1999

Analytes:	As_D	Fe_D	Ni_D	Zn_D
Units:	mg/l	mg/l	mg/l	mg/l
********** BASIC STATISTICS				
N of Cases :	49	53	58	49
Average :	1.306E-03	2.528E-02	2.172E-02	2.184E-02
Std. Dev. :	4.657E-04	2.172E-02	1.837E-02	1.728E-02
Variance :	2.168E-07	4.716E-04	3.373E-04	2.986E-04
Std. Err. :	6.652E-05	2.983E-03	2.412E-03	2.469E-03
Maximum :	2.000E-03	1.000E-01	5.000E-02	1.000E-01
Minimum :	1.000E-03	1.000E-02	1.000E-02	1.000E-02
********** STUDENT'S T STATISTIC				
Student T :	.	.	.	3.397E+00
Deg. Free :	.	.	.	6.000E+00
2-Tail Sig :	.	.	.	1.455E-02
S.E. Diff :	.	.	.	1.472E-02
95%C.I.Dif :	.	.	.	1.398E-02
Cat 1 Mean :	1.000E-03	5.000E-02	5.000E-02	6.500E-02
S.D. :	0.000E+00	0.000E+00	0.000E+00	2.887E-02
S.E. Mean :	0.000E+00	0.000E+00	0.000E+00	1.443E-02
Cat 2 Mean :	2.000E-03	1.000E-02	1.000E-02	1.500E-02
S.D. :	0.000E+00	0.000E+00	0.000E+00	5.774E-03
S.E. Mean :	0.000E+00	0.000E+00	0.000E+00	2.887E-03
********** MANN-WHITNEY-U STATISTIC				
U-Stat :	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Signific :	-2.646E+00	-2.646E+00	-2.646E+00	-2.337E+00
P = Val 1T :	4.075E-03	4.075E-03	4.075E-03	9.709E-03
P = Val 2T :	8.151E-03	8.151E-03	8.151E-03	1.942E-02
********** LINEAR REGRESSION				
Slope :	5.431E-07	-2.038E-05	-1.460E-05	-1.613E-05
Intercept :	8.078E-04	4.474E-02	3.692E-02	3.663E-02
R-square :	5.139E-01	3.685E-01	2.921E-01	3.290E-01
r :	7.169E-01	-6.071E-01	-5.405E-01	-5.735E-01
F :	4.969E+01	2.977E+01	2.311E+01	2.304E+01
P :	3.935E-09	1.448E-06	1.190E-05	1.651E-05

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
09/29/1993		33.2	1.6#0.5	1.4#0.6
10/27/1993		33.2	1.5#0.3	2.4#0.6
11/17/1993		30.5	1.1#0.2	3.4#0.4
12/14/1993		29.1	0.7#0.2	4.8#0.8
01/19/1994		22.34	1.9#0.3	3.2#3.2
02/16/1994		29.79	0.8#0.4	<1.0
03/22/1994		51.45	1.9#0.7	1.2#1.2
04/19/1994		32.50	0.4#0.3	1.6#0.5
05/17/1994		33.85	0.7#0.3	2.2#2.0
06/29/1994	<0.01	37.91	0.9#0.5	<1.0
06/29/1994	<0.0004			
07/20/1994	<0.01	25.73	2.9#1.2	3.3#3.0
08/24/1994	<0.01	29.11	0.7#0.4	<1.0
08/24/1994	<0.0004			
09/21/1994	<0.01	41.30	0.2#0.2	<1.0
09/21/1994	<0.0004			
10/19/1994	<0.01	38.59	1.6#0.4	2.9#0.9
10/19/1994	<0.0004			
11/22/1994	<0.01	37.91	1.0#0.5	1.5#1.3
11/22/1994	<0.0004			
12/20/1994	<0.01	35.88	0.7#0.4	<1.0
12/20/1994	<0.0004			
01/26/1995	<0.01	35.2	1.3#0.3	1.6#1.1
01/26/1995	<0.0004			
02/28/1995	<0.01	29.1	1.4#0.5	3.3#2.3
02/28/1995	<0.0004			
03/29/1995	<0.01	34.5	0.6#0.3	<1.0
03/29/1995	<0.0004			
04/20/1995	<0.0004	32.5	0.9#0.2	<1.0
05/02/1995	<0.0004	31.1	1.0#0.4	1.7#0.7
06/06/1995	<0.0004	38.6	1.1#0.5	3.0#1.4
07/06/1995	<0.0004	36.6	1.6#0.8	4.9#1.5
08/24/1995	<0.0004	39.6	1.4#0.4	1.4#1.1
09/27/1995	<0.0004	38.6	1.5#0.7	<1.0
10/25/1995	<0.0004	36.4	1.5#0.4	1.9#0.9
11/21/1995	<0.0004	36.4	0.7#0.4	1.4#1.1
02/21/1996	<0.0004	37.2	1.3#0.4	1.1#0.6
05/01/1996	<0.0004	51.5	1.0#0.2	5.6#0.9
09/25/1996	<0.0004	43.5	0.9#0.3	4.3#0.5
11/21/1996	<0.0004	39.5	1.6#0.2	<1.0
03/27/1997	<0.0004	41.97	1.9#0.2	2.8#0.3
05/22/1997	<0.0004	43.33	1.8#0.2	1.5#0.2
06/26/1997	<0.0004	38.59	1.5#0.2	<1.0
07/24/1997	<0.0004	33.17	0.8#0.2	3.1#0.2
08/21/1997	<0.0004	37.24	0.9#0.2	<1.0
09/25/1997	<0.0004	35.2	1.3#0.2	<1.0
10/16/1997	<0.0004	41.97	0.9#0.2	<1.0
11/20/1997	<0.0004	41.30	2#0.30	<1
12/17/1997	<0.0004	39.47	1.3#0.20	<1
01/22/1998	<0.0004	37.6	1.6#0.2	1.9#0.2
02/25/1998	<0.0004	43.3	1.3#0.2	<1.0
03/18/1998	<0.0004	37.3	1.7#0.20	<1
04/22/1998	<0.0004	39.401	1.6#0.2	<1.0
05/28/1998	<0.0004	33.444	0.8#0.2	3.7#1.2
06/17/1998	<0.0004	27.622	0.3#0.1	<1.0
07/16/1998	<0.0004	40.96	1.2#0.2	2.6#1.6
08/19/1998	<0.0004	39.06	1.1#0.2	<1.0
09/17/1998	<0.0004	43.33	0.7#0.2	3.4#1.6
10/22/1998	<0.0004	38.25	1.2#0.2	<1.0
11/19/1998		41.84		
12/10/1998		41.57		

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Thallium (D) mg/l	Uranium (D) pCi/l	Radium-226 (D) pCi/l	Radium-228 (D) pCi/l
01/27/1999	<0.0004	33.38	1.4#0.1	1.8#0.2
02/24/1999		39.60		
03/24/1999		40.89		
04/08/1999		42.72		
05/12/1999	<0.0004	40.62	1.7#0.3	<1.0
09/15/1999	<0.0004	37.9	0.9#0.2	6.3#0.3

Site : SHERWOOD
Sample Type : MONITOR WELLS
Sample Location: MW10
Date Range : 01/01/1978 - 12/31/1999

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Analytes:	Tl_D	URD	Ra_226_D	Ra_228_D
Units:	mg/l	pCi/l	pCi/l	pCi/l
********** BASIC STATISTICS **************************				
N of Cases :	53	58	53	53
Average :	2.211E-03	3.713E+01	1.213E+00	2.023E+00
Std. Dev. :	3.792E-03	5.491E+00	4.965E-01	1.347E+00
Variance :	1.438E-05	3.015E+01	2.466E-01	1.814E+00
Std. Err. :	5.209E-04	7.210E-01	6.821E-02	1.850E-01
Maximum :	1.000E-02	5.150E+01	2.900E+00	6.300E+00
Minimum :	4.000E-04	2.234E+01	2.000E-01	1.000E+00
********** STUDENT'S T STATISTIC *********************				
Student T :	3.000E+00	-6.336E+00	-2.822E-01	3.243E-01
Deg. Free :	6.000E+00	6.000E+00	6.000E+00	6.000E+00
2-Tail Sig :	2.401E-02	7.236E-04	7.873E-01	7.567E-01
S.E. Diff :	2.400E-03	1.426E+00	2.658E-01	1.465E+00
95%C.I.Dif :	1.327E-03	-1.252E+01	-7.253E-01	-3.109E+00
Cat 1 Mean :	7.600E-03	3.150E+01	1.225E+00	3.000E+00
S.D. :	4.800E-03	2.045E+00	4.113E-01	1.451E+00
S.E. Mean :	2.400E-03	1.022E+00	2.056E-01	7.257E-01
Cat 2 Mean :	4.000E-04	4.053E+01	1.300E+00	2.525E+00
S.D. :	0.000E+00	1.988E+00	3.367E-01	2.545E+00
S.E. Mean :	0.000E+00	9.938E-01	1.683E-01	1.272E+00
********** MANN-WHITNEY-U STATISTIC ******************				
U-Stat :	2.000E+00	0.000E+00	7.000E+00	5.000E+00
Signific :	-2.049E+00	-2.323E+00	-2.887E-01	-8.712E-01
P = Val 1T :	2.021E-02	1.008E-02	3.864E-01	1.918E-01
P = Val 2T :	4.042E-02	2.016E-02	7.728E-01	3.836E-01
********** LINEAR REGRESSION *************************				
Slope :	-3.229E-06	3.386E-03	3.530E-05	-8.544E-05
Intercept :	4.580E-03	3.361E+01	1.180E+00	2.104E+00
R-square :	2.490E-01	1.758E-01	2.115E-03	1.684E-03
r :	-4.990E-01	4.192E-01	4.598E-02	-4.104E-02
F :	1.691E+01	1.194E+01	1.081E-01	8.604E-02
P :	1.430E-04	1.055E-03	7.437E-01	7.705E-01

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Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	Thorium-230 (D) pCi/l
09/29/1993	<1.0
10/27/1993	<1.0
11/17/1993	<1.0
12/14/1993	<1.0
01/19/1994	<1.0
02/16/1994	<0.2
03/22/1994	<0.2
04/19/1994	<0.2
05/17/1994	<0.2
06/29/1994	<1.0
07/20/1994	<1.0
08/24/1994	<1.0
09/21/1994	<0.2
10/19/1994	<0.2
11/22/1994	1.4#0.4
12/20/1994	<0.2
01/26/1995	<0.2
02/28/1995	<0.2
03/29/1995	<0.2
04/20/1995	<0.2
05/02/1995	<0.2
06/06/1995	<0.2
07/06/1995	<0.2
08/24/1995	<0.2
09/27/1995	<0.2
10/25/1995	<0.2
11/21/1995	<0.2
02/21/1996	<0.2
05/01/1996	0.4#0.2
09/25/1996	<0.2
11/21/1996	<0.2
03/27/1997	<0.2
05/22/1997	<0.2
06/26/1997	<0.2
07/24/1997	<0.2
08/21/1997	<0.2
09/25/1997	<0.2
10/16/1997	<0.2
11/20/1997	<0.2
12/17/1997	<0.2
01/22/1998	<0.2
02/25/1998	<0.2
03/18/1998	<0.2
04/22/1998	<0.2
05/28/1998	<0.2
06/17/1998	<0.2
07/16/1998	<0.2
08/19/1998	<0.2
09/17/1998	<0.2
10/22/1998	<0.2
01/27/1999	<0.2
05/12/1999	<0.2
09/15/1999	<0.2

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Site            :  SHERWOOD
Sample Type     :  MONITOR WELLS
Sample Location:  MW10
Date Range      :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:      Th_230_D
Units:            pCi/l
********** BASIC STATISTICS ***************************
N of Cases :          53
Average    : 3.472E-01
Std. Dev.  : 3.238E-01
Variance   : 1.048E-01
Std. Err.  : 4.448E-02
Maximum    : 1.400E+00
Minimum    : 2.000E-01

********** STUDENT'S T STATISTIC **********************
Student T  :  .
Deg. Free  :  .
2-Tail Sig :  .
S.E. Diff  :  .
95%C.I.Dif :  .
Cat 1 Mean : 1.000E+00
      S.D. : 0.000E+00
 S.E. Mean : 0.000E+00
Cat 2 Mean : 2.000E-01
      S.D. : 0.000E+00
 S.E. Mean : 0.000E+00

********** MANN-WHITNEY-U STATISTIC *******************
U-Stat     : 0.000E+00
Signific   :-2.646E+00
P = Val 1T : 4.075E-03
P = Val 2T : 8.151E-03

********** LINEAR REGRESSION **************************
Slope      :-2.674E-04
Intercept  : 6.024E-01
R-square   : 2.854E-01
r          :-5.342E-01
F          : 2.036E+01
P          : 3.794E-05
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Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	SWL ft.
06/14/1993	1780.92
06/22/1993	1780.57
07/06/1993	1780.57
07/20/1993	1780.57
08/02/1993	1780.57
08/16/1993	1780.52
08/30/1993	1780.62
09/08/1993	1780.57
09/20/1993	1780.52
09/27/1993	1780.57
10/13/1993	1780.57
10/25/1993	1780.52
11/09/1993	1780.62
11/15/1993	1780.67
12/02/1993	1780.42
12/08/1993	1780.57
12/13/1993	1780.47
12/30/1993	1780.52
01/13/1994	1780.32
01/17/1994	1780.37
02/10/1994	1780.42
02/14/1994	1780.52
03/02/1994	1780.42
03/17/1994	1780.37
03/21/1994	1780.42
04/08/1994	1780.52
04/14/1994	1780.42
04/18/1994	1780.42
05/05/1994	1780.42
05/12/1994	1780.42
05/16/1994	1780.42
06/01/1994	1780.57
06/15/1994	1780.57
06/23/1994	1780.52
06/28/1994	1780.47
07/14/1994	1780.42
08/04/1994	1780.52
08/18/1994	1780.47
08/22/1994	1780.47
09/15/1994	1780.47
09/20/1994	1780.42
10/06/1994	1780.42
10/13/1994	1780.57
10/18/1994	1780.52
11/07/1994	1780.37
11/18/1994	1780.42
12/06/1994	1780.47
12/15/1994	1780.47
12/19/1994	1780.57
01/05/1995	1780.37
01/19/1995	1780.42
01/26/1995	1780.47
02/06/1995	1780.52
02/22/1995	1780.52
02/23/1995	1780.52
02/28/1995	1780.57
03/14/1995	1780.52
03/23/1995	1780.47
03/27/1995	1780.57
03/29/1995	1780.57
04/13/1995	1780.52

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	SWL ft.
04/17/1995	1780.57
04/18/1995	1780.37
04/20/1995	1780.52
04/27/1995	1780.57
05/01/1995	1780.67
05/02/1995	1780.47
05/16/1995	1780.67
06/01/1995	1780.57
06/05/1995	1780.52
06/06/1995	1780.47
06/13/1995	1780.57
06/29/1995	1780.62
07/18/1995	1780.57
07/25/1995	1780.62
07/26/1995	1780.32
08/08/1995	1780.52
08/22/1995	1780.52
08/23/1995	1780.47
08/24/1995	1780.37
09/06/1995	1780.57
09/21/1995	1780.57
09/26/1995	1780.57
09/27/1995	1780.12
10/03/1995	1780.62
10/18/1995	1780.42
10/24/1995	1780.52
10/25/1995	1780.22
11/09/1995	1780.47
11/16/1995	1781.52
11/20/1995	1780.52
11/21/1995	1780.42
12/29/1995	1780.42
01/10/1996	1780.47
02/15/1996	1780.52
02/20/1996	1780.42
03/25/1996	1780.57
04/11/1996	1780.57
04/24/1996	1780.52
04/30/1996	1780.62
05/01/1996	1780.57
06/25/1996	1780.67
07/18/1996	1780.57
08/28/1996	1780.57
09/19/1996	1780.62
09/23/1996	1780.67
10/30/1996	1780.57
11/18/1996	1780.62
12/11/1996	1780.52
01/09/1997	1780.57
02/05/1997	1780.52
03/24/1997	1780.62
04/22/1997	1780.57
05/01/1997	1780.62
05/06/1997	1780.67
05/19/1997	1780.82
05/29/1997	1780.72
06/02/1997	1780.77
06/12/1997	1780.67
06/18/1997	1780.72
06/24/1997	1780.77
07/03/1997	1780.72

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

Sample Date	SWL ft.
07/07/1997	1780.72
07/16/1997	1780.67
07/22/1997	1780.72
08/01/1997	1780.77
08/07/1997	1780.77
08/13/1997	1780.72
08/20/1997	1780.82
08/26/1997	1780.82
09/03/1997	1780.77
09/10/1997	1780.67
09/18/1997	1780.72
09/23/1997	1780.72
09/29/1997	1780.82
10/08/1997	1780.82
10/14/1997	1780.72
10/21/1997	1780.72
10/28/1997	1780.77
11/03/1997	1780.82
11/10/1997	1780.72
11/18/1997	1780.72
11/24/1997	1780.72
12/02/1997	1780.77
12/10/1997	1780.72
12/15/1997	1780.67
12/22/1997	1780.67
12/30/1997	1780.77
01/05/1998	1780.77
01/15/1998	1780.72
01/20/1998	1780.67
01/22/1998	1780.62
01/29/1998	1780.92
02/04/1998	1780.72
02/09/1998	1780.67
02/19/1998	1780.82
02/23/1998	1780.72
02/25/1998	1780.67
03/05/1998	1780.72
03/11/1998	1780.82
03/16/1998	1780.82
03/18/1998	1780.67
03/23/1998	1780.72
03/30/1998	1780.77
04/07/1998	1780.72
04/13/1998	1780.80
04/22/1998	1780.82
05/13/1998	1780.82
05/20/1998	1780.82
05/26/1998	1780.87
05/28/1998	1780.77
06/03/1998	1780.77
06/09/1998	1780.82
06/15/1998	1780.92
06/17/1998	1780.77
06/22/1998	1780.87
06/29/1998	1780.82
07/09/1998	1780.82
07/16/1998	1780.72
07/22/1998	1780.82
07/28/1998	1780.82
08/06/1998	1780.77
08/13/1998	1780.82

Site: SHERWOOD
Sample Type: MONITOR WELLS
Sample Location: MW10

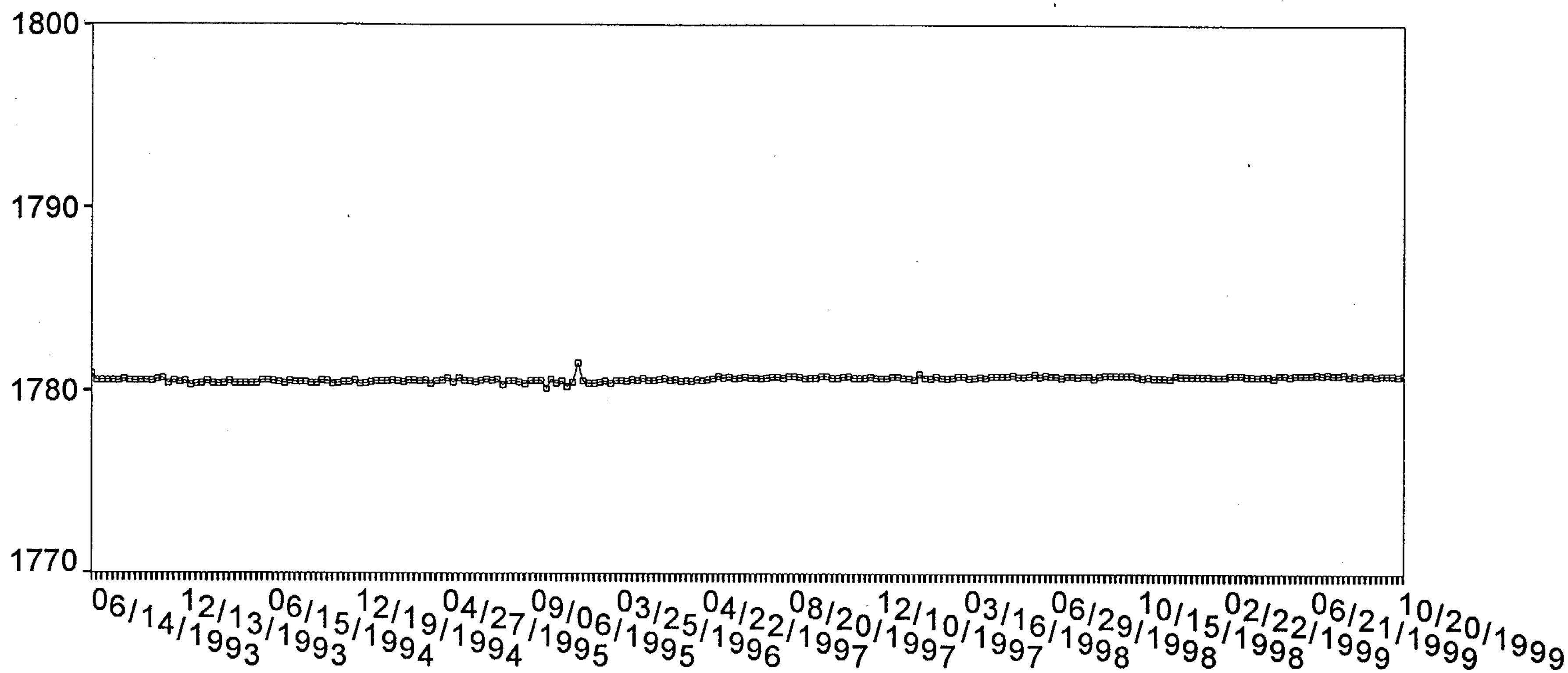
Sample Date	SWL ft.
08/17/1998	1780.82
08/19/1998	1780.67
08/26/1998	1780.82
08/31/1998	1780.87
09/08/1998	1780.87
09/15/1998	1780.87
09/23/1998	1780.87
09/30/1998	1780.87
10/07/1998	1780.87
10/15/1998	1780.82
10/20/1998	1780.72
11/03/1998	1780.77
11/18/1998	1780.72
11/24/1998	1780.72
12/01/1998	1780.72
12/08/1998	1780.67
12/17/1998	1780.87
12/30/1998	1780.82
01/05/1999	1780.82
01/11/1999	1780.82
01/19/1999	1780.82
01/25/1999	1780.82
02/03/1999	1780.82
02/09/1999	1780.77
02/18/1999	1780.77
02/22/1999	1780.77
03/02/1999	1780.87
03/08/1999	1780.87
03/15/1999	1780.87
03/22/1999	1780.82
03/30/1999	1780.82
04/05/1999	1780.77
04/22/1999	1780.82
04/26/1999	1780.82
05/04/1999	1780.72
05/10/1999	1780.87
05/18/1999	1780.87
05/26/1999	1780.82
06/03/1999	1780.87
06/07/1999	1780.87
06/17/1999	1780.87
06/21/1999	1780.87
07/06/1999	1780.92
07/14/1999	1780.87
07/19/1999	1780.92
07/26/1999	1780.87
08/02/1999	1780.87
08/09/1999	1780.92
08/17/1999	1780.82
08/23/1999	1780.87
09/02/1999	1780.82
09/08/1999	1780.87
09/13/1999	1780.87
09/20/1999	1780.82
09/28/1999	1780.87
10/04/1999	1780.87
10/13/1999	1780.87
10/20/1999	1780.82
11/02/1999	1780.87

```
Site            :  SHERWOOD
Sample Type     :  MONITOR WELLS
Sample Location:   MW10
Date Range      :  01/01/1978 - 12/31/1999
*******************************************************
Analytes:           SWL
Units:              ft.
********** BASIC STATISTICS ***************************
N of Cases :        242
Average    : 1.781E+03
Std. Dev.  : 1.722E-01
Variance   : 2.964E-02
Std. Err.  : 1.107E-02
Maximum    : 1.782E+03
Minimum    : 1.780E+03

********** STUDENT'S T STATISTIC **********************
Student T  :-2.263E+00
Deg. Free  : 6.000E+00
2-Tail Sig : 6.431E-02
S.E. Diff  : 8.839E-02
95%C.I.Dif :-4.163E-01
Cat 1 Mean : 1.781E+03
      S.D. : 1.750E-01
 S.E. Mean : 8.750E-02
Cat 2 Mean : 1.781E+03
      S.D. : 2.500E-02
 S.E. Mean : 1.250E-02

********** MANN-WHITNEY-U STATISTIC *******************
U-Stat     : 4.000E+00
Signific   :-1.214E+00
P = Val 1T : 1.124E-01
P = Val 2T : 2.248E-01

********** LINEAR REGRESSION **************************
Slope      : 1.909E-04
Intercept  : 1.780E+03
R-square   : 5.975E-01
r          : 7.730E-01
F          : 3.563E+02
P          : 0.000E+00
*******************************************************
```

MONITOR WELLS

SHERWOOD : MW10

ANALYTE: SWL (ft)

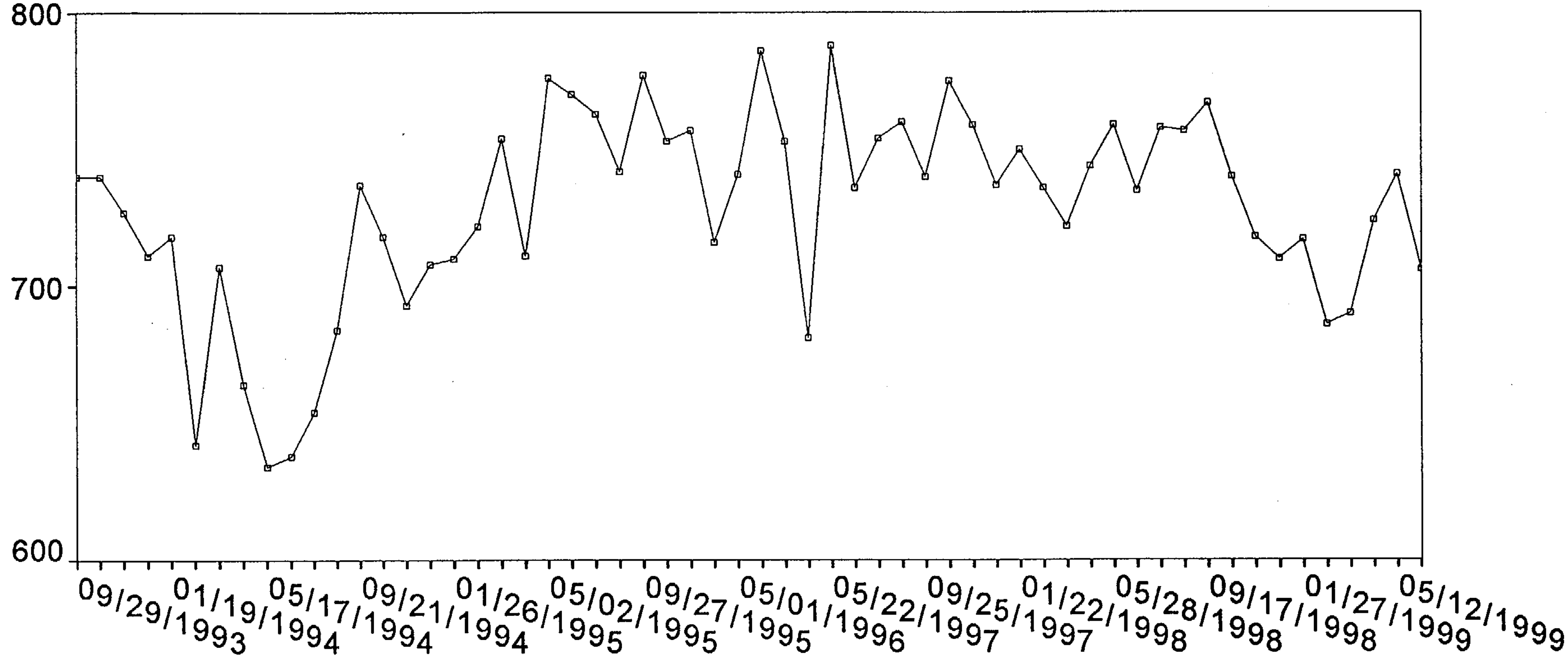


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW10

ANALYTE: TDS (mg/l)

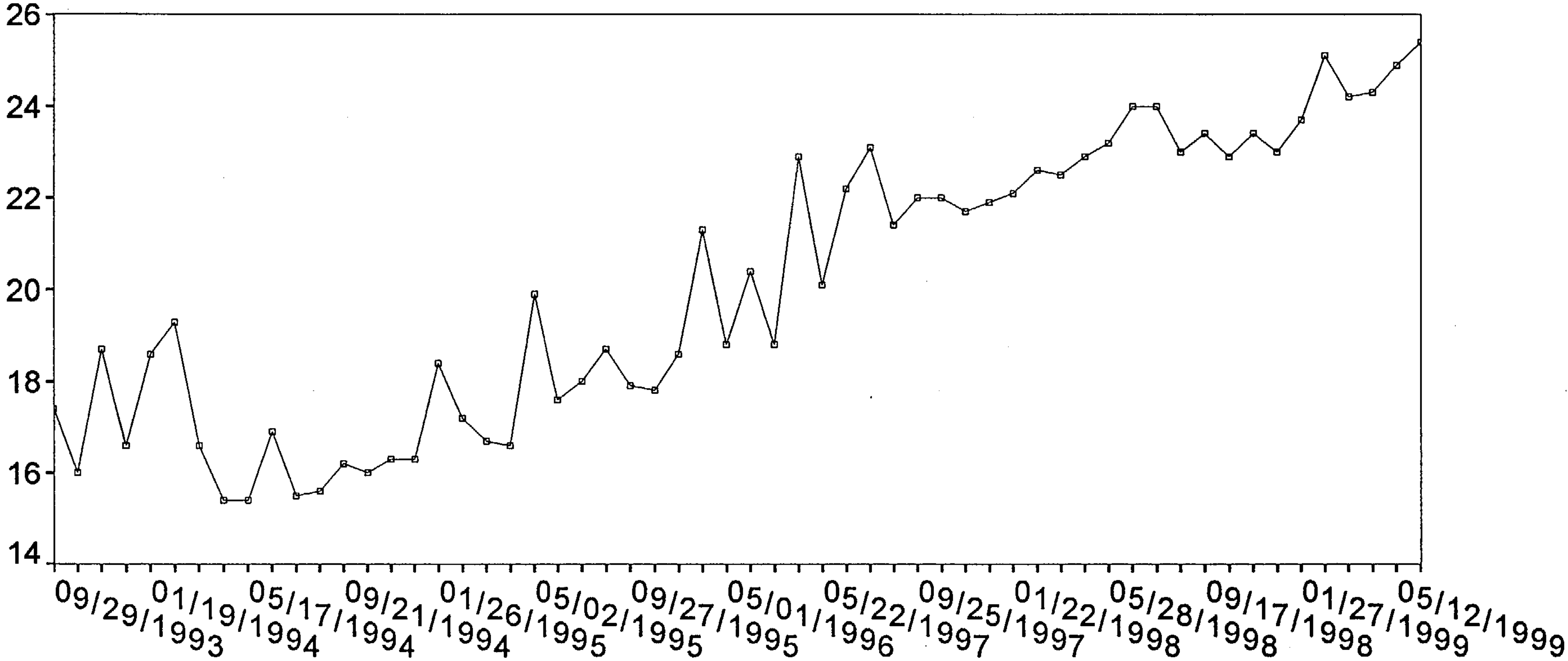


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW10

ANALYTE: SO4 (mg/l)

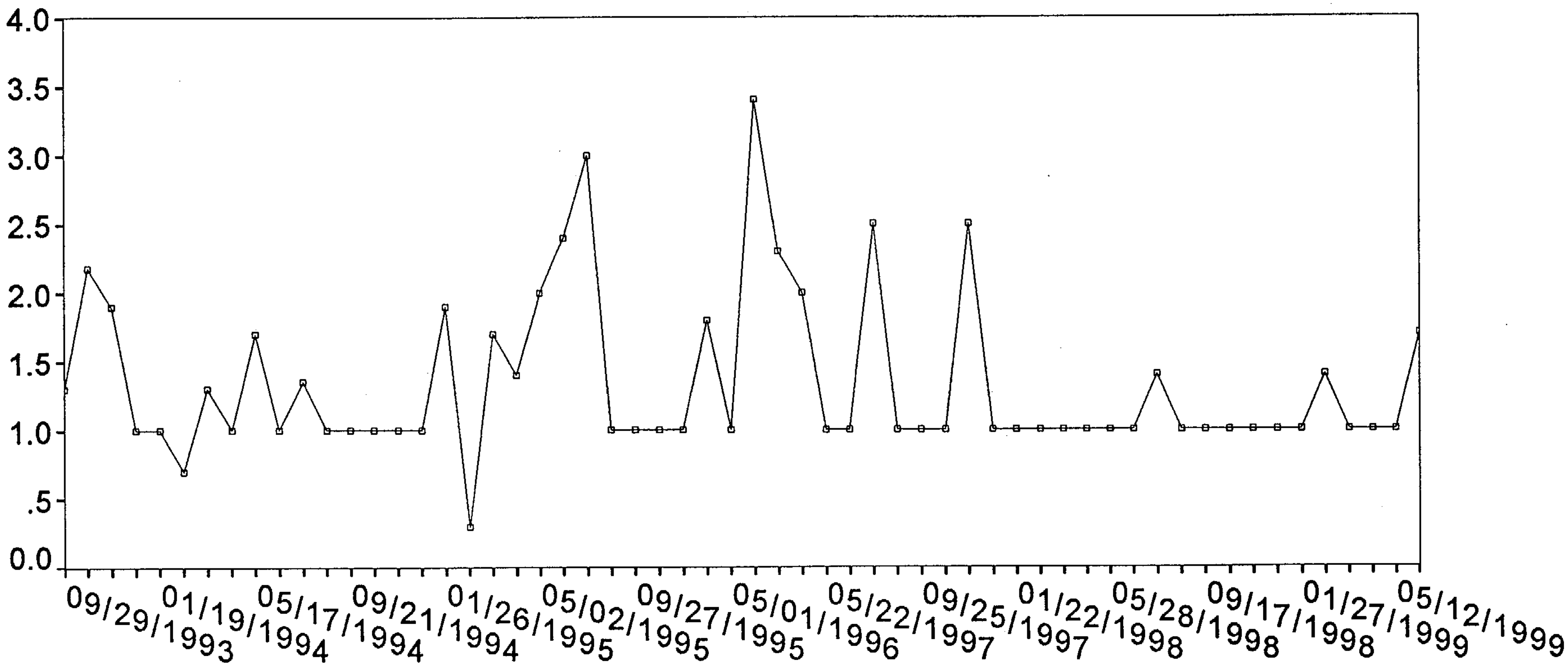


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW10

ANALYTE: Cl (mg/l)

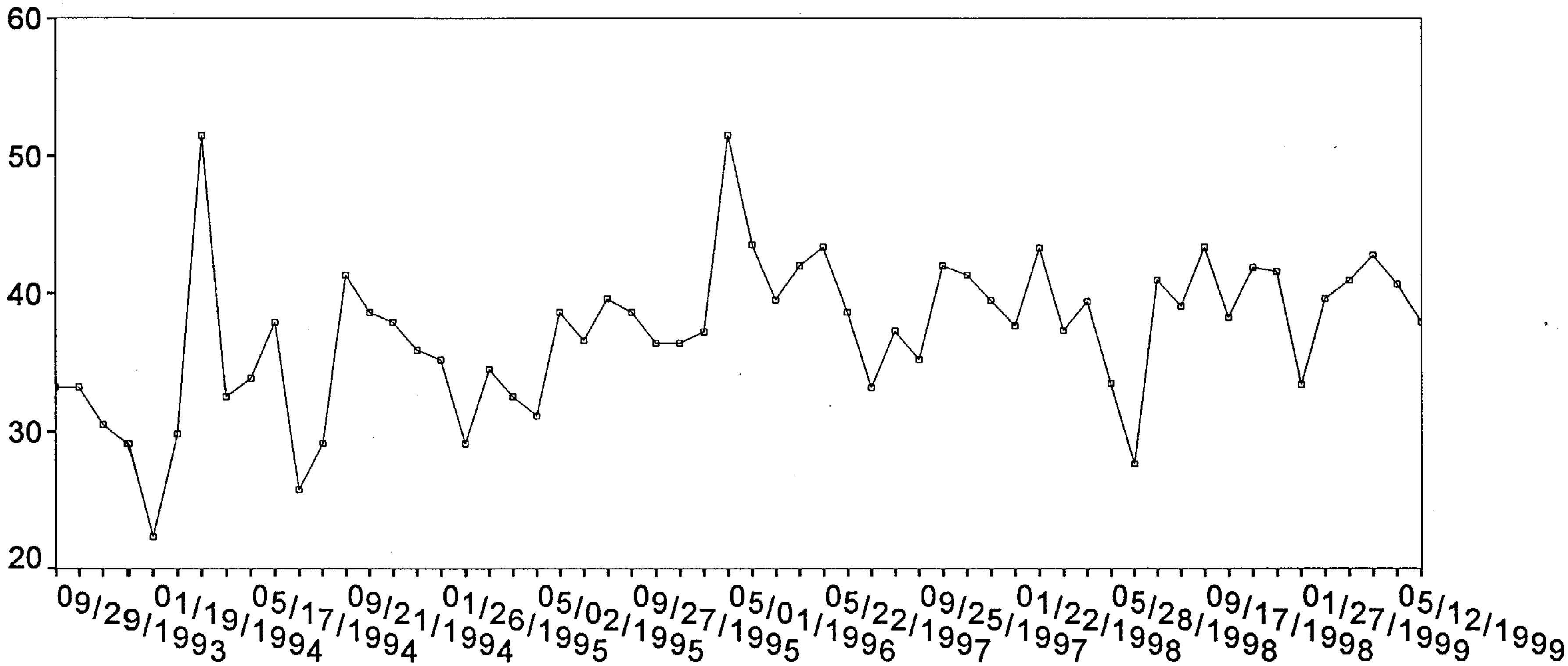


Run Chart - Raw Data

MONITOR WELLS

SHERWOOD : MW10

ANALYTE: URD (pCi/l)



Run Chart - Raw Data

ATTACHMENT B

FALL 1999

STABILITY REPORT

Sheila Pachernegg, P.E.
Post Office Box 128
Spokane, WA 99210
phone/fax: 509-624-1160

November 15, 1999

Western Nuclear, Inc.
Attn: Mr. Brad DeWaard
P. O. Box 358
Elijah Road
Wellpinit, WA 99040

RE: FALL 1999 INSPECTION REPORT
SHERWOOD PROJECT
RECLAIMED TAILING IMPOUNDMENT AREA

This letter report documents the results of the Fall 1999 structural stability inspection of the Western Nuclear, Inc. (WNI) Sherwood Tailing Impoundment Area Reclamation Project.

Scope of Inspection

The Fall 1999 inspection was conducted on November 3 and 12, 1999 in accordance with guidance summarized in **Section 2.3**, *Structural Stability Monitoring of the Monitoring and Stabilization Plan, Sherwood TRP* (March 1997); and revisions to the inspection transects, which were approved via license amendment number #32. The revised inspection transects allow for visual observation of all reclamation components and potential areas of instability. This report addresses only the structural stability portion of the *Monitoring and Stabilization Plan* (MSP). The other components of the MSP, groundwater and vegetation monitoring, are addressed by WNI in separate reports.

In accordance with the *WNI Monitoring and Stabilization Plan* and revised transects, the areas of inspection included:

- Tailing impoundment surface cover, swale, and outlet;
- Drainage diversion channel (including west drainage area), confluences, and outlet;
- Tailing impoundment margins;

- Tailing embankment and groin;
- Additional areas of previous disturbance;

Although the watershed drainage basin surrounding the reclaimed tailing impoundment was not directly inspected in Fall 1999 (in accordance with the revised transects), it is presumed that any significant impacts within the watershed drainage basin would be detected in the side drainages, diversion channel confluences, and/or the reclaimed tailing impoundment margins.

Where applicable, elements of the reclamation design were visually inspected for new occurrences or changes in: rill development, settlement, gullying, head-cutting, slumping, erosion and deposition, loss of erosion protection material, and man-made or animal impacts which may adversely affect erosion protection performance or compromise the stability and integrity of the reclamation design elements. Although evaluation and monitoring of the vegetative cover is outside the scope and intent of these inspections, information collected from the structural stability inspections is shared with the vegetation stability inspector.

A site map and photographic documentation are provided as Attachment A to this inspection report. Observations and conclusions were verbally transmitted to Brad DeWaard prior to leaving the site at the end of the inspection to serve as 24-hour notification to the owner.

The inspection resulted in **no corrective action requirements** to maintain overall stability and integrity of the reclamation design elements. The following summarizes the scope of the Fall 1999 inspection and field observations.

Field Observations

Prior to conducting the Fall 1999 inspection, correspondence and documentation related to surface regrading issues and proposed plans of action for the area west of the reclaimed embankment and reclaimed northwest borrow area were reviewed. These specific areas were inspected on November 3, 1999, accompanied by Brad DeWaard; and the remaining structural stability inspection was completed on November 12, 1999.

Inspection of the site on November 12, 1999 was conducted during overcast and rainy weather conditions, with unseasonably warm temperatures. Field observations are summarized in the following and resulted in **no corrective action requirements** to maintain reclamation design element stability. Refer to Attachment A of this inspection report for the transect locations and photographic documentation (note that the date on the photographs is incorrectly recorded as November 13, 1999):

- **Tailing impoundment surface cover, swale and outlet:**

  No changes from previous inspections were observed in the tailing impoundment surface cover other than continued improvements in re-vegetation. The previously observed settlement area is drier (contains less impounded water than noted during the Spring 1999 inspection). **This area does not pose a structural stability problem** (refer to photo documentation numbers 1, 2, 3, and 4).

  As noted in all previous inspection reports, rills and gullies (exposing bedrock) are still observed near the outlet, which is over 2,000 feet from the reclaimed tailings area (refer to the site map and photo documentation numbers 5 through 10 in Attachment A). With the exceptions of continuing stabilization by vegetation, minor occurrences of ponding and spring seepage along the margins (photo documentation numbers 8 and 9), and drier conditions no changes were observed in the area since the Spring 1999 inspection. **No corrective action** is required to maintain reclamation design element stability.

- **Drainage diversion channel (including west drainage area), confluences, and outlet:**

  As observed during previous inspections in the northwestern portion of the impoundment area, accumulation of sediment in the drainage diversion channel resulting from concentrated stormwater flow (gully) has to date resulted in **no corrective actions** to maintain reclamation design element stability. However, this area has recently undergone regrading and erosion control measures as documented in:

  WN-I0133-1: License Condition 37: Sherwood Monitoring and Stabilization Plan Inspection Results and Resolution of 2 Surface Regrading Issues, Submission of Regrading Designs for Approval, October 11, 1999; and

  WN-I0133-1: License Condition 37; Sherwood Monitoring and Stabilization Plan Inspection; Regrading As-built Report for Two Surface Regrading Issues, (Attachment B).

Based upon all previous inspections, there has been no demonstrated need for completing this corrective action. There continues to be no indications that the drainage and conveyance functions of the system have changed or degraded since the Spring 1999 inspection (or previous inspections). The repair work was completed in accordance with the October 11, 1999 design and as documented in the November 1, 1999 report (refer to photo documentation numbers 11, 12, and 13 in Attachment A). **No corrective action** is required to maintain reclamation design element stability.

The drainage diversion channel outlet (refer to photo documentation numbers 14 and 15) has downcut an established gully that has been observed during previous inspections. Steady improvement continues to be observed, with increased density of vegetation dispersing the flow and subsequently reducing downcutting effects. This area is outside the reclamation boundaries, but it is noted that no adverse impacts require corrective action to maintain reclamation design element stability.

The rock armoring throughout the site has exhibited no visually observable degradation (due to weathering) that would adversely impact the function of the various reclamation components, including the conveyance and erosional protection capabilities of the drainage diversion channel. Additionally, any observed irregularities in the armor related to thickness, rock size, void spaces, and infiltration of sediment are considered to be insignificant and require **no corrective action** to maintain conveyance function of the drainage diversion channel and reclamation design element stability (refer to photo documentation numbers 16 through 22 in Attachment A).

The west drainage area has also undergone some regrading (refer to photo documentation numbers 23 and 24 in Attachment A), in accordance with:

> *WN-I0133-1: License Condition 37: Sherwood Monitoring and Stabilization Plan Inspection Results and Resolution of 2 Surface Regrading Issues, Submission of Regrading Designs for Approval*, October 11, 1999; and
>
> *WN-I0133-1: License Condition 37; Sherwood Monitoring and Stabilization Plan Inspection; Regrading As-built Report for Two Surface Regrading Issues* (Attachment B).

Although previous inspections have not indicated the need to complete this corrective action, the repair work is in accordance with the October 11, 1999 design and as documented in the November 1, 1999 report. **No corrective action** is required to maintain reclamation design element stability.

- **Tailing impoundment margins**

  As discussed in previous inspection reports, some rills and gullies are still observed on tailing impoundment margins and in many of the disturbed area slopes above the drainage diversion channel and confluences. Soils transported during the rilling process are invading the rock armoring on the slope toes. This is considered to be beneficial by allowing vegetation to reclaim the slope from both the crown and toe. The magnitude and frequency of occurrences are becoming less apparent as vegetative cover continues to increase in density. Slopes with exposed bedrock and/or poor soil development are still relatively barren of vegetation. However, they exhibit no evidence of structural instability (refer to photo documentation numbers 25 through 30 in Attachment A). A monitoring well abandonment area is shown in photo documentation number 31.

  During the Fall 1999 inspection, there were no observable changes in the frequency, magnitude, and locations of rills and gullies from observations during previous inspections. **No corrective action** is required to maintain reclamation design element stability.

- **Tailing embankment and groin:**

  There is no evidence of slumping, erosion of the rock armoring, or gullying. This is consistent with all previous inspections (refer to photo documentation numbers 32, 33, and 34). **No corrective action** is required to maintain reclamation design element stability.

- **Watershed drainage basin surrounding the reclaimed tailing impoundment:**

  During the Fall 1999 inspection, there was no evidence of significant impacts or changes within the watershed drainage basin exhibited along the reclaimed tailing impoundment margins, side drainages, and confluences within the drainage diversion channel. **No corrective action** is required to maintain reclamation design element stability.

Conclusions

- No corrective actions are required, based upon field observations during the Fall 1999 inspection.

- No significant changes in erosional features were observed at the site between the Spring and Fall 1999 inspections.

- As required by WDOH, the area west of the impoundment near the tailing embankment and site access road and the area of gully erosion upgradient of the silt collection point in the diversion channel have undergone corrective actions since the Spring 1999 inspection. These areas have been repaired in accordance with the October 11, 1999 design and as documented in the as-built reports. To date (and based upon all previous inspections at the site), no corrective actions have been recommended to maintain reclamation design element stability.

- The rock armoring throughout the site has exhibited no visually observable degradation (due to weathering) that would adversely impact the function of the various reclamation components, including the conveyance and erosional protection capabilities of the drainage diversion channel. Additionally, any observed irregularities in the armor related to thickness, rock size, void spaces, and infiltration of sediment are considered to be insignificant and do not compromise the conveyance function of the drainage diversion channel and reclamation design element stability.

- Although rill and gully erosional features are still observed along the margins and in previously disturbed areas, there were no observable changes in the frequency, magnitude, and locations of rilling and gullies from observations during previous inspections. These erosional features continue to show improvement, especially in areas having increased density of vegetative cover.

- Slopes with exposed bedrock and/or poor soil development are still relatively barren of vegetation. However, there are no observable changes from previous inspections; and these slopes exhibit no evidence of structural instability.

- Based on the results of this inspection and the four previous inspections (Fall 1997, Spring 1998, Fall 1998, and Spring 1999), the post-construction structural stability aspects of the reclamation indicate the site is performing as designed. As such, no future structural stability monitoring as part of the MSP is necessary.

Please contact me at 509-624-1160 if you have any questions or require clarifications related to this inspection report.

Sincerely,

Sheila Pachernegg, P.E.

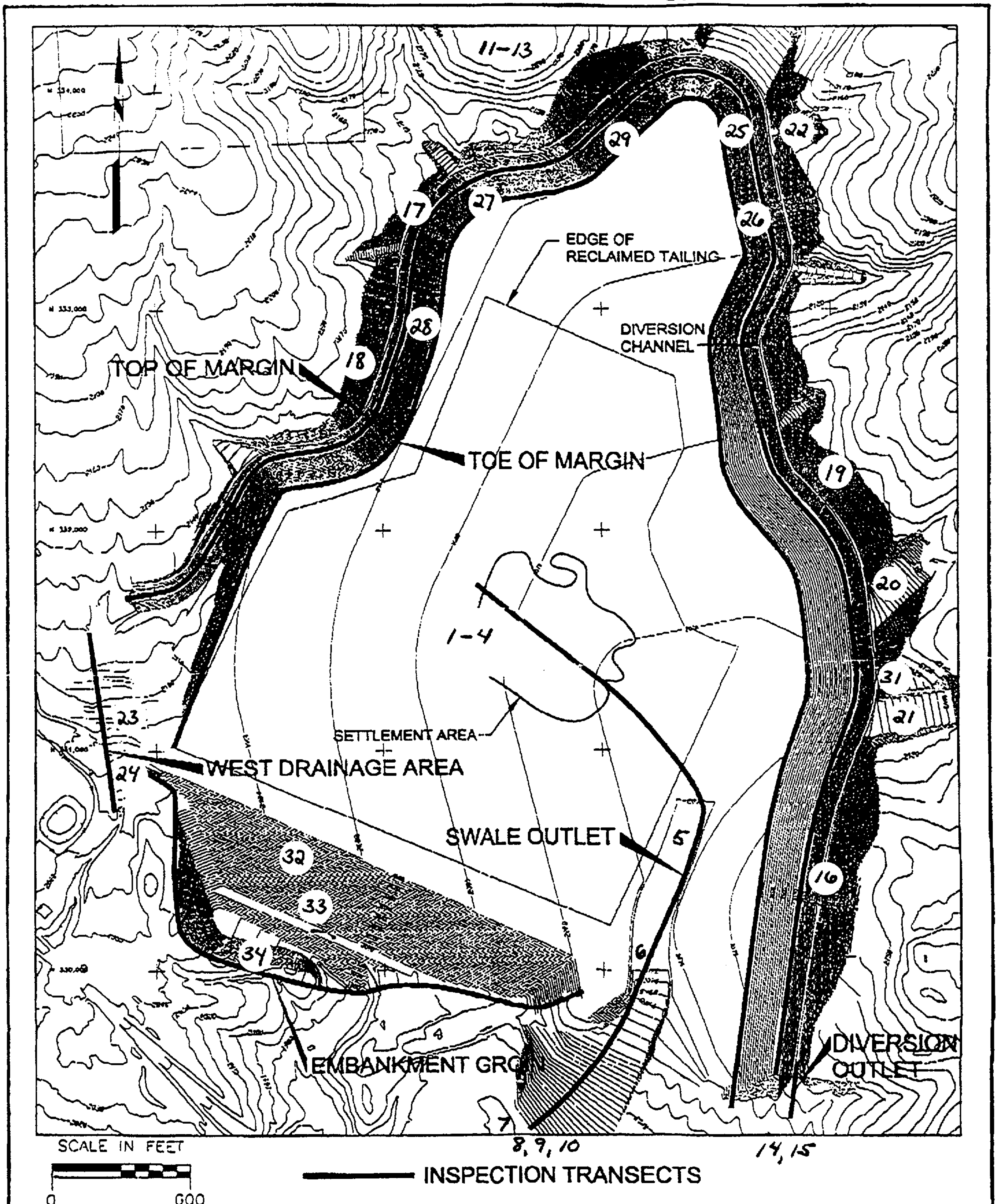
Attachments (2)

SHEILA M. PACHERNEGG
STATE OF WASHINGTON
31927
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 11-01

11/15/99

fn: sherwd6.ins
11/15/99

Attachment A



SHEPHERD MILLER
INCORPORATED

FIGURE 1
SRUCTURAL STABILITY
MONITORING PLAN

Date:	SEPTEMBER 1998
Project:	03-317
File:	STR-STAB.DWG

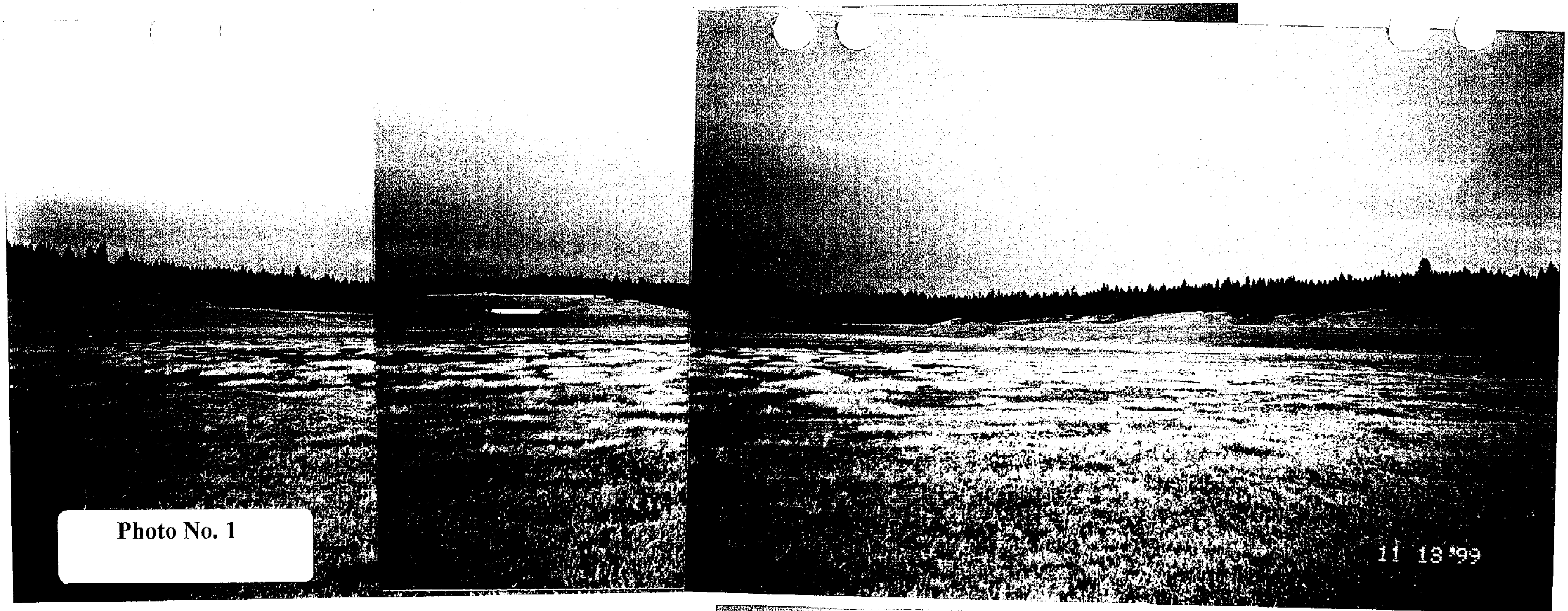


Photo No. 1

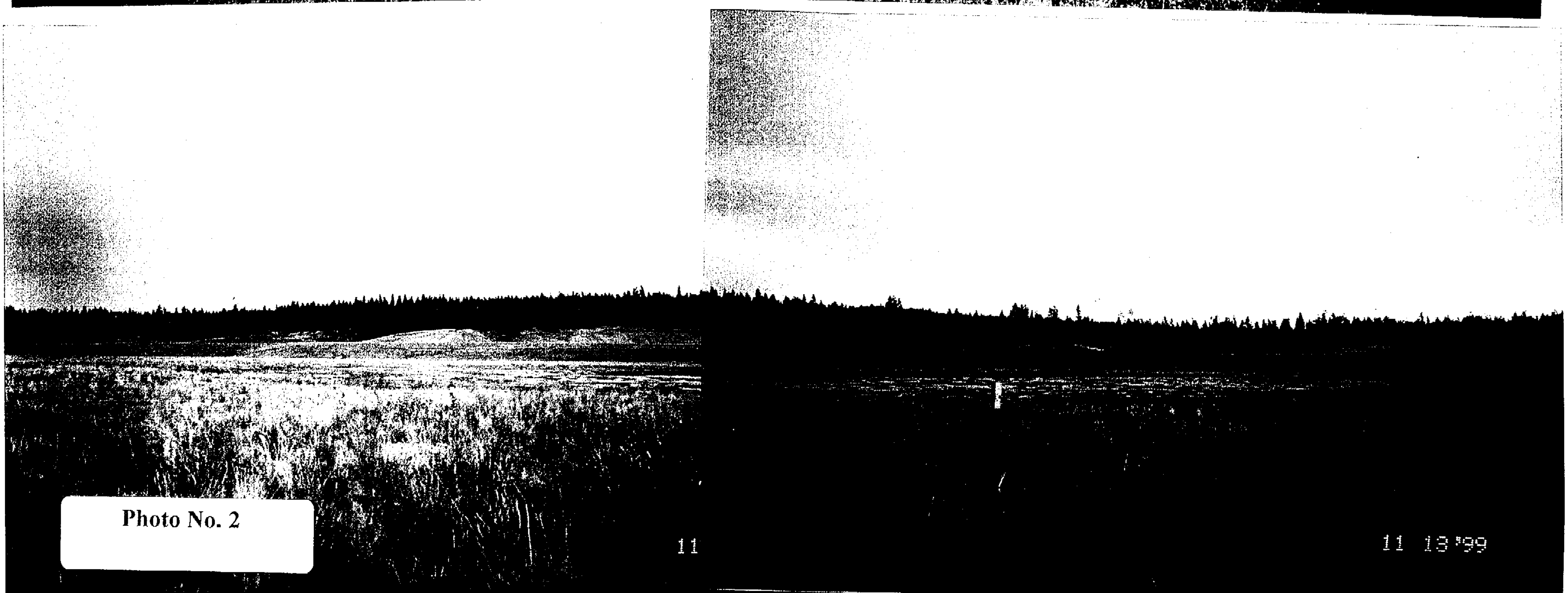


Photo No. 2

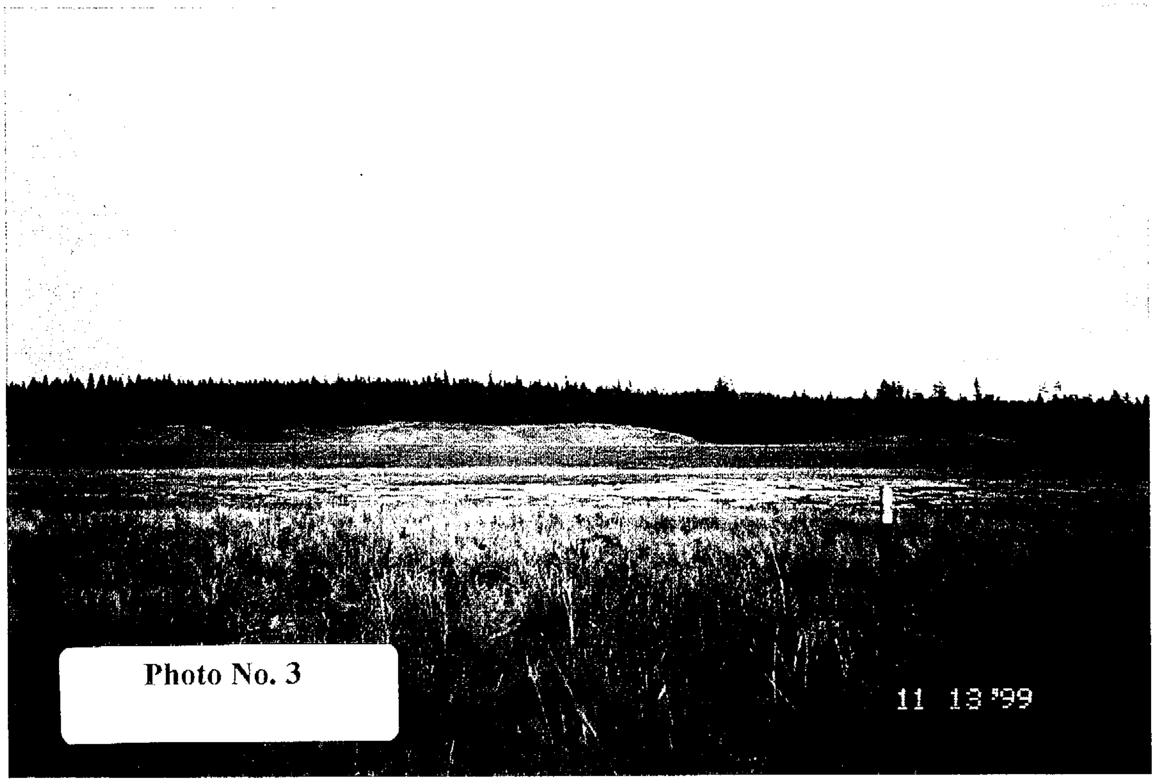


Photo No. 3

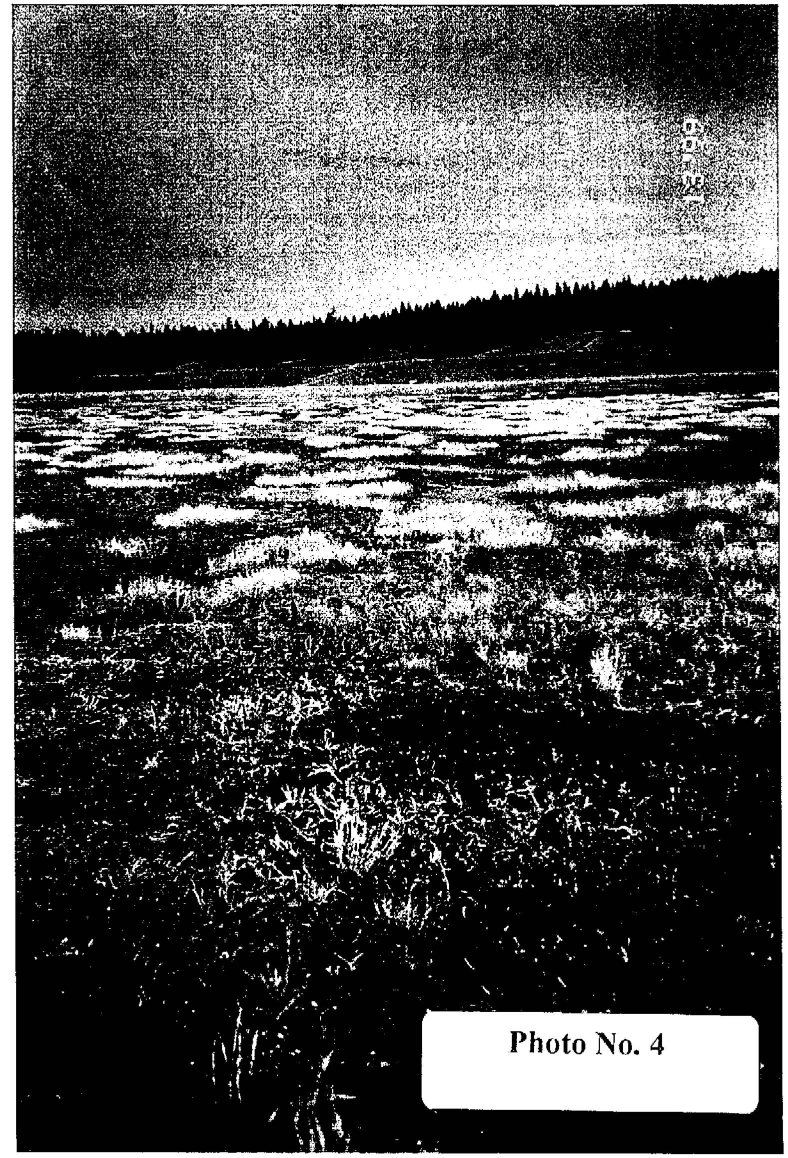


Photo No. 4

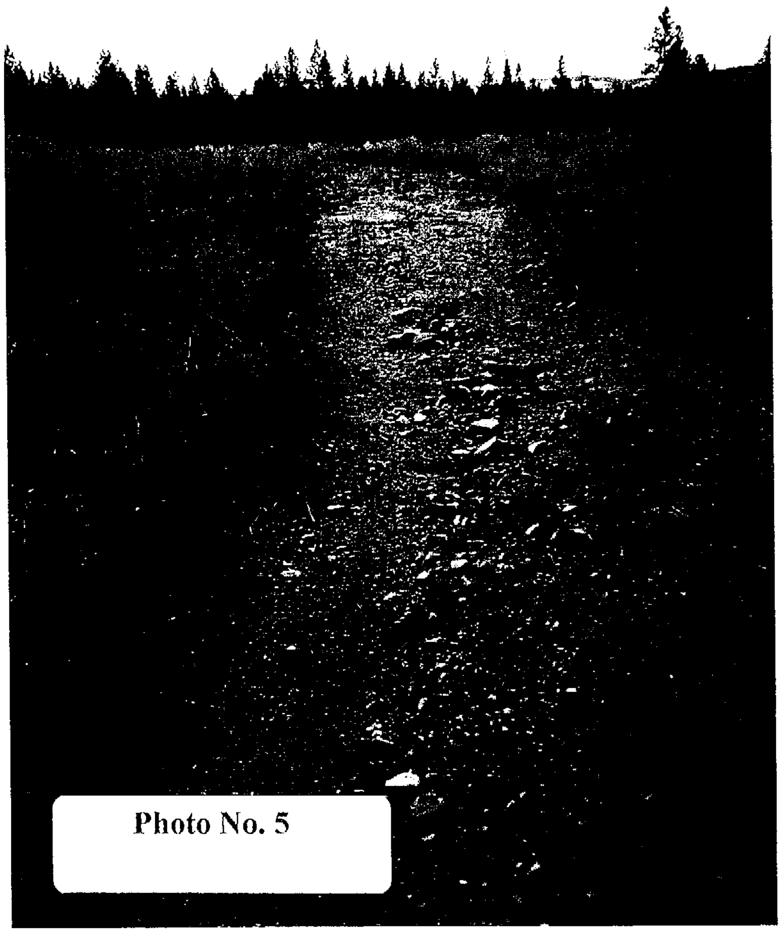


Photo No. 5

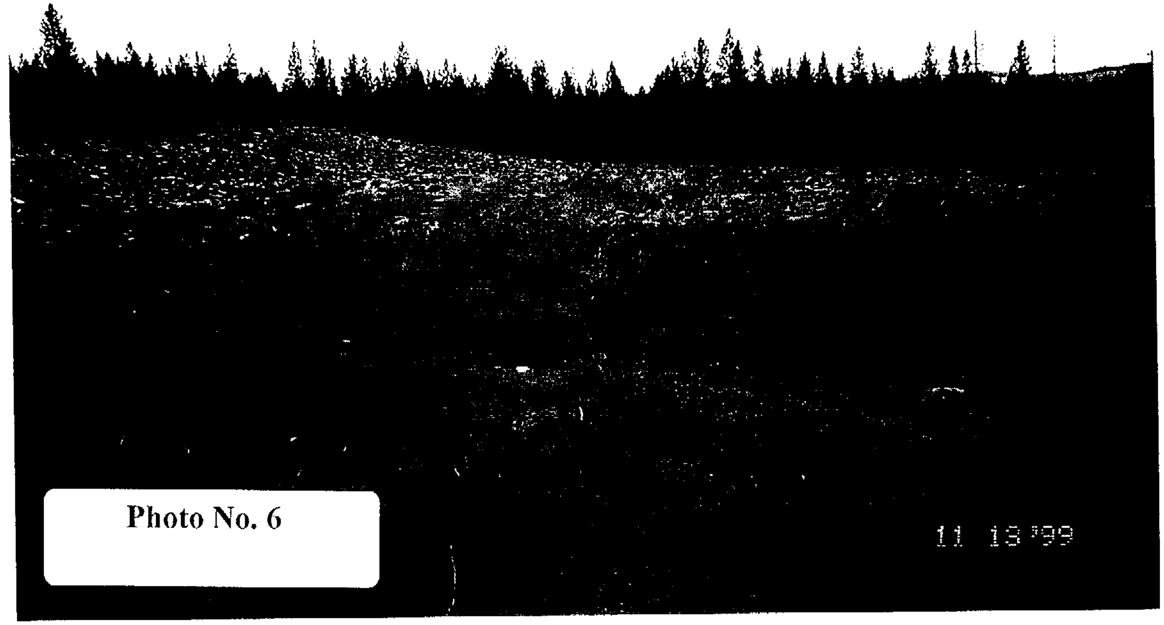


Photo No. 6

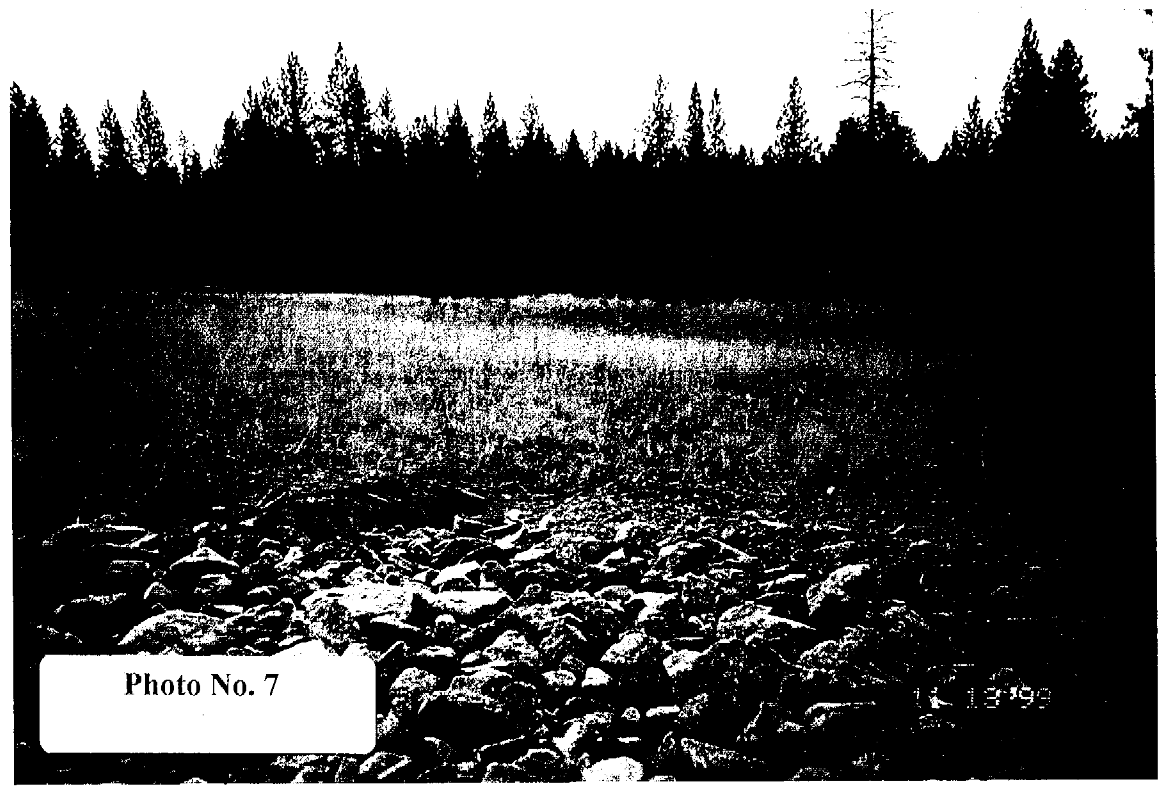


Photo No. 7

Photo No. 8

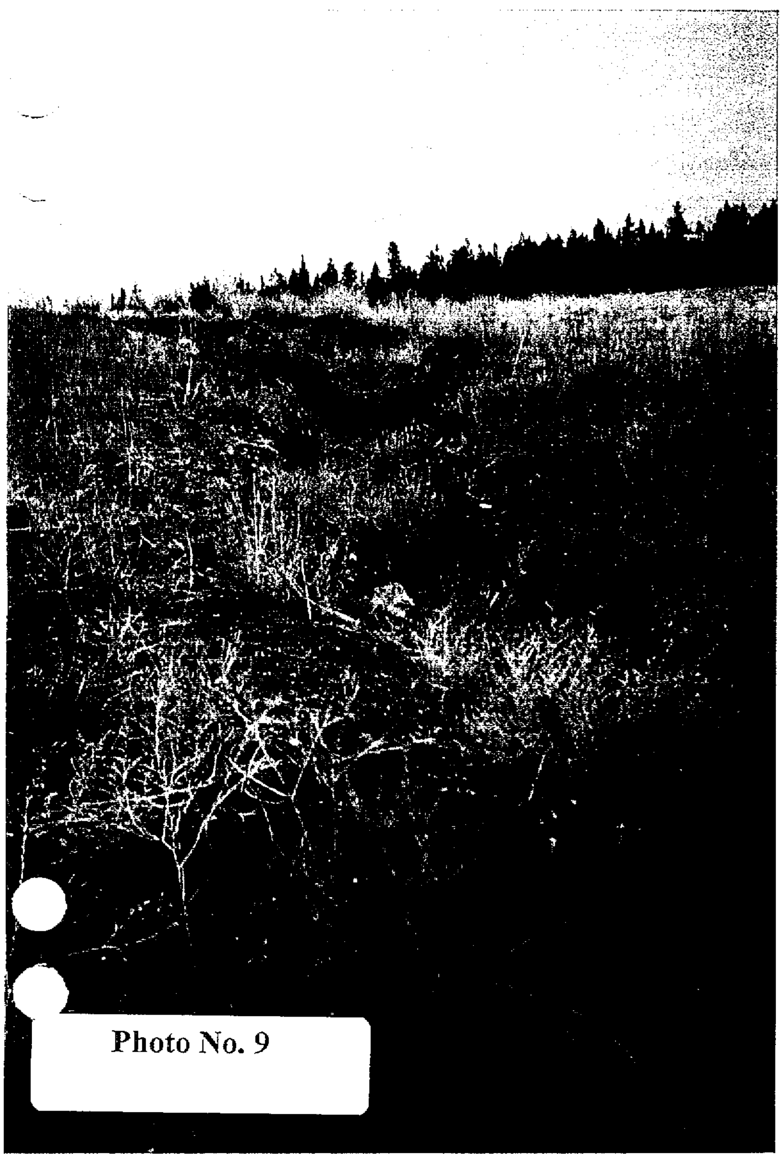


Photo No. 9

Photo No. 10

Photo No. 11

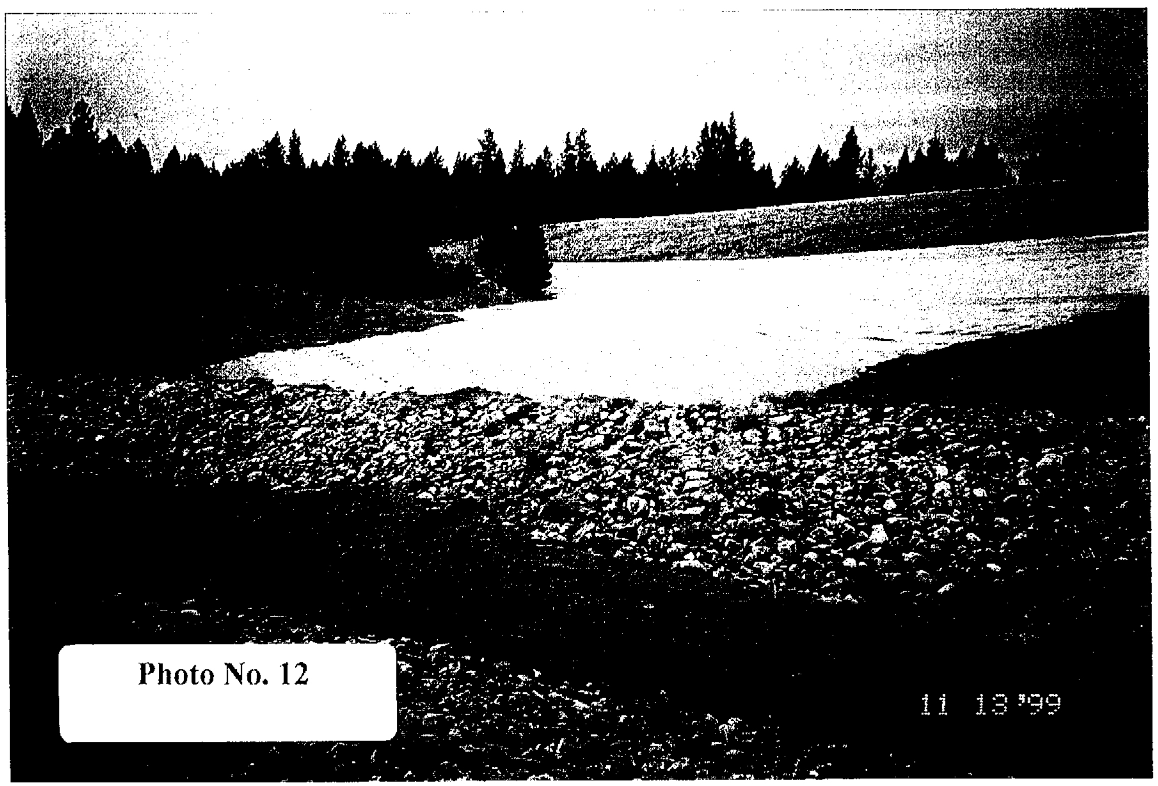
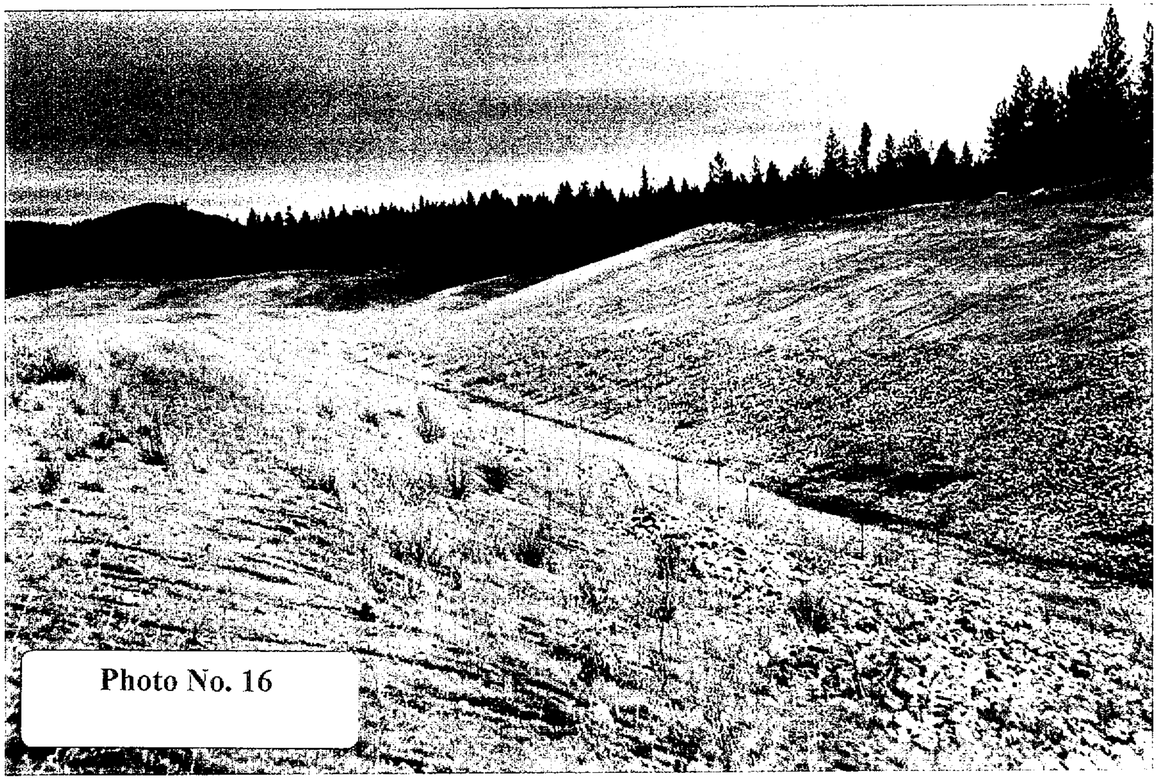


Photo No. 12

Photo No. 13

Photo No. 14

Photo No. 15



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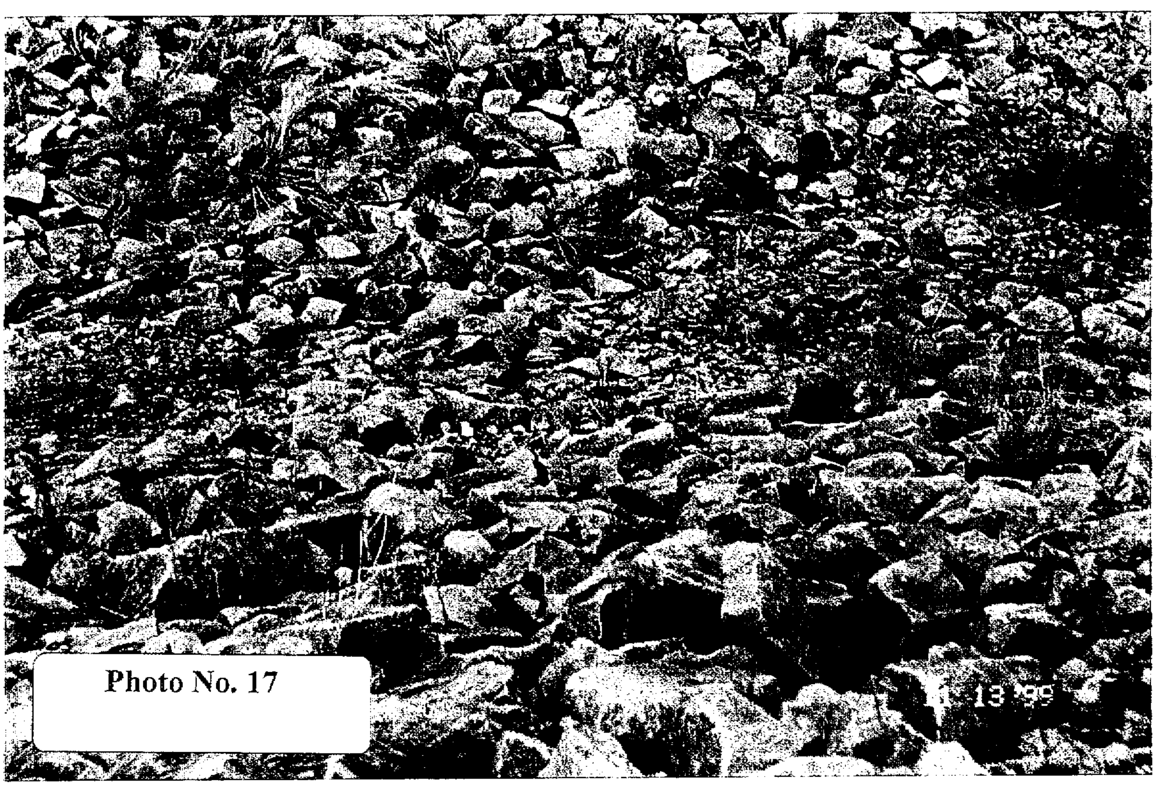
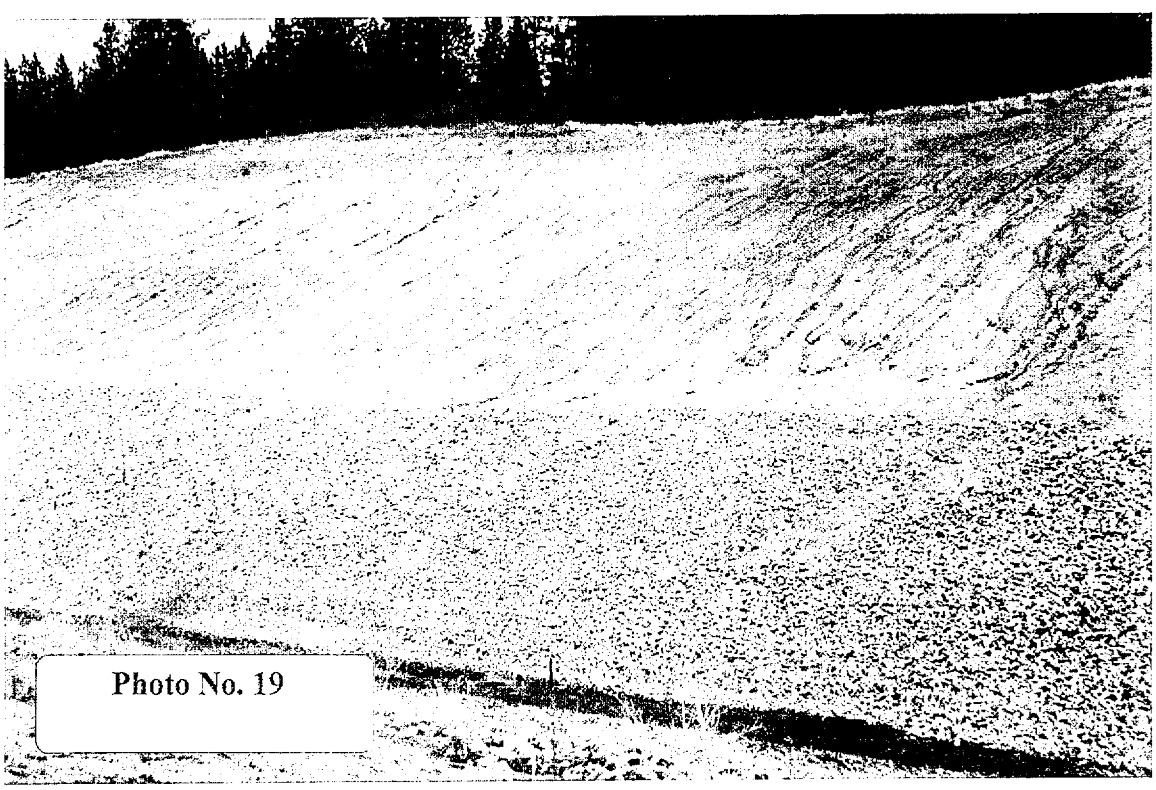


Photo No. 17

Photo No. 18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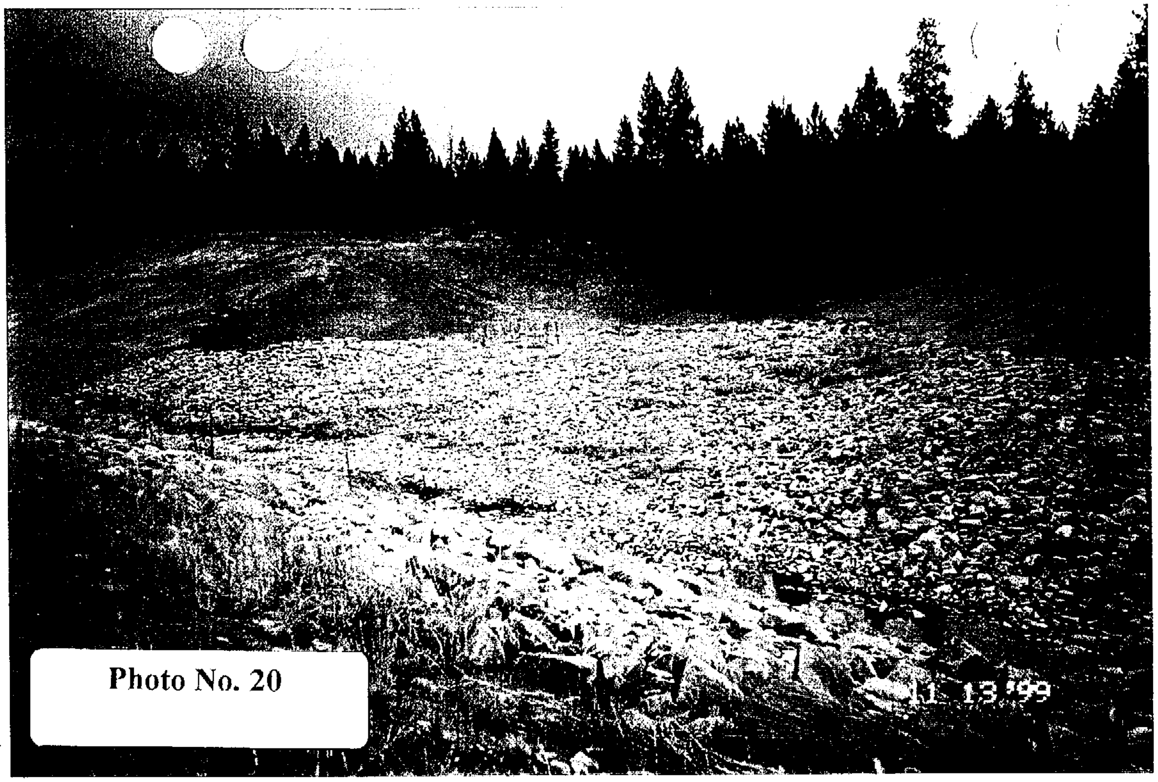
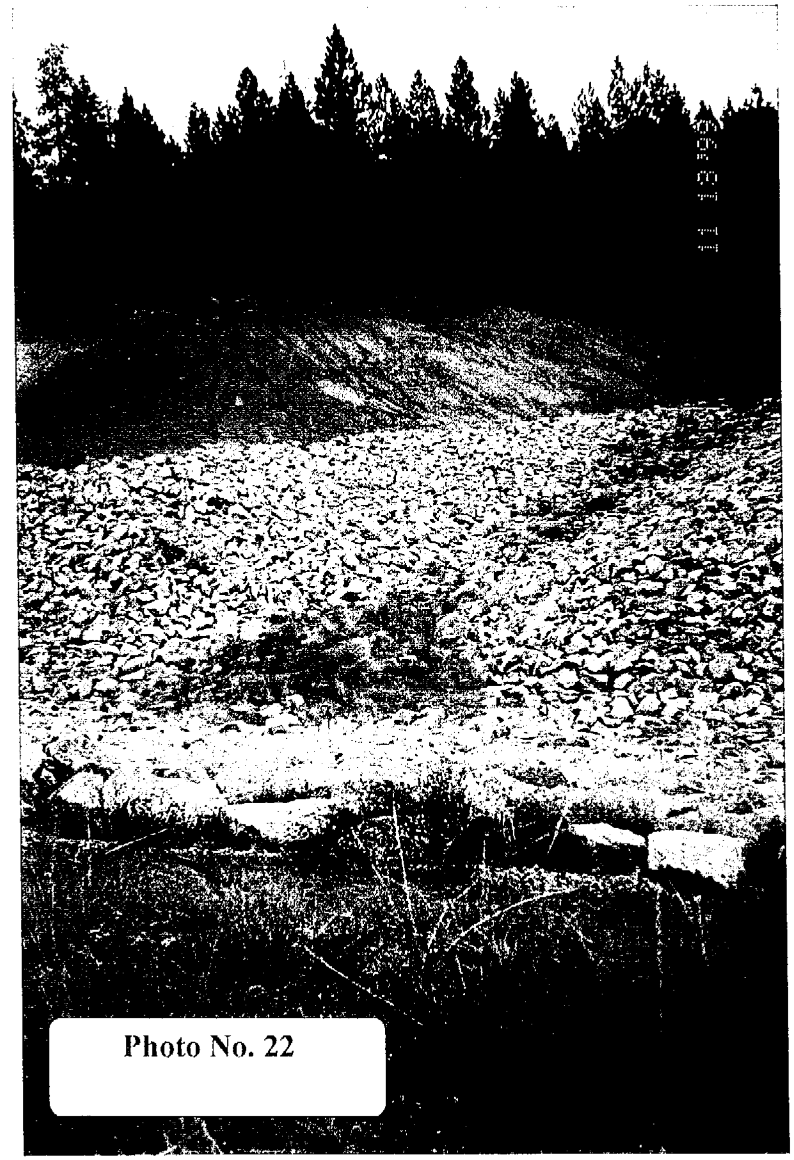


Photo No. 20

Photo No. 21



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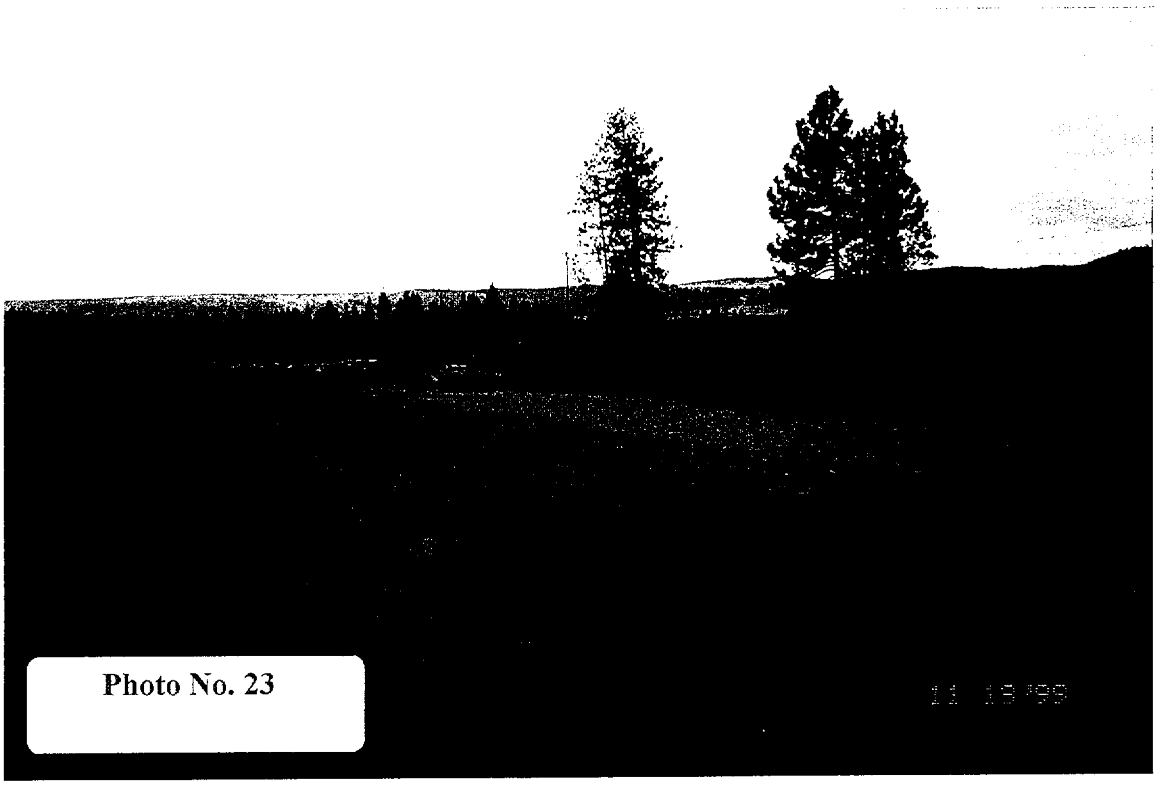
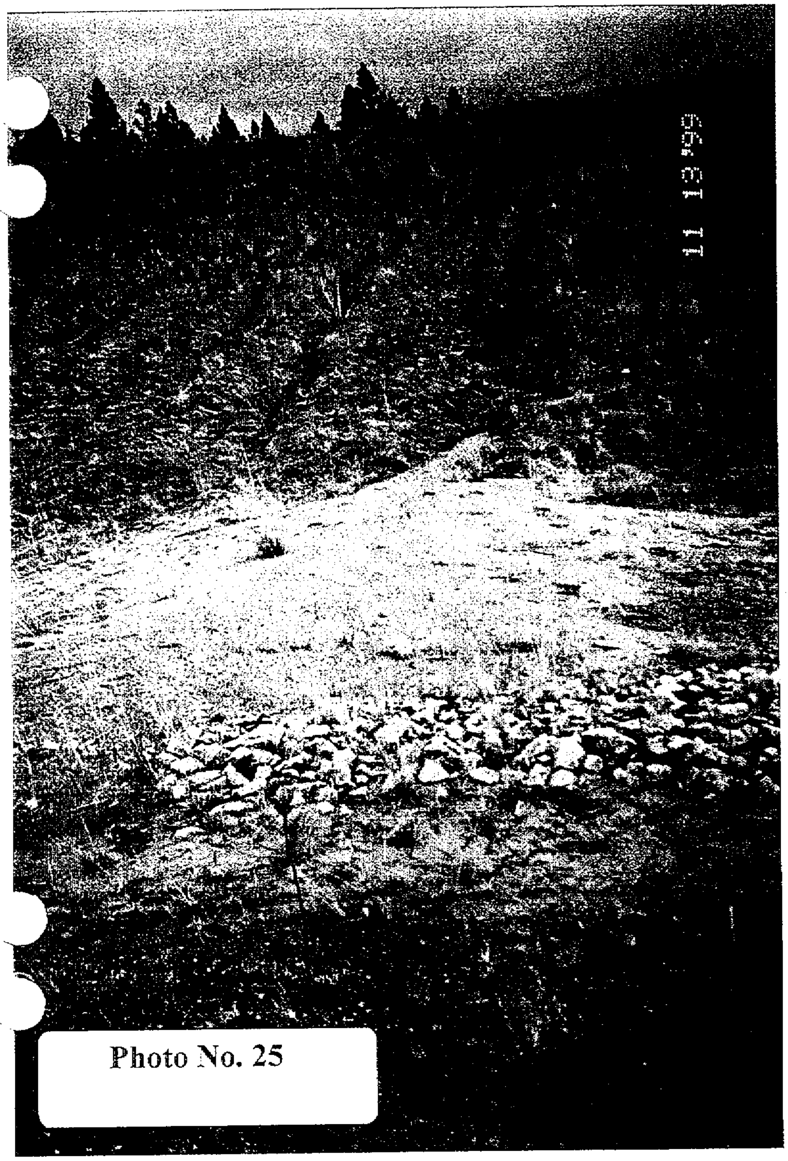


Photo No. 23

Photo No. 24



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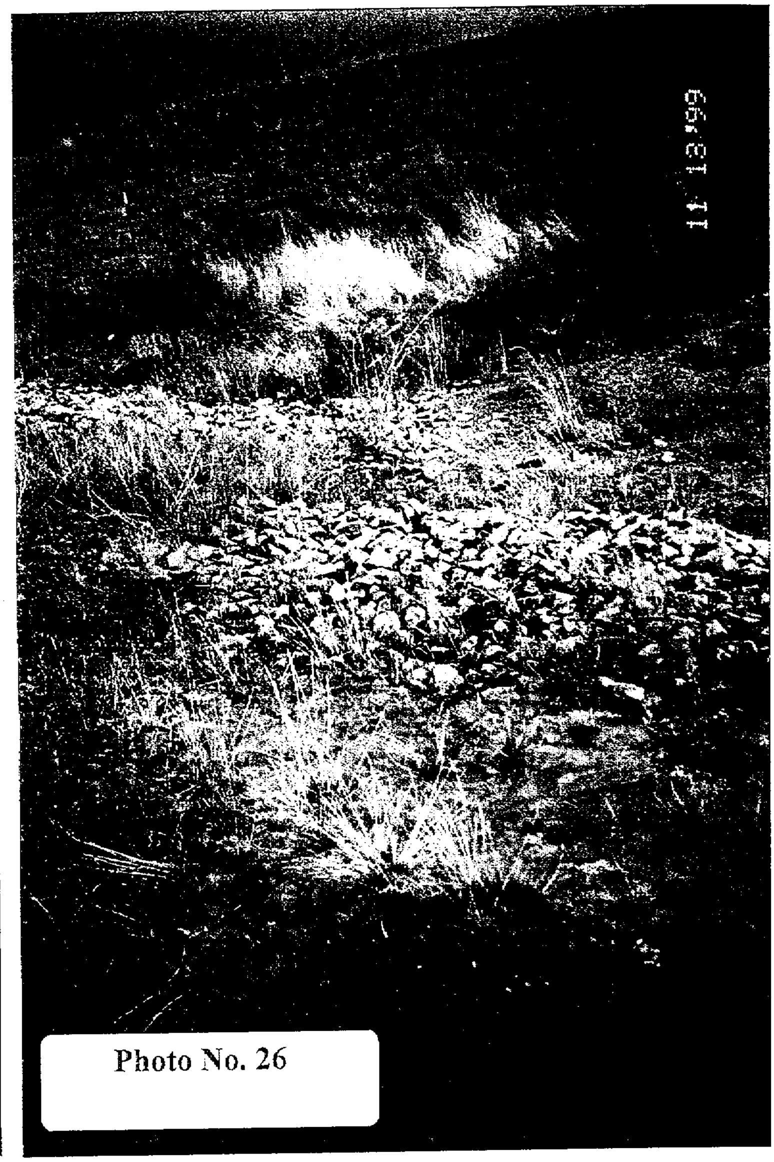

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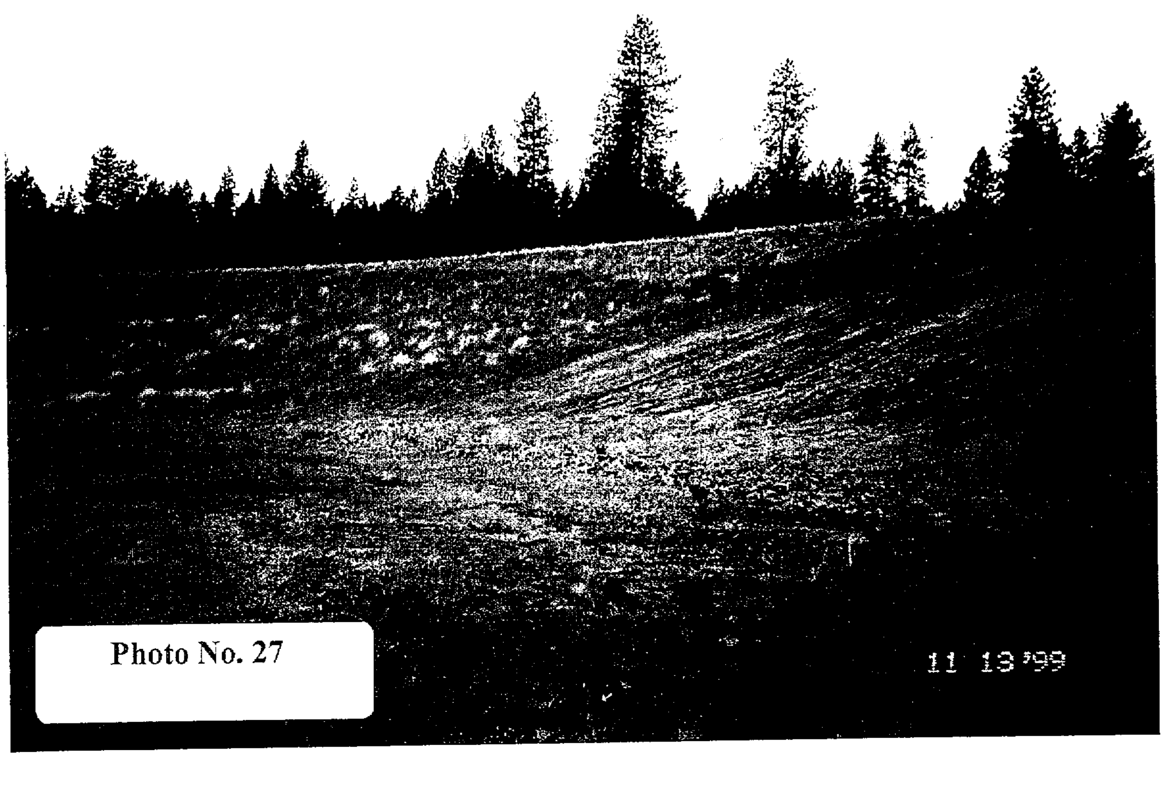

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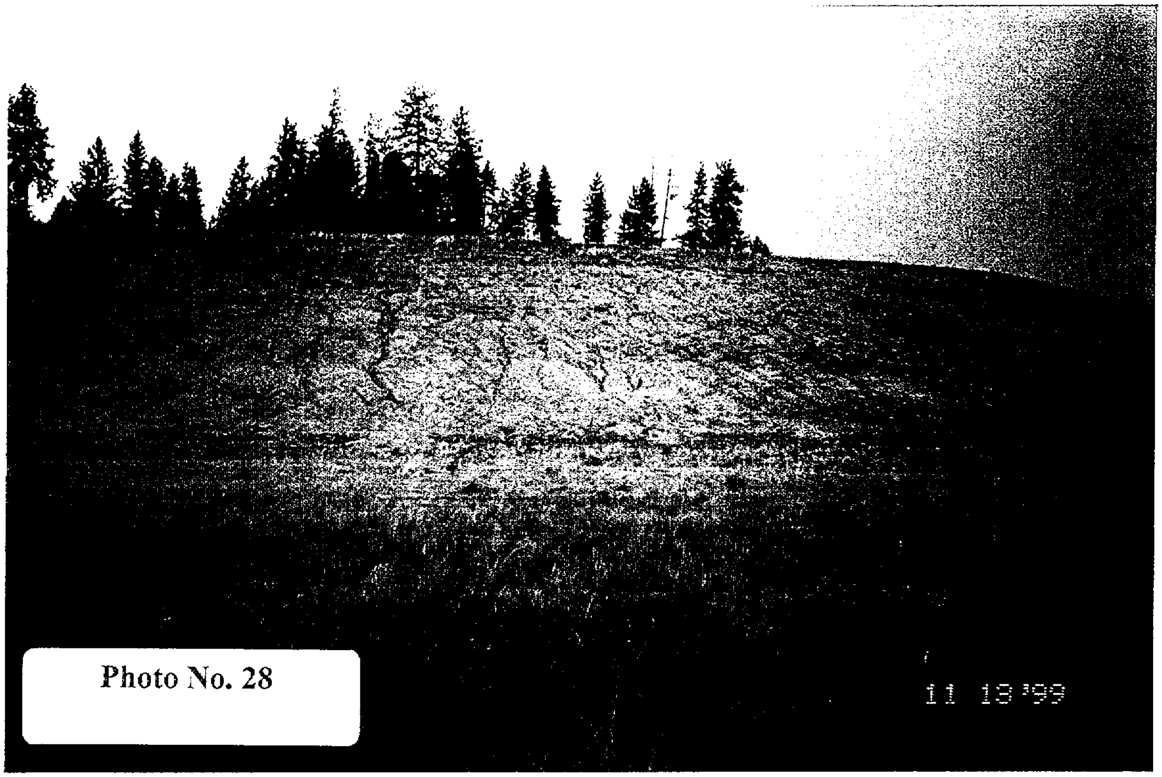

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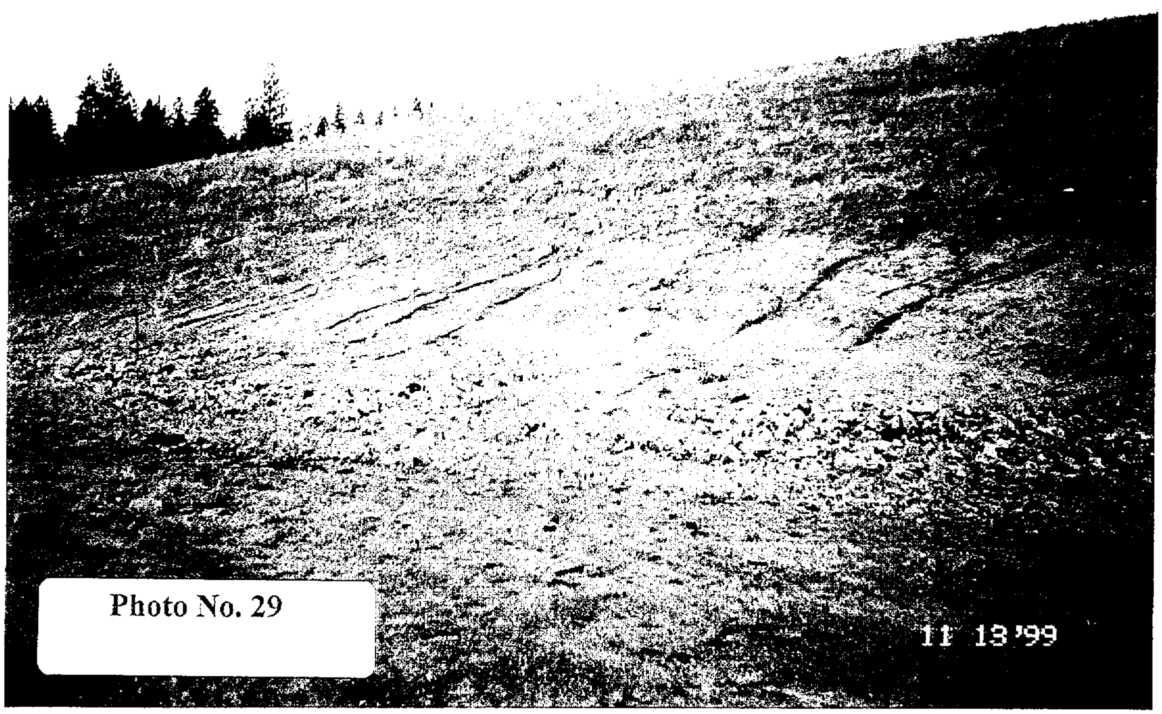

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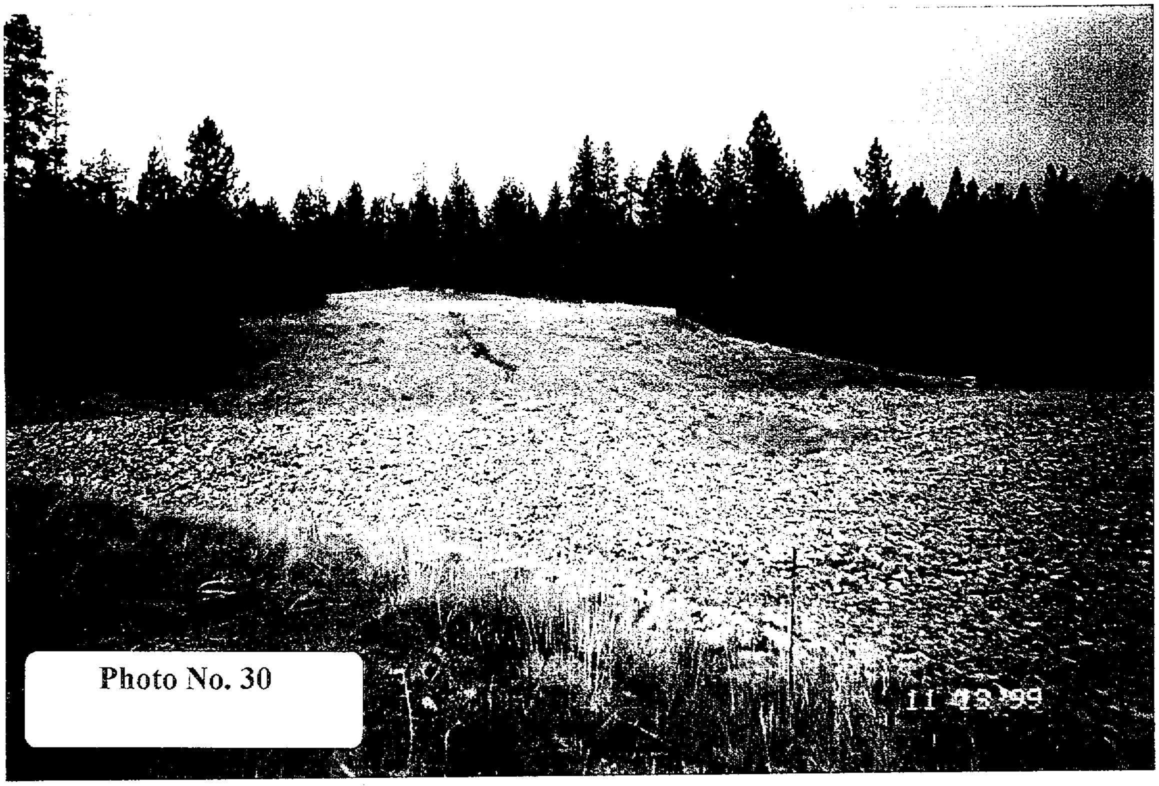
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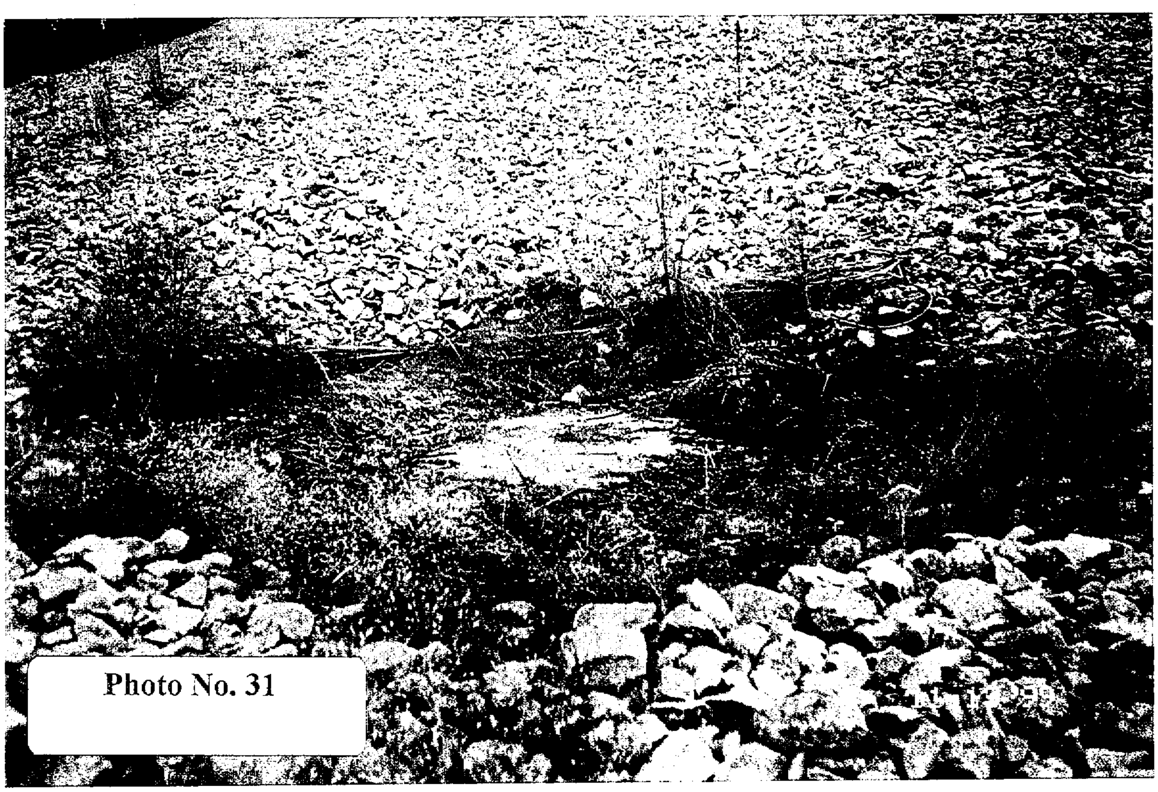
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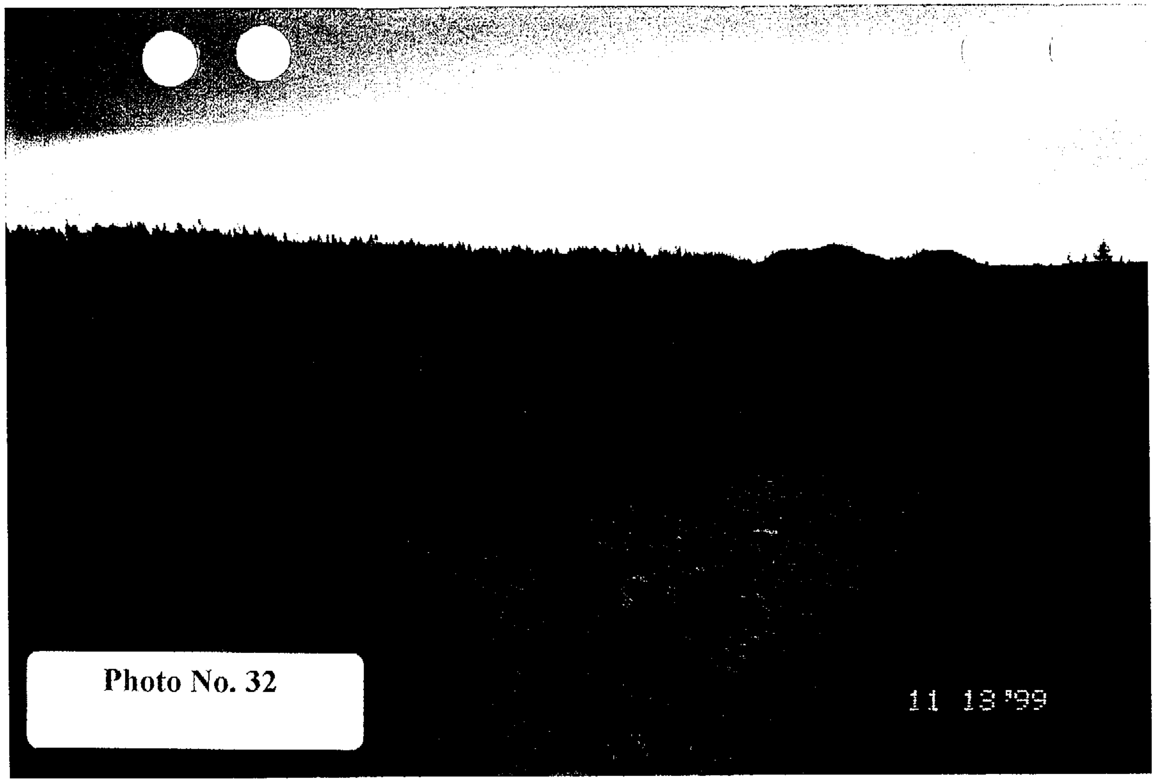

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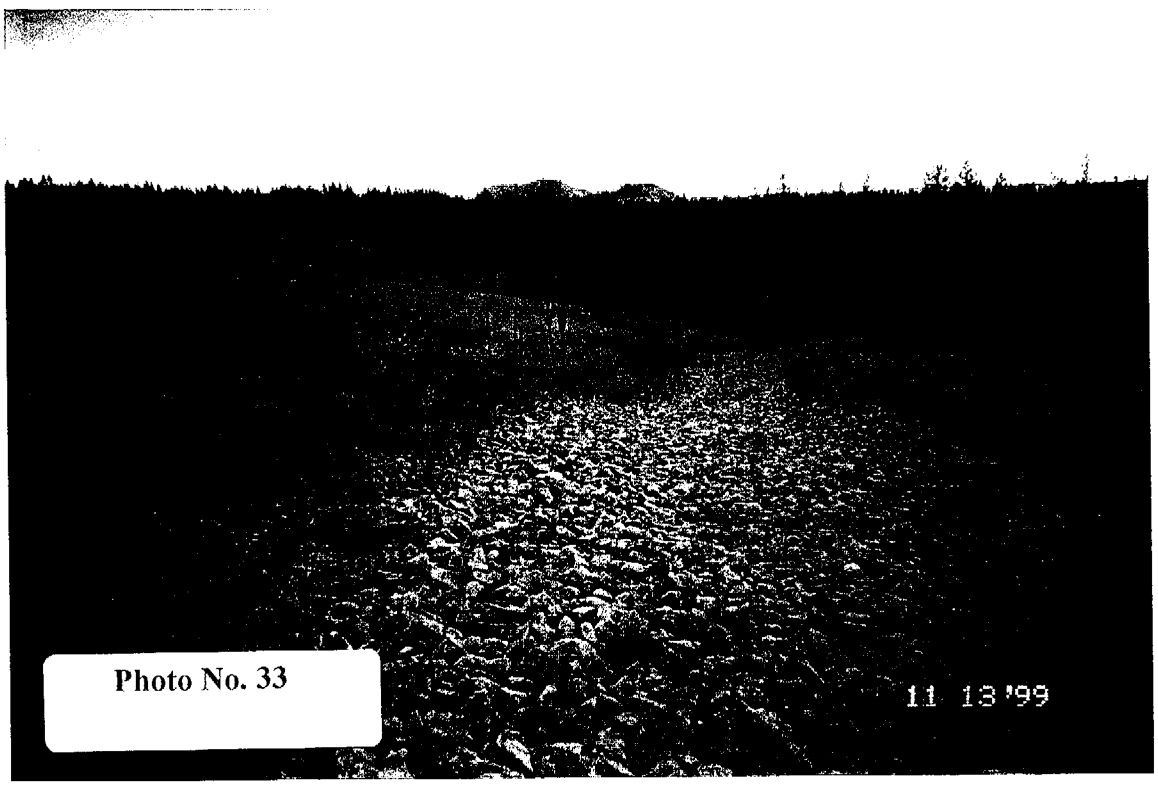

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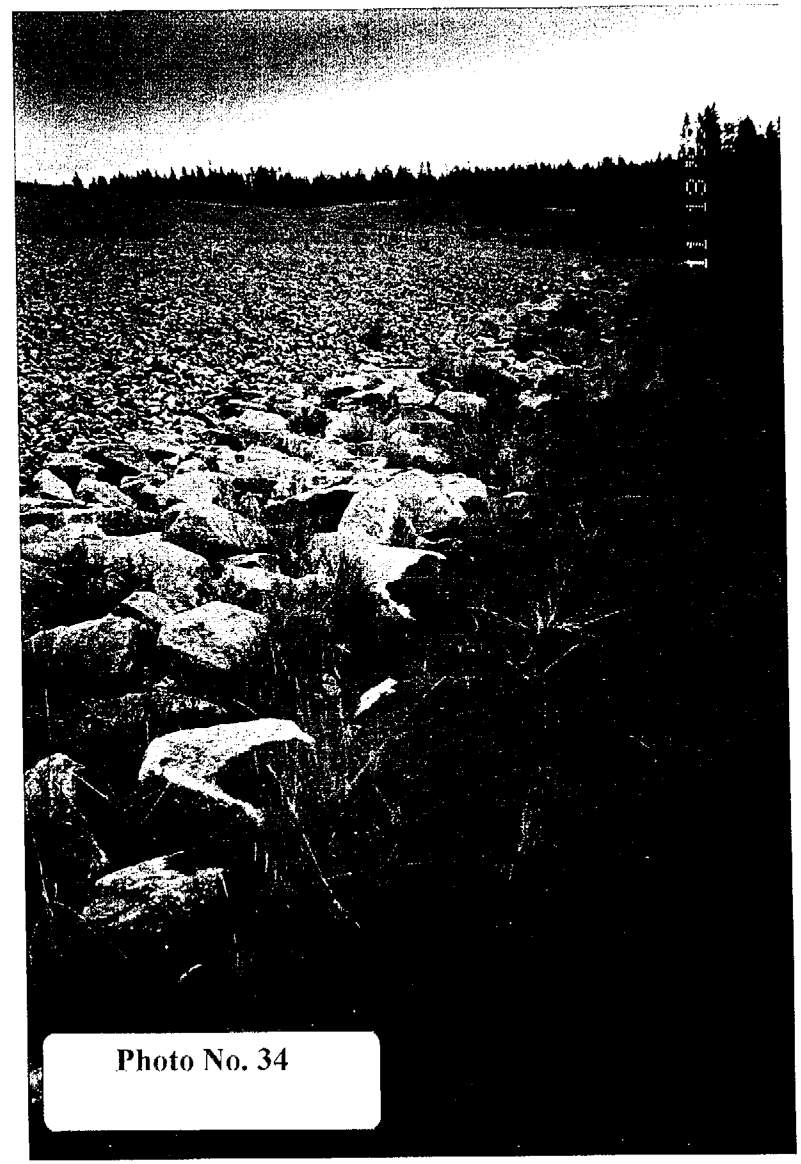


Photo No. 34

Attachment B

WESTERN NUCLEAR, INC.

SHERWOOD PROJECT
P. O. BOX 392 • WELLPINIT, WASHINGTON 99040 • (509) XXXXXXXX 258-4521

November 1, 1999

Mr. Gary Robertson, Head
Waste Management Section
Washington Department of Health, Division of Radiation Protection
7171 Cleanwater Lane, Building 5
P. O. Box 47827
Olympia, WA 98504-7827

Re: WN-I0133-1: License Condition 37; Sherwood Monitoring and Stabilization Plan Inspection; Regrading As-built Report for Two Surface Regrading Issues.

Dear Mr. Robertson:

This letter represents the as-built report for the two final surface stability regrading issues identified in your letter dated August 20, 1999 and further discussed in your letter dated September 21, 1999:

1.) The area west of the impoundment near the dam outslope and site access road; and
2.) Area of gully erosion up-gradient of the silt collection point in the diversion channel.

In accordance with License Condition 37, design criteria (Attachment 1) were submitted for Regrading Item #1, above, in my letter dated October 11, 1999. Regrading was performed by grading surface riprap and subsurface soils to enhance existing drainage to protect the main embankment groin area. Attachment 2 contains a set of photographs which demonstrate before and after appearance of the area. During field inspection on October 22, 1999, Mr. John Blacklaw of your staff voiced verbal concurrence that the regrading performed fulfilled the design specifications. In addition, the fall engineering stability inspection to be performed by Ms. Sheila Pachernegg, P.E. will include critical review of this regrading design and as-built.

Formal engineering design criteria for Regrading Item #2, above, were included in my letter dated October 11, 1999. In addition, field review and approval of the regrading design was provided by Mr. John Blacklaw of your staff on October 13, 1999. Briefly, an existing berm at the base of a slope had failed resulting in flow concentration of runoff. The regrading design would remove the berm completely to eliminate flow concentration. The regrading disturbance would then be seeded with native species and covered with an erosion protection blanket. The seed mix utilized was that used for tailing reclamation.

On October 22, 1999, Mr. Blacklaw reviewed and verbally approved the as-built regrading, seeding and in-progress installment of the erosion blanketing. The erosion protection blanketing was completed on October 25, 1999. Attachment 3 is the manufacturers brochure for the erosion blanketing. Temporary, photo-degradable, straw blanketing as shown on pages 4 and 5 were used. The heavier S150 product was used on the bottom 1/5 of the slope. Page 23 depicts installation for slopes. Blankets were installed horizontally to the slope. Page 20 depicts stapling patterns. Six inch wire staples were used. Pattern 'B' was utilized throughout with staggered 3 foot centers using 1.2 staples per square yard . Three thousand square yards of blanketing was installed and secured with 4000 staples. Attachment 4 contains pictures of the regraded slope with the completed erosion blanket installation. It was noted during installation of the erosion blanketing that approximately 1/3 of the area had quartz monzonite bedrock within six inches of the regraded surface. The fall engineering stability inspection to be performed by Ms. Sheila Pachernegg, P.E. will include critical review of this regrading design and as-built.

This additional remedial construction was performed at Sherwood to facilitate timely license termination. We anticipate that the completion of regrading and WDOH approval of this regrading as-built document, as well as the evaluations to address the other structural stability issues (submitted under separate cover) will resolve <u>all</u> structural concerns regarding the tailing reclamation plan and construction.

This letter also reaffirms the position of Western Nuclear, Inc. (WNI) that we sincerely believe no additional reclamation is warranted or necessary. The Washington Department of Health (WDOH) has previously approved the tailing reclamation plan and also previously approved the construction completion report that documents that construction was performed in accordance with the approved reclamation plan. Our decision to accommodate the WDOH in these issues does not indicate nor should it be construed in any way that WNI believes or concedes that the approved reclamation plan and the approved reclamation construction are insufficient to meet all performance objectives for the reclamation of uranium mill tailing impoundments as set forth in WAC 246-252.

Should you have any questions regarding this as-built document and the attachments, please contact me at your earliest convenience.

Sincerely,

Brad K. DeWaard
Resident Agent

/bd
Attachments - 4

cc: L. J. Corte, Esq.
L. L. Miller, SMI
E. M. Schern
H. W. Shaver, Esq., S & L
WNI - Central File (Sherwood, WN-I0133-1, L.C. 37.)

ATTACHMENT 1.

SHEPHERD MILLER
INCORPORATED

October 11, 1999 SMI # 03317

Mr. Brad DeWaard
Western Nuclear, Inc.
P.O. Box 392
Wellpinit, Washington 99049

This letter is in response to your letter dated September 21, 1999 regarding surface stability inspection issues at the Sherwood project site. Specifically this letter presents the required design to address the regrading activities for Issue 1, the area immediately west of the reclaimed embankment and Issue 3, the reclaimed northwest borrow area.

Area west of the reclaimed embankment

The WDOH raised concern that the regrading in this area directs flow from an area immediately west of the southern portion of the reclaimed impoundment to the south and close to the rock lined groin along the west edge of the reclaimed embankment. Concern was raised that if this flow were deep enough it could flow into the groin area.

As discussed during our site inspection on September 7, 1999 this concern will be addressed by enlarging the existing drainage to the south to keep drainage water away from the groin area. This will be done by removing the existing rock in the drainage, excavating the subsoil material and replacing the existing rock. Figure 1 depicts a typical cross section of the reconfigured drainage.

Your letter suggested that regrading be done in the small drainage basin to direct flow towards the west and the roadway culvert. I disagree with performing any regrading in the drainage basin for two reasons. First, enlarging the existing drainage to the south will address the concern and thus regrading the drainage basin is not necessary. Additionally, this area has become revegetated and any regrading in the area will destroy the successful revegetation effort. Since enlarging the existing drainage addresses the concern and regrading the drainage basin will destroy the revegetation effort, regrading will not be done in this area. This is consistent with conversations I had with John Blacklaw of your office during our site visit of September 7.

Environmental & Engineering Consultants

3801 Automation Way, Suite 100
Fort Collins, CO 80525
Phone: (970) 223-9600
Fax: (970) 223-7171
www.shepmill.com

Reclaimed northwest borrow area

The WDOH raised concern that the existing bench on the reclaimed northwest borrow area would continue to contribute sediment to the diversion channel. To address this concern, the bench will be removed and the area will be regraded to a uniform slope. All disturbed areas will be reseeded with the same seed mixture that was used for all other disturbed areas outside of the tailing area. Erosion control netting (jute matting) will be installed over the disturbed area. This netting will insure erosional stability until the vegetation becomes established and will eliminate any need for any type of vegetation success criteria for this area. The netting will be installed in accordance with manufacturer's recommendations.

Both of these areas will be inspected and documented as part of the semi-annual surface stability inspection. If the inspector concludes that the areas have been constructed as designed, these issues will be considered successfully completed and closed.

Because of the short remaining construction season, we request that you give prompt concurrence to this design letter so that construction activities can be completed as soon as possible.

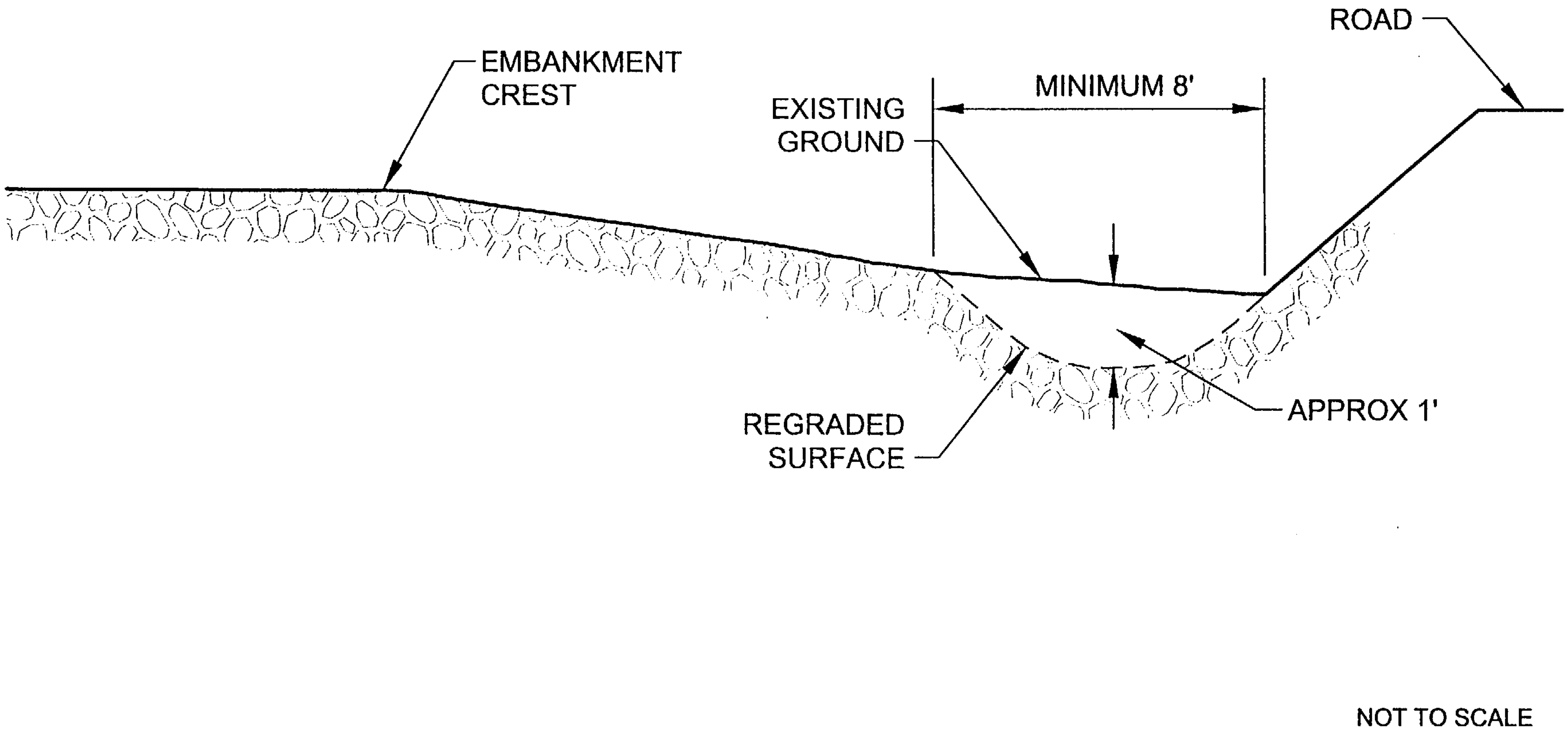
If you have any questions, please let me know as soon as possible.

Sincerely,
SHEPHERD MILLER, INC.

Louis Miller, PE
Vice President

Attachments

LOUIS L. MILLER
STATE OF WASHINGTON
27992
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 5/1/00

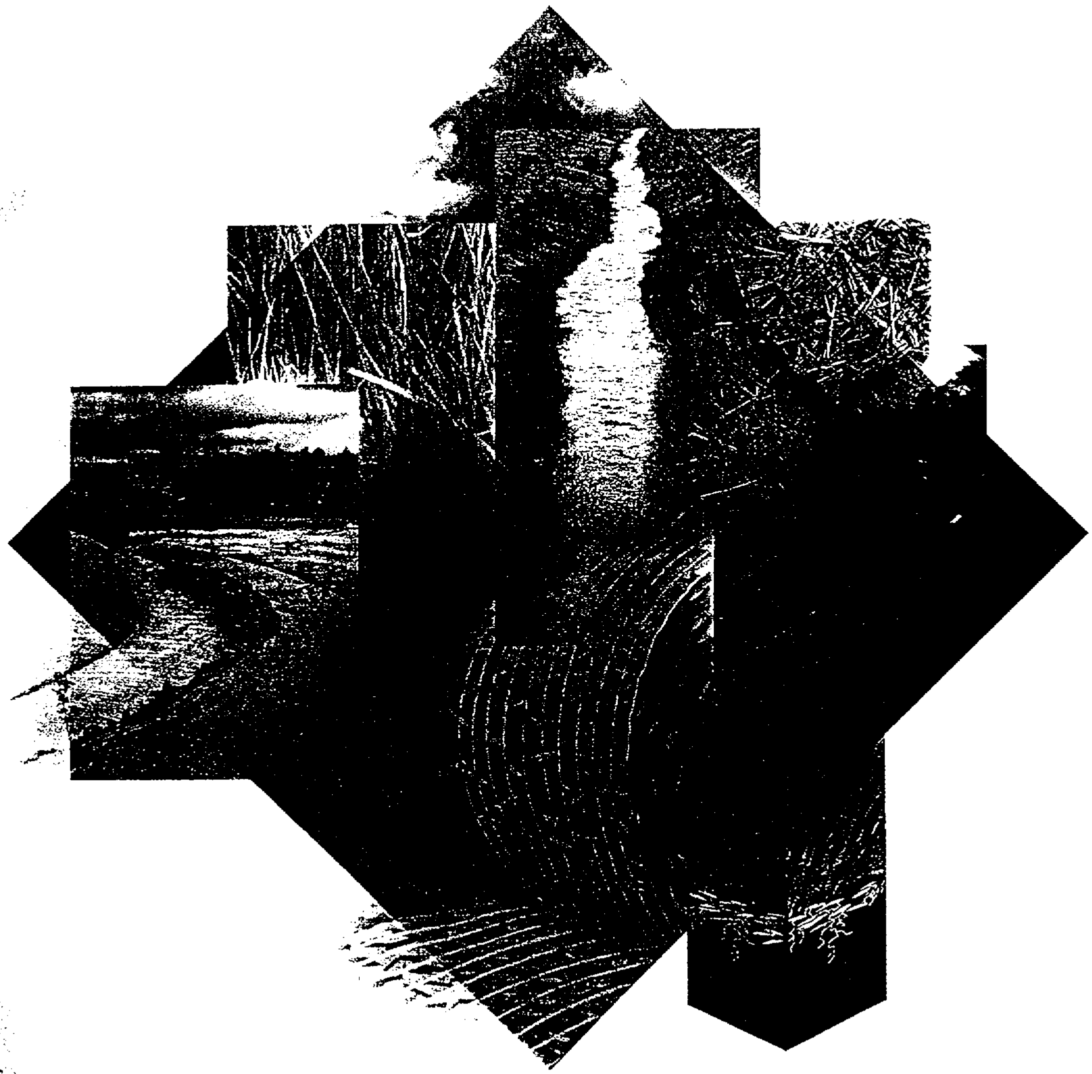


SHEPHERD MILLER
INCORPORATED

FIGURE 1
TYPICAL CROSS SECTION

Date:	OCTOBER 1999
Project:	03-317
File:	XS-10-99.dwg

NORTH AMERICAN GREEN®



EROSION CONTROL
HAS NEVER BEEN MORE ADVANCED

DEDICATED TO OUR CUSTOMERS

TABLE OF CONTENTS

NORTH AMERICAN GREEN®

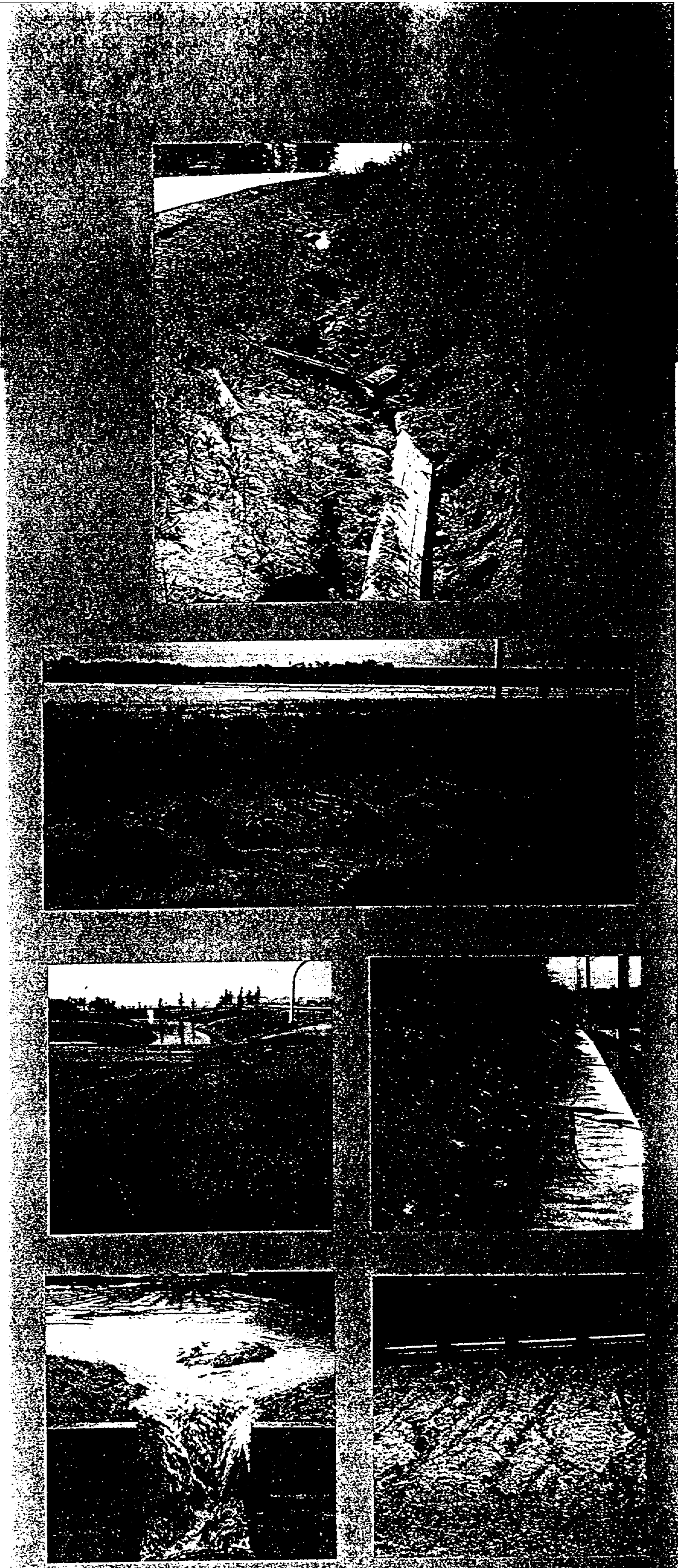
NORTH AMERICAN GREEN

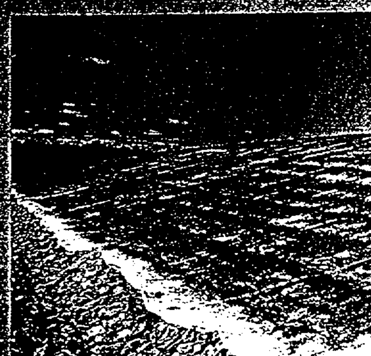
Founded in late 1985, the success of North American Green is due to the dedication of its employees and the management's "down to earth" business philosophy. A fair business relationship, trust, honesty, quality products, and technical support are the corner stones of the business. During the initial business start up, local distribution was selected as the means of providing products to the industry. Selection of distribution was extremely important. North American Green distributors must be recognized in their respective areas as leaders. Leaders in honest and fair business practices with the motivation to assist their customers in solving the critical problem of soil erosion. Distributors must be a resource for the design and construction disciplines. We are happy to know that our business philosophy is working. Through our combined efforts, many of the same North American Green distributors have been supplying our products to the industry for over a decade. Together, we believe that quality products, service, and product knowledge separates us from other manufacturers of similar products. At North American Green manufacturing quality erosion control blankets is our only business. With this in mind, it is our sincere desire to continue the effort of supplying and supporting our product line with the latest in erosion control technology. Time tested by field evaluations and continued laboratory testing, North American Green leads the industry in erosion control blanket development and technology. We believe that what we do is important to everyone.

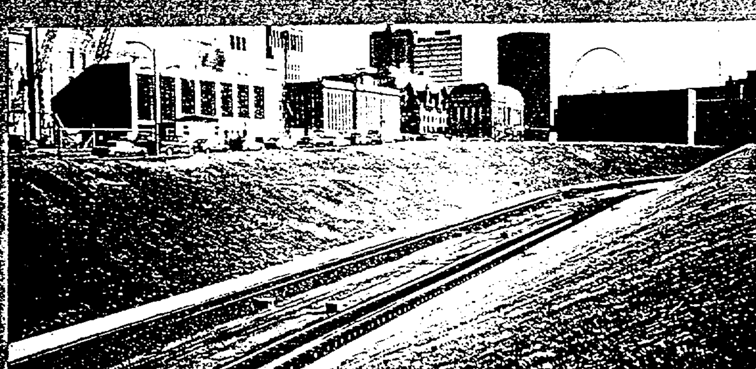
ERROSION CONTROL HAS NEVER BEEN MORE IMPORTANT

Soil erosion and sedimentation are problems which have always been associated with the agricultural industry. Erosion reduces the productivity of our land and the subsequent sediment released chokes our streams, ruins precious wildlife habitat and causes billions of dollars in damages each year. However, due to increased public environmental awareness and rising costs of repairing erosion damaged sites, erosion and sediment control have become serious considerations on all potentially affected projects. Construction sites with unvegetated steep slopes and/or surface drainage ways are prime targets for erosion and large quantities of sediment release. In recognition of this fact, the U.S. Environmental Protection Agency has included erosion and sediment control as an important stipulation in the National Pollution Discharge Elimination System (NPDES). The NPDES is a provision within the 1990 Clean Water Act requiring proper erosion/sediment control planning and the utilization of Best Management Practices on construction projects. Erosion of non-agricultural sites has finally been recognized as a major problem which must be dealt with.

NORTH AMERICAN GREEN IS LEADING THE WAY.

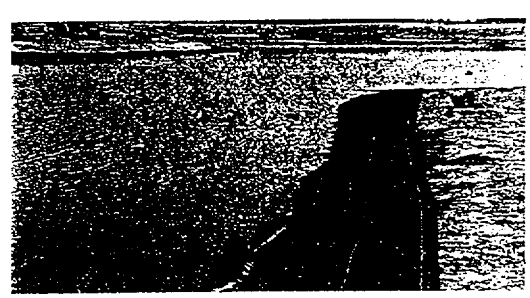






EROSION CONTROL HAS NEVER BEEN MORE ADVANCED.

North American Green is proud to offer the most advanced line of erosion control products and design tools to assist engineers and contractors in complying with the E.P.A.'s NPDES. Our unique system consists of a wide range of erosion control blankets backed by computer-assisted recommendations for cost-effective erosion and sediment control planning. Each North American Green blanket is designed for a specified range of erosion control and revegetation applications. From severe slopes requiring erosion protection/mulch to high velocity channels and moderate impact shorelines needing permanent turf reinforcement, North American Green is your complete source for erosion control technology and products.



TEMPORARY PHOTODEGRADABLE

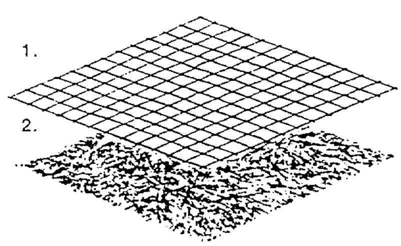
Straw

S75

S75 is constructed of 100% agricultural straw and a lightweight, photodegradable, top net. The functional longevity of the blanket is approximately 10 months. The components are sewn together on 1.5 inch centers with degradable thread to ensure blanket durability and performance. The S75 provides effective erosion control and mulching on 3:1 slopes (≤ 33% slope or ≤19 degree slope) and low-flow swales. May be used on steeper slopes. Consult North American Green software for specific recommendations.

DS75

DS75 features a 100% agricultural straw matrix sewn into a lightweight, accelerated photodegradable, top net. The accelerated photodegradable netting starts degradation in 30 to 45 days (with an approximate functional longevity of 60 days). This blanket provides the same protection as the S75; however, it should be used where lawn management will occur soon after vegetation has established.



Material Composition

1. Net
Lightweight photodegradable polypropylene 1.64 lbs/1000 sq ft approx wt

2. Straw Fiber
0.5 lbs/sq yd (0.27 kg/sq m)

Thread
Degradable

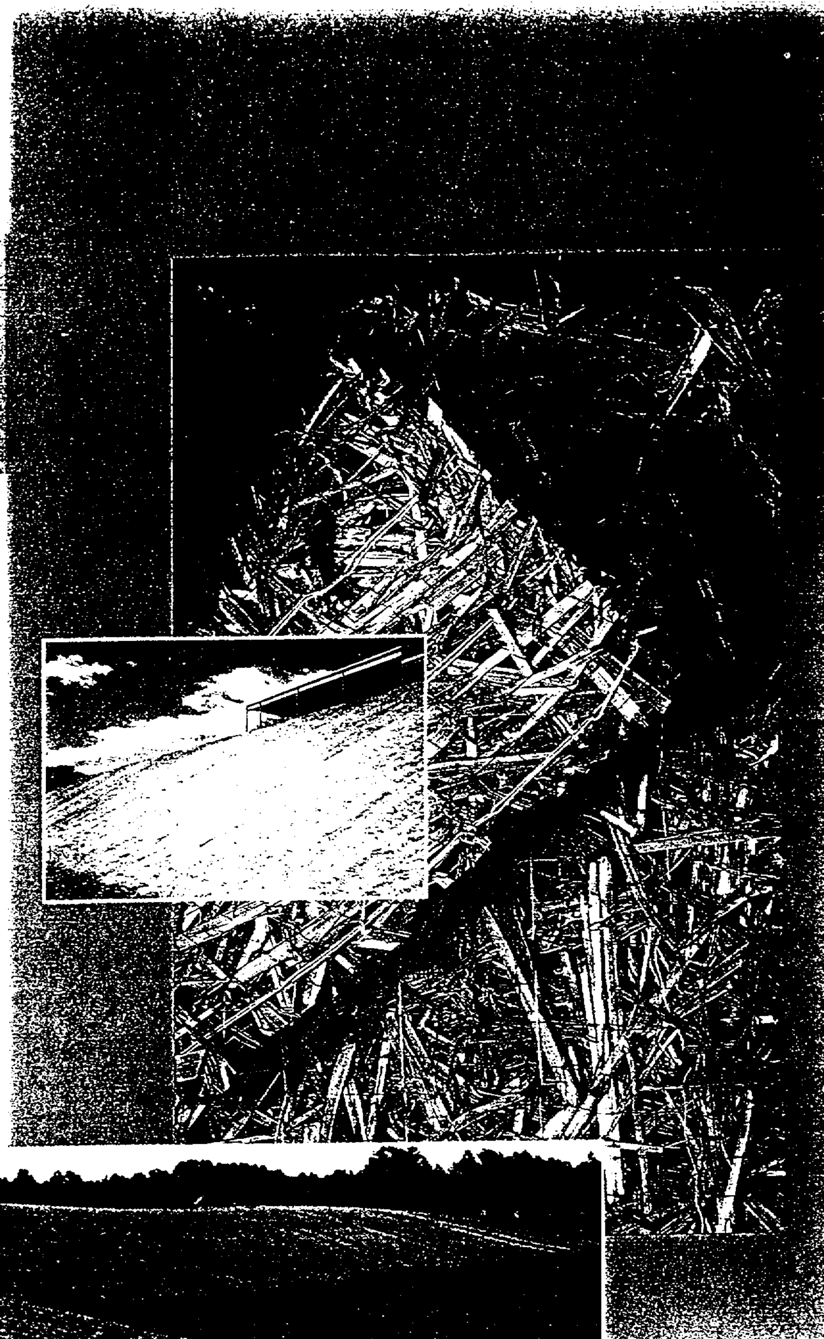
Roll Specifications

Width	6.5 feet (2m)
Length	83.5 feet (25.4m)
Weight	30 lbs ± 10% (13.6 kg)
Area	60 sq yds (50m sq)

Straw

TEMPORARY PHOTODEGRADABLE

Straw

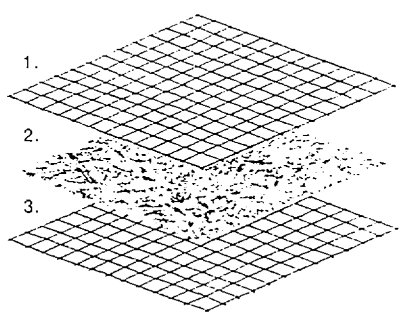


S150

S150 is constructed of 100% agricultural straw and lightweight, photodegradable, top and bottom nets. The functional longevity of the blanket is approximately 10 months. The components are sewn together on 1.5 inch centers with degradable thread to ensure blanket durability and performance. The double net structure of the S150 enables the blanket to provide effective erosion control and mulching on 3:1 - 2:1 slopes (33% - 50% slopes or 19-27 degree slopes) and moderate discharge swales. May be used on steeper slopes. Consult North American Green software for specific recommendations.

DS150

DS150 features a 100% agricultural straw matrix sewn into lightweight, accelerated photodegradable, top and bottom nets. The accelerated photodegradable netting starts degradation in 30 to 45 days (with an approximate functional longevity of 60 days). This blanket provides the same protection as the S150: however, it should be used where lawn management will occur shortly after grass has established.



Straw

Material Composition

1. Top Net
Lightweight photodegradable polypropylene
1.64 lbs/1000 sq ft approx wt

2. Straw Fiber
0.5 lbs/sq yd (0.27 kg/sq m)

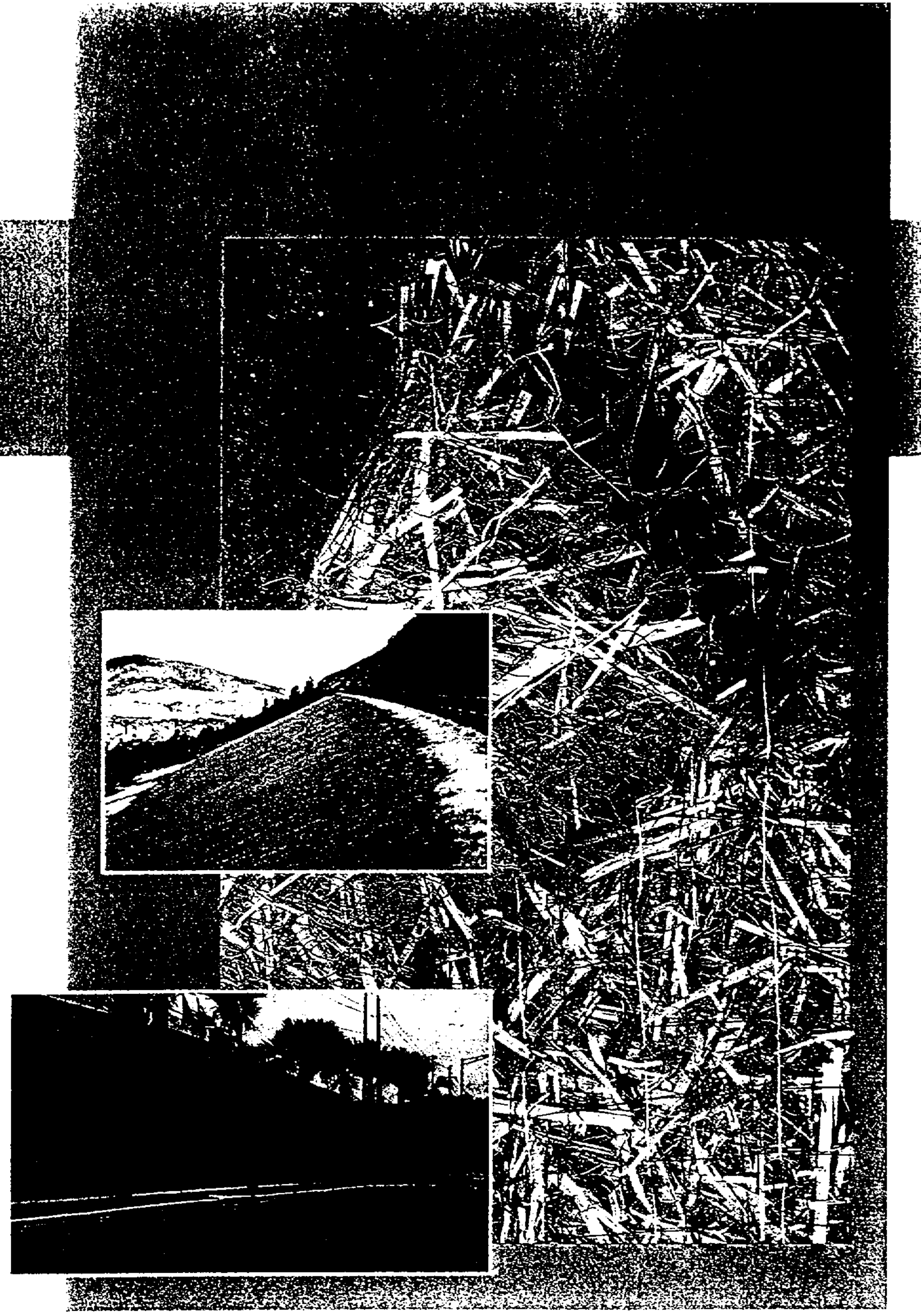
3. Bottom Net
Lightweight photodegradable polypropylene
1.64 lbs/1000 sq ft approx wt

Thread
Degradable

Roll Specifications

Width	6.5 feet (2m)
Length	83.5 feet (25.4m)
Weight	30 lbs ± 10% (13.6 kg)
Area	60 sq yds (50m sq)

TEMPORARY
LONG TERM PROTECTION
Straw/Coconut

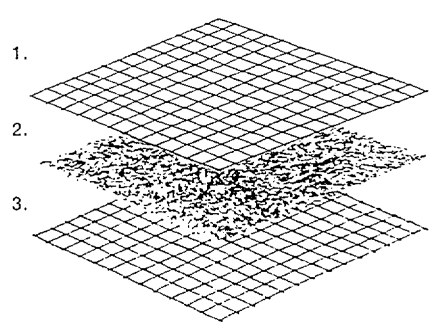


SC150

The SC150 is constructed with 70% agricultural straw, 30% coconut fiber encased in a heavyweight, UV stabilized, top net and a lightweight, photodegradable, bottom net. To ensure blanket durability and performance, the components are sewn together on 1.5 inch centers with degradable thread. The long-lasting durability of the heavy-duty top net and added effectiveness of the coconut fiber enable the SC150 to effectively control erosion on more severe 2:1-1:1 slopes (50% - 100% slopes or 27-45 degree slopes), medium discharge channels, and areas where protection is needed for more than one growing season. Consult North American Green software for specific recommendations.

Roll Specifications

Width	6.5 feet (2m)
Length	83.5 feet (25.4m)
Weight	30 lbs ± 10% (13.6 kg)
Area	60 sq yds (50m sq)



Material Composition

1. Top Net
Heavyweight UV stabilized polypropylene 3 lbs/1000 sq ft approx wt

2. Straw/Coconut Matrix
70% straw at 0.35 lbs/sq yd (0.19 kg/sq m)
30% coconut at 0.15 lbs/sq yd (0.08 kg/sq m)

3. Bottom Net
Lightweight photodegradable polypropylene 1.64 lbs/1000 sq ft approx wt

Thread
Degradable

100% BIODEGRADABLE NATURAL FIBER NETTING

Straw

BIONET SERIES

The BioNet Series of erosion control blankets consists of all the high performance straw, straw/coconut, and coconut fiber matrices of the standard product line, with a natural fiber netting used in place of polypropylene netting. The woven natural fiber netting provides effective mulch retention throughout vegetation establishment, and its 100% biodegradability means absolutely no synthetic netting residues left on the job site after grow-in. Complete biodegradability is not the only environmentally advantageous feature of the BioNet products. The flexibility and water absorption characteristics of the

S75BN

S75BN is a 100% biodegradable version of the standard S75. The blanket features an agricultural straw matrix sewn to a single natural fiber netting. S75BN is designed for use on environmentally sensitive areas with a slope of 3:1 and flatter (≤33% or ≤19 degrees) and low flow swales. The functional longevity of the S75BN is approximately 10 months. Consult North American Green software for specific recommendations.

S150BN

S150BN is a 100% biodegradable version of the standard S150. This blanket consists of a straw matrix sewn between two natural fiber nets. S150BN provides erosion protection on 3:1-2:1 slopes (33 - 50% slopes or 19-27 degree slopes) and moderate discharge swales. The functional longevity of the S150BN is approximately 10 months. Consult North American Green software for specific recommendations.

S75BN
Material Composition

1. Net
Woven, 100% biodegradable, natural organic fiber 9.3 lbs/l000 sq ft approx wt

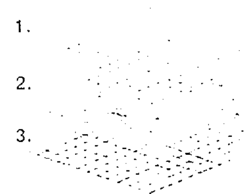
2. Straw Fiber
0.5 lbs/sq yd (0.27 kg/sq m)

Thread
Biodegradable

Roll Specifications*

Width	6.0 feet (1.83m)
Length	90.0 feet (27.4m)
Weight	35 lbs ± 10% (15.9 kg)
Area	60 sq yds (50m sq)

*All roll specifications are approximate.



S150BN
Material Composition

1. Top Net
Woven, 100% biodegradable, natural organic fiber 9.3 lbs/1000 sq ft approx wt

2. Straw Fiber
0.5 lbs/sq yd (0.27 kg/sq m)

3. Bottom Net
Woven, 100% biodegradable, natural organic fiber 9.3 lbs/1000 sq ft approx wt

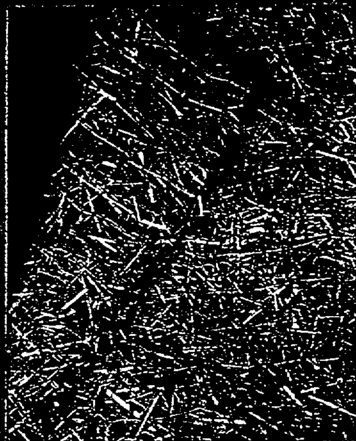
Thread
Biodegradable

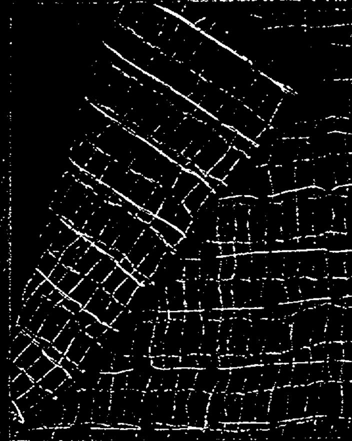
Roll Specifications*

Width	6.0 feet (1.83m)
Length	90.0 feet (27.4m)
Weight	40 lbs ±10% (18.1 kg)
Area	60 sq yds (50m sq)

*All roll specifications are approximate.

Biodegradable





100% BIODEGRADABLE NATURAL FIBER NETTING

Straw/Coconut, Coconut

SC150BN

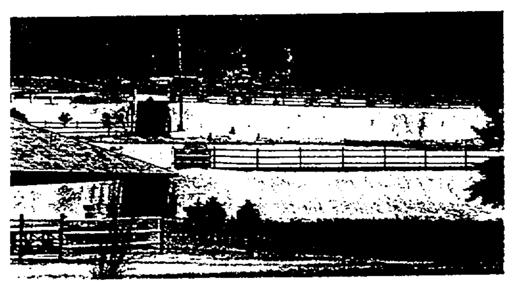
SC150BN is a 100% biodegradable version of the standard SC150. This blanket features a straw/coconut matrix sewn between two natural fiber nets. SC150BN is designed for erosion protection on 2:1–1:1 slopes (50 - 100% slopes or 27-45 degree slopes) and medium discharge channels. The functional longevity of the SC150BN is approximately 18 months. Consult North American Green software for specific recommendations.

C125BN

C125BN is a 100% biodegradable version of the standard C125. The blanket consists of a coconut matrix sewn between two natural fiber nets. C125BN provides erosion protection on 1:1 and greater slopes (≥100% or ≥45 degrees) and high discharge channels. The functional longevity of the C125BN is approximately 24 months. Consult North American Green software for specific recommendations.

BIONET SERIES CONT.

natural fiber netting actually enhance the blanket's erosion control performance. The woven construction of the BioNet, which allows the intersecting jute strands to move independently of one another, reduces the risk of wildlife entrapment, making the BioNet a necessity in ecologically sensitive areas requiring high performance erosion control.



SC150BN Material Composition

1. Top Net
Woven, 100% biodegradable, natural organic fiber
9.3 lbs/1000 sq ft approx wt

2. Straw/Coconut Matrix
70% straw at 0.35 lbs/sq yd (0.19 kg/sq m)
30% coconut at 0.15 lbs/sq yd (0.08 kg/sq m)

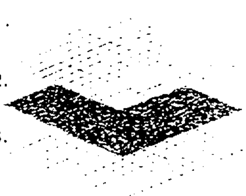
3. Bottom Net
Woven, 100% biodegradable, natural organic fiber
9.3 lbs/1000 sq ft approx wt

Thread
Biodegradable

Roll Specifications*

Width	6.0 feet (1.83m)
Length	90.0 feet (27.4m)
Weight	40 lbs ±10% (18.1 kg)
Area	60 sq yds (50m sq)

*All roll specifications are approximate



C125BN Material Composition

1. Top Net
Woven, 100% biodegradable, natural organic fiber
9.3 lbs/1000 sq ft approx wt

2. Coconut Fiber
0.50 lbs/sq yd (0.27 kg/sq m)

3. Bottom Net
Woven, 100% biodegradable, natural organic fiber
9.3 lbs/1000 sq ft approx wt

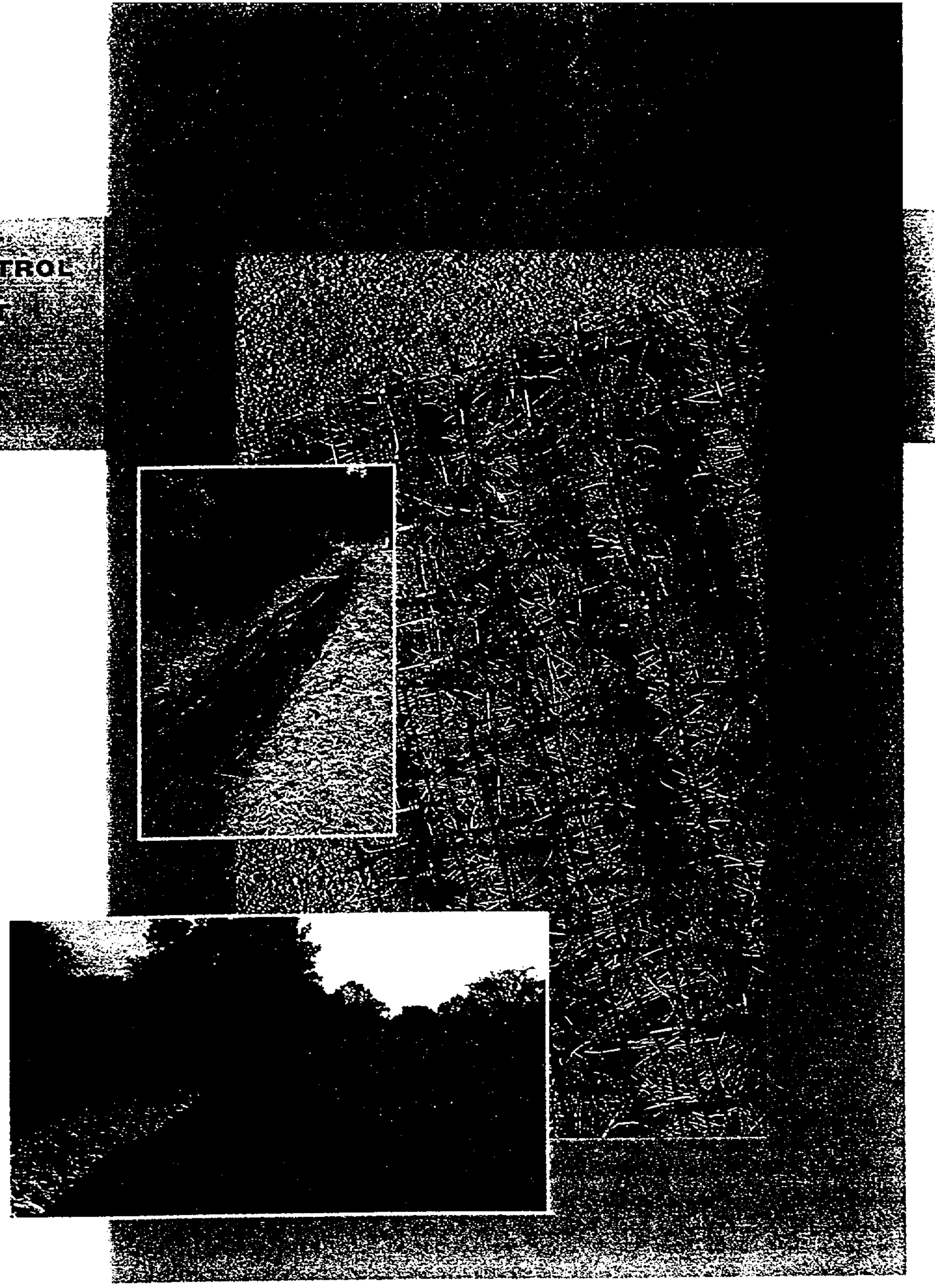
Thread
Biodegradable

Roll Specifications*

Width	6.0 feet (1.83m)
Length	90.0 feet (27.4m)
Weight	40 lbs ± 10% (18.1 kg)
Area	60 sq yds (50m sq)

*All roll specifications are approximate.

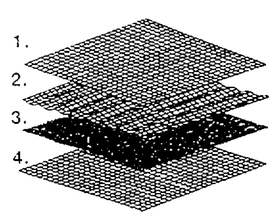
Biodegradable



PERMANENT EROSION CONTROL
TURF REINFORCEMENT MAT
Coconut/Poly Structure

C350

North American Green's C350 Erosion Control/Turf Reinforcement Mat combines the superior erosion control effectiveness of a coconut fiber blanket with the permanent stem and root reinforcement capabilities of a synthetic matting. The patent pending design of the C350 utilizes a coconut fiber matrix stitch-bonded between a heavy-duty bottom netting and a super heavy, crimped, intermediate net overlaid with a heavy-duty top net. This unique triple net construction forms prominent ridges across the matting to trap sediment and provide a permanent three dimensional structure for turf stem and root reinforcement. C350 Erosion Control/Turf Reinforcement Mat provides long-lasting erosion control and permanent vegetal stem and root reinforcement on severe slopes with heavy run-off, channels with super-critical flow velocities, and shorelines with elevated wave action. The C350 is designed for increasing the velocity and shear stress resistance of natural vegetation. C350 was developed specifically for use in the 3 Phase Reinforced Turf Design System. Consult North American Green software for specific design recommendations.



Roll Specifications

Width	6.5 feet (2m)
Length	55.5 feet (16.9m)
Weight	37 lbs ±10% (16.8 kg)
Area	40 sq yds (33m sq)

Material Composition

1. Top Net
Extra heavyweight UV stabilized polypropylene
8.5 lbs/1000 sq ft approx wt

2. Middle Net
Extra heavyweight UV stabilized polypropylene, crimped
20 lbs/1000 sq ft approx wt

3. Coconut Fiber
0.5 lbs/sq yd (0.27 kg/sq m)

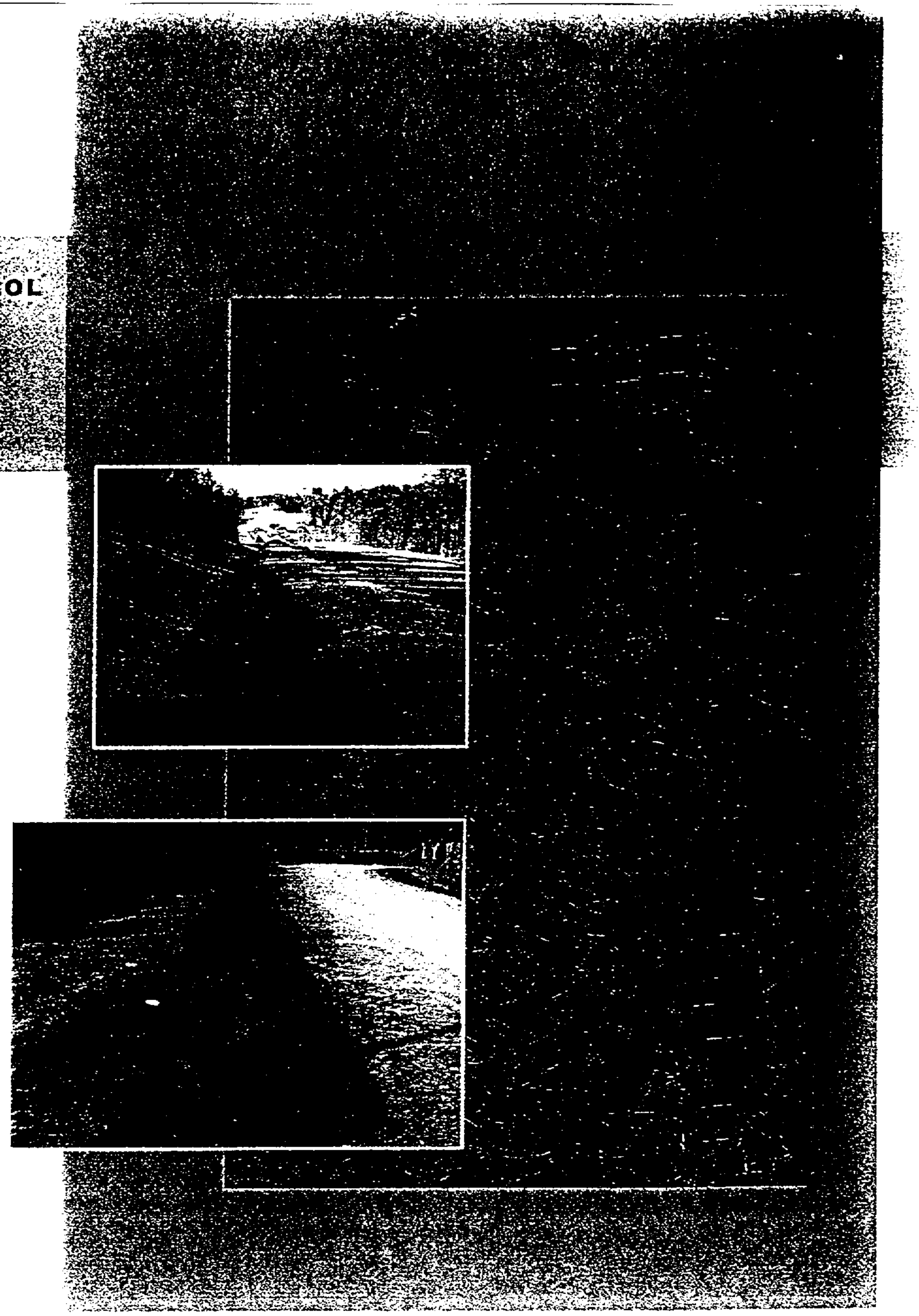
4. Bottom Net
Extra heavyweight UV stabilized polypropylene
8.5 lbs/1000 sq ft approx wt

Thread
UV stabilized polypropylene

Coconut/Polypropylene

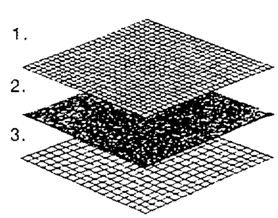
PERMANENT EROSION CONTROL TURF REINFORCEMENT MAT

Polypropylene



P300

The P300 Erosion Control/Turf Reinforcement Mat features a 100% UV stabilized polypropylene fiber matrix encased in an extra heavy-duty, UV stabilized top net and a heavy, UV stabilized bottom net. The blanket is sewn together on 1.5 inch centers with black polypropylene thread to ensure long-lasting durability and performance. The P300 provides permanent erosion control and vegetal reinforcement on severe slopes, high discharge channels, and shorelines with wave action. P300 is designed for use where natural vegetation will not withstand design flow conditions. The P300 is ideal for use in the 3 Phase Reinforced Turf Design System. Consult North American Green software for specific design recommendations.



Material Composition

1. Top Net
Extra heavyweight UV stabilized polypropylene
5 lbs/1000 sq ft approx wt

2. UV Stabilized Poly Fiber
0.7 lbs/sq yd (0.38 kg/sq m)

3. Bottom Net
Heavyweight UV stabilized polypropylene
3 lbs/1000 sq ft approx wt

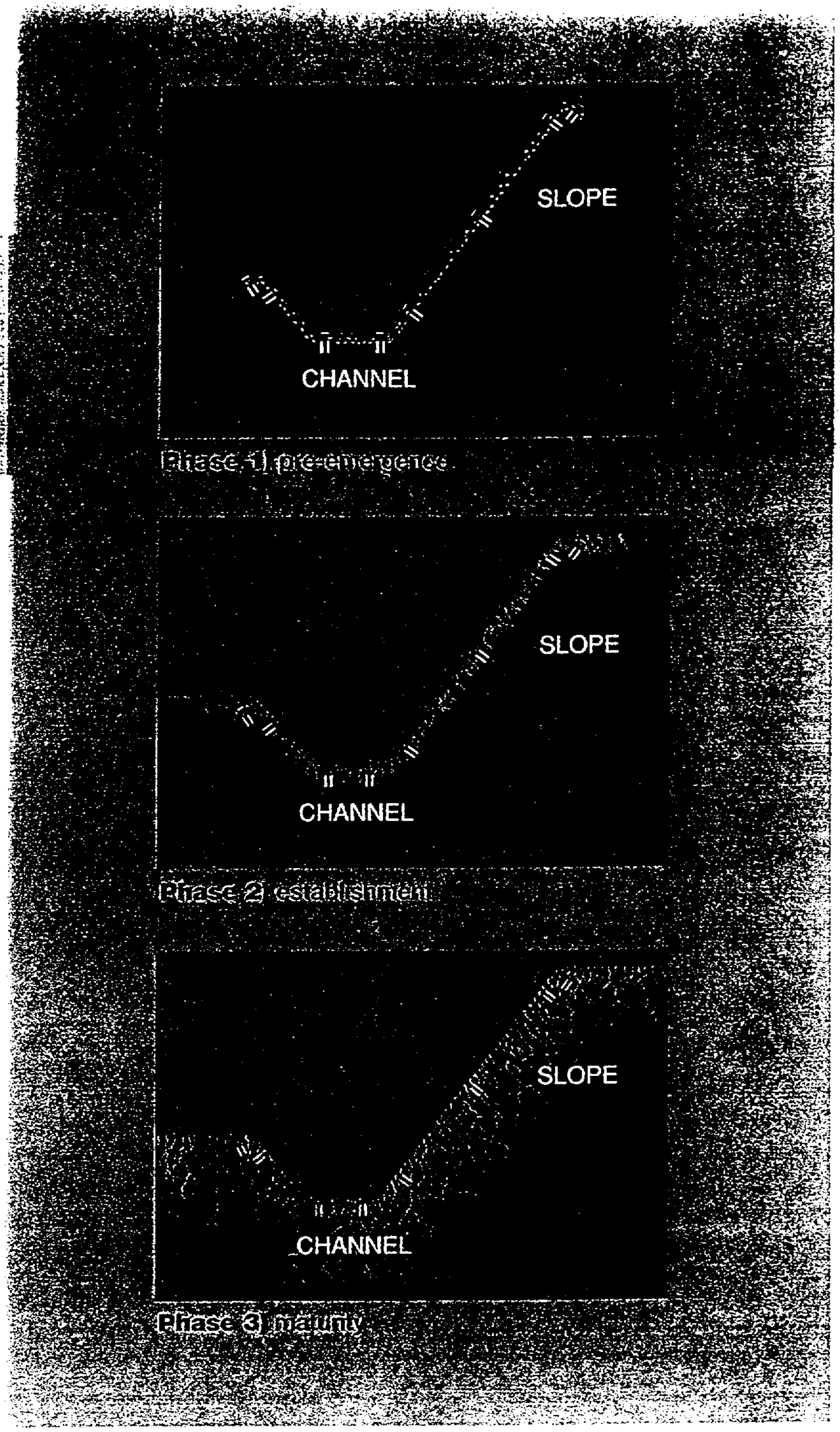
Thread
UV stabilized polypropylene

Roll Specifications

Width	6.5 feet (2m)
Length	83.5 feet (25.4m)
Weight	42 lbs ±10% (19.1 kg)
Area	60 sq yds (50m sq)

Polypropylene

C350/P300 3 PHASE REINFORCED TURF DESIGN SYSTEM



The North American Green 3 Phase Design System is a practical method for developing geosynthetically reinforced vegetative linings for permanent slope and channel protection. This system is unlike conventional turf reinforcement systems in that it requires no soil in-filling of the geosynthetic mattings during installation. The 3 Phase System, in contrast, utilizes the performance of the C350 or P300 erosion control/turf reinforcement matting through each development phase of the vegetative lining. The effective development of a geosynthetically reinforced lining is dependent upon the success of each phase. If the lining suffers damage in Phases 1 or 2, those damages often inhibit its development into Phase 3. Each phase is characterized by different needs in terms of protection. The performance of the C350 and P300 in laboratory research simulating each phase of a 3 Phase System are presented on the following pages. Please refer to the North American Green Erosion Control Materials Design Software for more detailed, accurate product recommendations for channel protection through each phase.

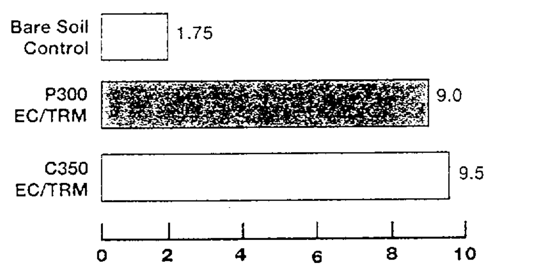
PRODUCT TESTING AND DESIGN

CHANNEL PROTECTION

TABLE 1

PHASE 1

Max Velocity For Unvegetated Mattings at .5 inch Soil Loss



Max. Flow Velocity (feet per second)

EC/TRM - Erosion Control/Turf Reinforcement Mat

PHASE 1/Test Summary

Phase 1, the pre-emergence phase, consists of the time period between seed application and seed germination and emergence. This phase requires effective erosion control and mulching to protect the seedbed and enhance seed germination. The C350 and P300 provide effective erosion control for the bare soil surface to promote vegetation establishment.

UNIVERSITY RESEARCH

North American Green erosion control blankets have been used extensively for protecting swales, channels and other areas of concentrated water flows from erosion during and after revegetation. To assist the engineer in designing effective vegetative linings, North American Green has quantified the capabilities of our products through channel lining research by two major erosion research laboratories. The objectives of these tests were to quantify the unvegetated scour control and permanent stem root reinforcement capabilities of the C350 and P300. Table 7 lists the maximum recommended shear stresses and roughness coefficients for all North American Green blankets.

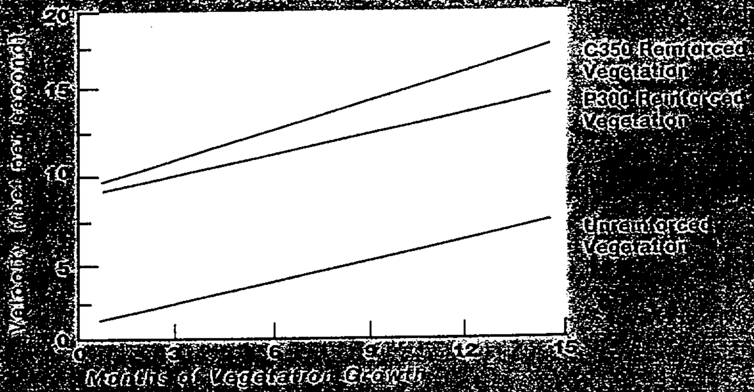
CHANNEL LINER TESTING PROTOCOL

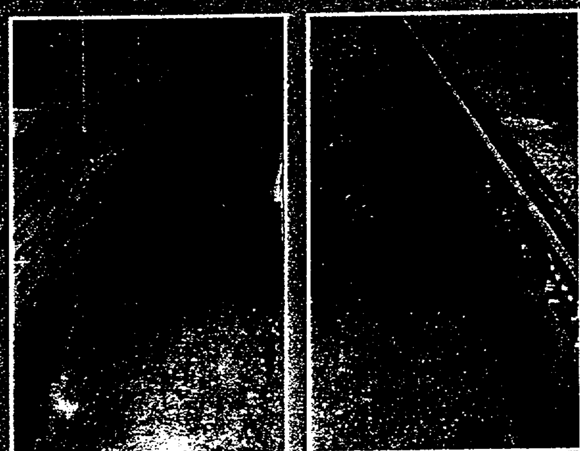
Both university studies utilized indoor laboratory channel flumes filled with highly erodible sandy loam soil and controlled volume flow events. Each channel lining material was subjected to consecutive .5 hour or longer flow events until an erosion and/or a material failure occurred. Failure within the testing regimes was defined for the different lining materials as:

Test Material	Erosion Failure	Material Failure
Bare Soil Control	>= .5 inches Average Soil Loss From Channel	N/A
Unvegetated Matting	>= .5 inches Average Soil Loss From Channel	Observed tears, rips or excess fiber loss
Unreinforced 6" Bluegrass Sod	>= .5 inches Average Soil Loss	Observed tears, scoured out holes
Reinforced 6" Bluegrass	>= .5 inches Average Soil Loss	Observed tears, scoured out holes

PRODUCT TESTING AND DESIGN
CHANNEL PROTECTION

TABLE 2
PHASE 2
Estimated Permissible Velocities for Natural and Reinforced KY Bluegrass

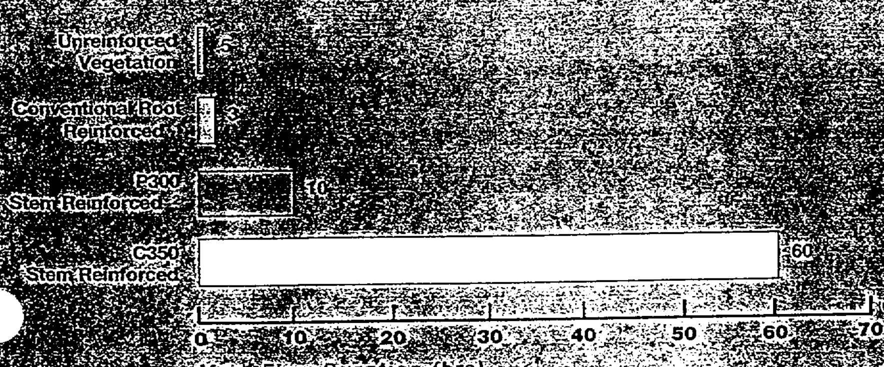




C350 Reinforced Turf — Unreinforced Turf

Note: Discoloration of outflow due to sediment release from unreinforced turf failure

TABLE 3
PHASE 3
Maximum Flow Durations for Reinforced and Unreinforced Mature Vegetation @ 18 Feet Per Second Velocity



1. Conventional Root Reinforcement Turf Data from other Manufacturers Published Data
2. P300 limit reached following a 60 hr. flow @ 14.5 fps

PHASE 2/Test Summary

In Phase 2 following seed germination and emergence, the need for erosion protection continues at the base of new seedlings and in the interstitial soil surfaces between plants. In addition, the seedlings, with predominately undeveloped root systems, often require a different form of protection–structural reinforcement against being "plucked" from the soil by high velocity, high shear stress water flows. Estimated limitations for C350 and P300 stem reinforced KY Bluegrass through Phase 2 reveal a considerable increase in performance over unreinforced vegetation.

PHASE 3/Test Summary

As the grass matures into Phase 3, the need for supplemental erosion protection is dissipated but not eliminated by dense vegetation stem and leaf growth, in conjunction with the consolidation of surface soils through extensive root system development. In this phase, continued erosion control and structural reinforcement are the ultimate requirements of the vegetation. Continued erosion control is important to retain interstitial soils and structural reinforcement must hold individual mature plants in position under the expected flows which the lined channel is designed to carry. The C350 stem reinforced mature KY Bluegrass revealed the highest damage resistance to long duration, high velocity flows. P300 stem reinforced Bluegrass also shows considerable performance advantages over conventional turf "root" reinforcement mattings.

PRODUCT TESTING AND DESIGN
SLOPE PROTECTION

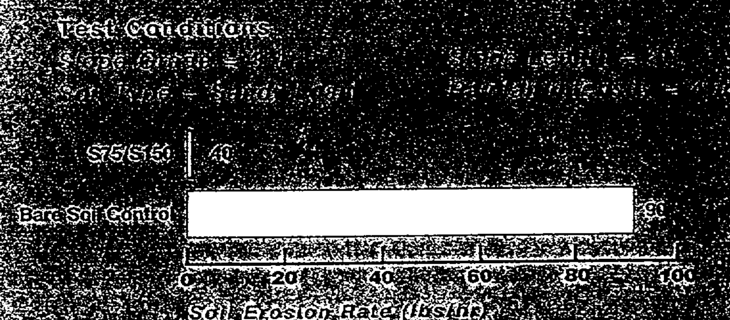
UNIVERSITY RESEARCH

Extensive research has been performed on all North American Green erosion control blankets and each product's effectiveness for reducing soil loss under various site conditions. The most recent testing was conducted at a major university erosion research laboratory using a variable slope, soil-filled test bed and a computer controlled rainfall simulator. The results of these tests confirm findings from other erosion control studies-*North American Green blankets are extremely effective for controlling erosion and sediment loss on mild to very steep slopes under heavy rainfall.*

SLOPE TESTING PROTOCOL

All tests were performed by installing each North American Green blanket type in 2 - 3 separate plots on a 20 feet long sandy loam test bed set at one of three slope gradients (3:1 - 1.5:1). After installation, the test plots were subjected to a simulated storm event with a rainfall intensity of 4 in/hr for one full hour. All runoff, infiltrated water, and sediment were collected at the end of each test plot and volumetrically measured and weighed. The following graphs display the test results in actual soil loss per hour from the respective material and bare soil control plots. For more detailed, performance guaranteed product recommendations for slope applications, refer to the North American Green Erosion Control Materials Design Software.

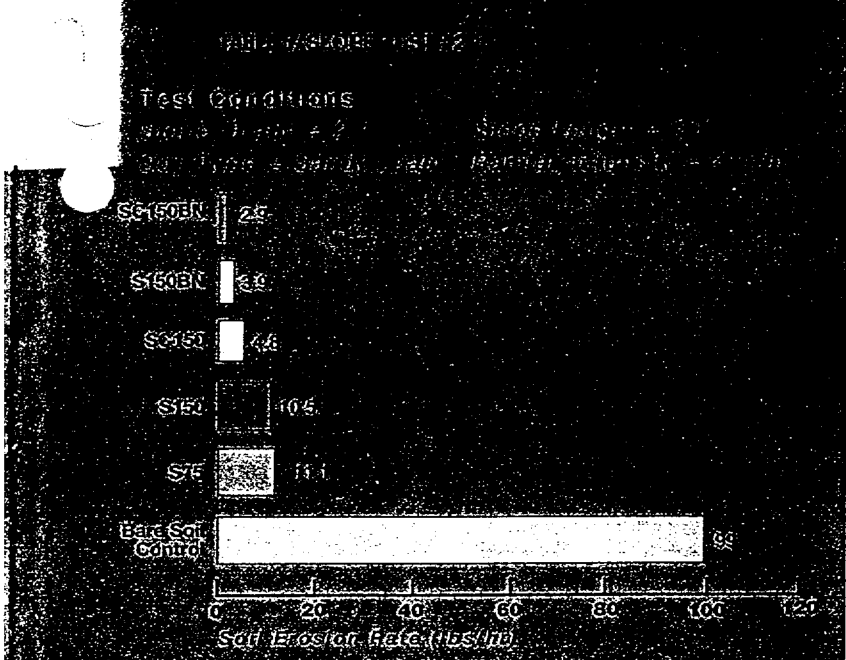
TABLE 4/SLOPE TEST #1

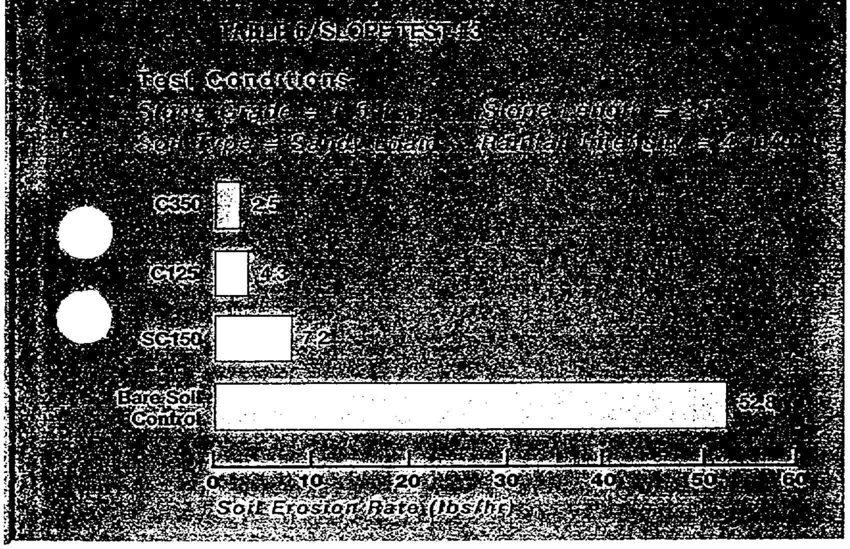


SLOPE TEST #1 SUMMARY

North American Green S75-S150 straw fiber blankets provided exceptional erosion control on the 3:1 test slope, revealing over 99.5% effectiveness as compared to the bare soil control plot. Comparable performance can be expected in similar actual slope applications when the blankets are properly installed. However, longer 3:1 slopes may require heightened protection due to an increase in runoff flow volumes and velocities.

PRODUCT TESTING AND DESIGN
SLOPE PROTECTION





SLOPE TEST #3 SUMMARY

The North American Green SC150 was quite effective at reducing soil loss from the 1.5:1 test slope. The C125 and C350 showed even greater performance at over 90% effectiveness. The C125 is recommended for temporary long term protection of critical slopes where the established permanent vegetation is expected to withstand design storm events. The C350 is recommended for severe slopes with heavy runoff necessitating both temporary/long term erosion protection and permanent turf reinforcement.

SLOPE TEST #2 SUMMARY

North American Green single and double netted 100% straw blankets provided adequate protection for the 2:1 slope. However, due to increased stresses on the materials during installation, double netted products are generally recommended. The standard straw/coconut fiber SC150 blanket provided twice the effectiveness as the S150. The SC150 is ideal for applications requiring a higher degree or longer lasting erosion protection. The S150BN and SC150BN BioNet products proved to be the most effective materials for reducing soil loss. The increased performance of the BioNet products over the standard poly-netted materials appears to be a function of water absorption and the fiberous nature of the BioNet nettings. When saturated, the natural fiber netting assists in conforming the blanket to the soil surface. Furthermore, the fine hair fibers protruding from the strands on the bottom netting adhere to the soil surface and aid in soil particle resistance to movement. The BioNet products are recommended for applications requiring the highest degree of erosion protection, and/or a product which is fully biodegradable.

TABLE 7 Tractive Force Limits and Roughness Coefficients for All North American Green Blankets

Blanket Type	Manning's "n" for Flow Depth			Max. Permissible Shear (lbs./sf)	
Unvegetated	0 - .5 ft	.5 - 2 ft.	> 2 ft.	*Short Duration	*Long Duration
S75/S75BN	.055	.028	.021	1.55	1.55
S150/S150BN	.055	.028	.021	1.65	1.65
SC150/SC150BN	.050	.025	.018	1.80	1.80
C125/C125BN	.022	.014	.014	2.25	2.25
C350	.040	.025	.020	3.20	2.25
P300	.034	.024	.020	3.00	2.00
Vegetated					
C350 Phase 2**	.044	.044	.044	6.00	4.50
P300 Phase 2**	.044	.044	.044	5.50	4.00
C350 Phase 3	.049	.049	.049	8.00	8.00
P300 Phase 3	.049	.049	.049	8.00	8.00

** Short Duration <= 2 hr Peak Flow* ** Long Duration > 2 hr Peak Flow*

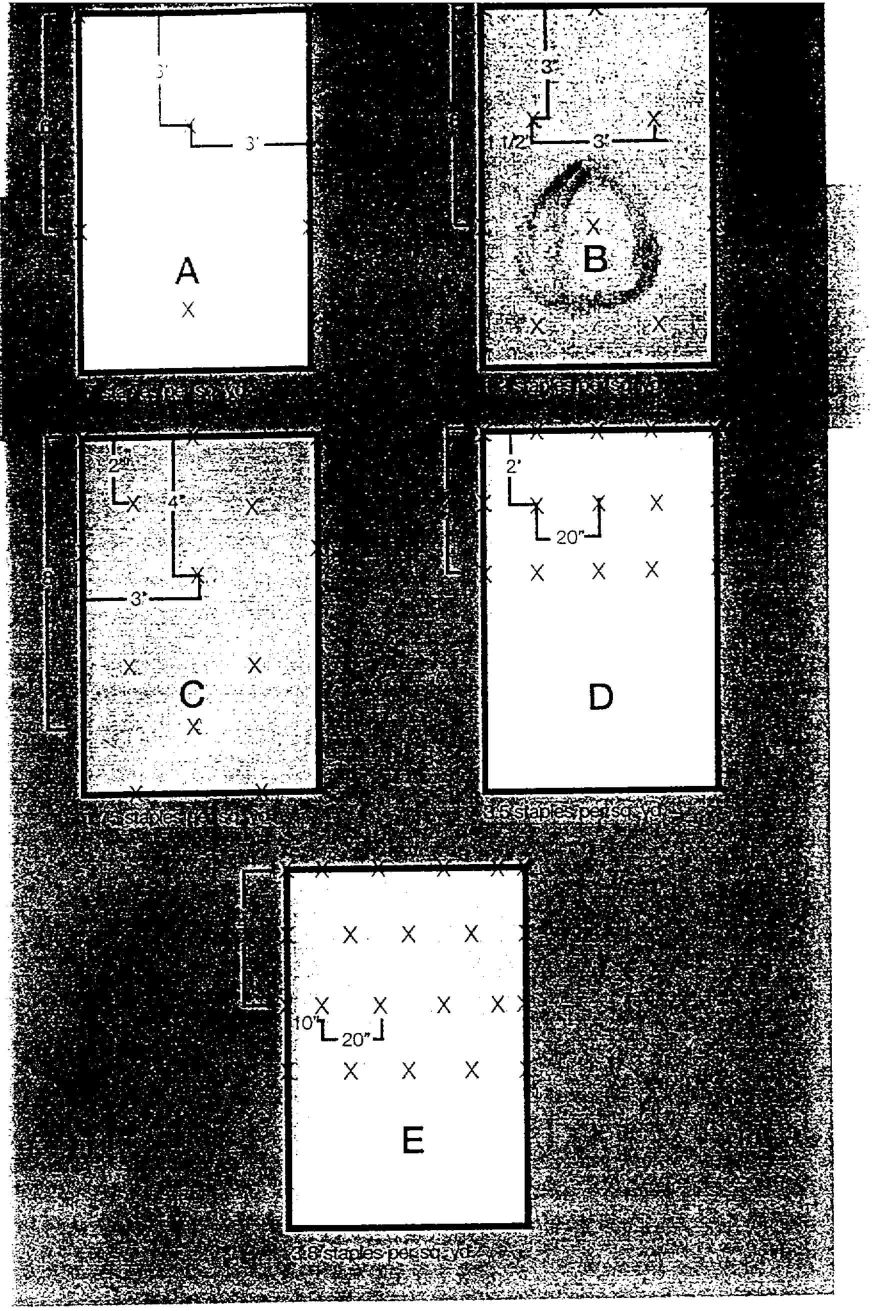
*** Phase 2 @ 6 months Veg. Growth*

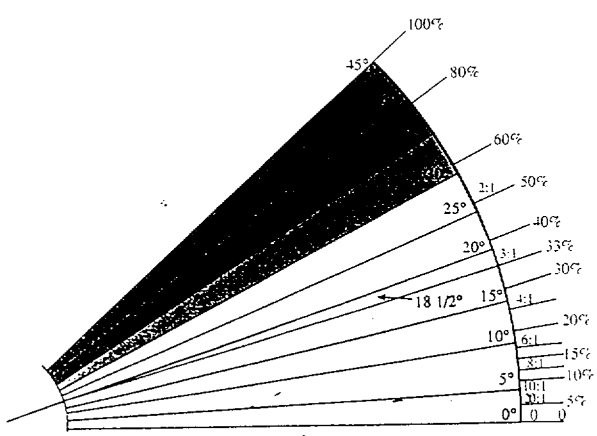
TABLE 8 "VM" (Fraction of Unprotected Soil Loss) Factors for North American Green Blankets in Slope Applications Based on Slope Length and Gradient-(Derived from Field Testing and Lab Research)

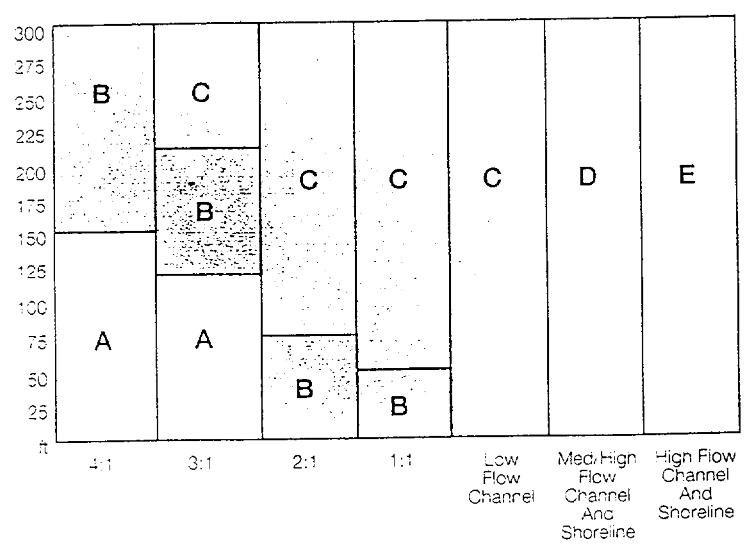
Slope Length	Material Type									
Gradient	S75	S150	SC150	C125	S75BN	S150BN	SC150BN	C125BN	C350	P300
L<= 20' <= 3:1	.029	.004	.001	.001	.029	.00014	.00009	.00009	.0005	.001
3:1 - 2:1	.11	.106	.048	.029	.11	.039	.029	.018	.015	.029
> 2:1	.23	.13	.10	.082	.23	.086	.063	.05	.043	.082
L > 20' < 50' <= 3:1	.11	.062	.051	.036	.11	.010	.005	.003	.018	.036
3:1 - 2:1	.21	.118	.079	.060	.21	.07	.055	.04	.031	.06
> 2:1	.45	.17	.145	.096	.45	.118	.092	.06	.050	.096
L >= 50' <= 3:1	.19	.12	.10	.07	.19	.02	.01	.007	.035	.07
3:1 - 2:1	.30	.18	.11	.09	.30	.10	.08	.07	.047	.09
> 2:1	.66	.22	.19	.11	.66	.15	.12	.07	.057	.11

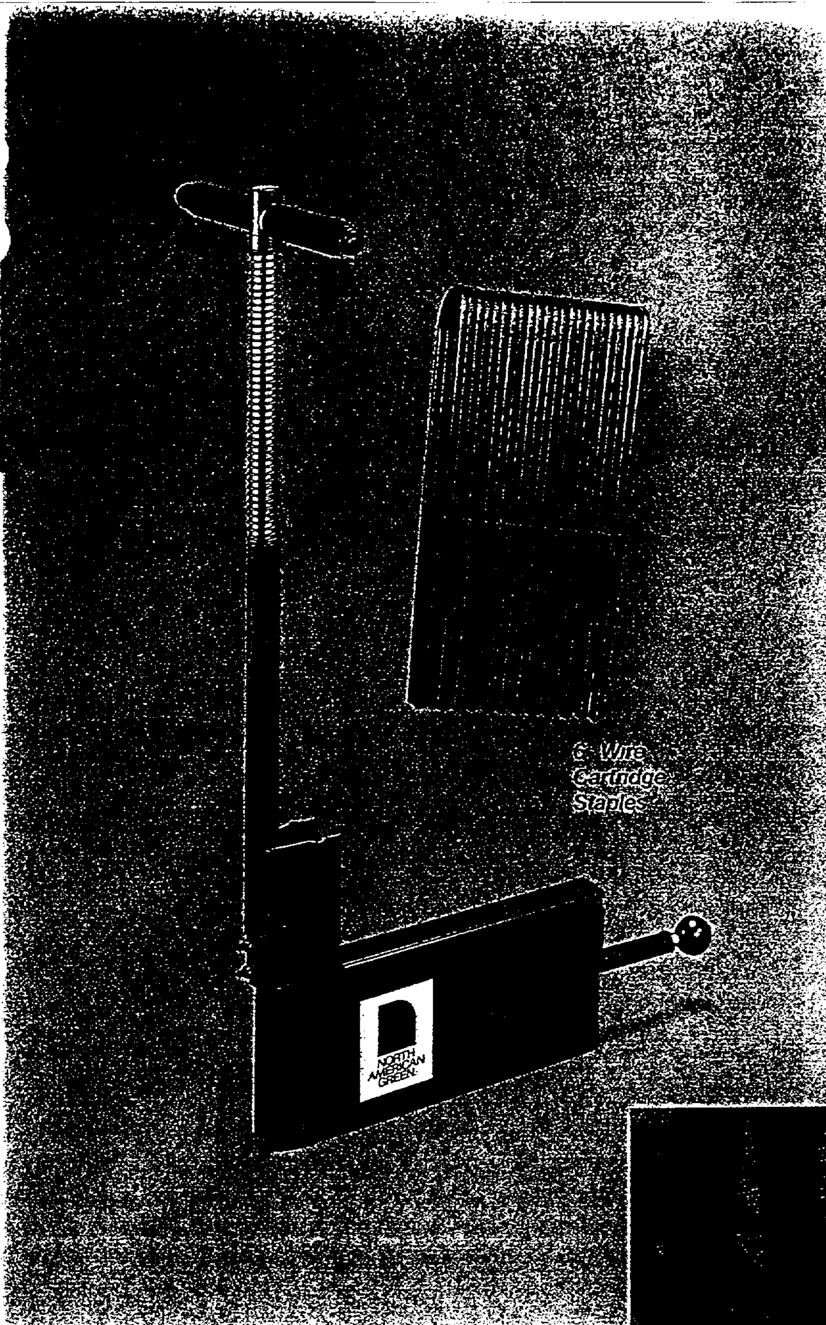
STAPLE PATTERN GUIDE

Staple patterns apply to all North American Green erosion control blankets. Staple patterns will vary depending upon application type, slope length, slope grade, soil type and annual rainfall. The following are general staple recommendations based on slope length, slope grade, and estimated run-off. Specific staple placement patterns are illustrated in diagrams A, B, C, D, and E. Increased staple rates may be necessary depending upon site conditions. For detailed specific recommendations, contact your nearest authorized North American Green distributor or call North American Green technical services.





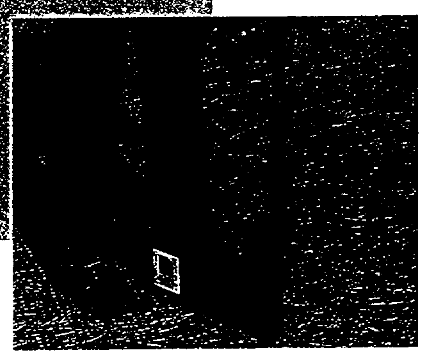


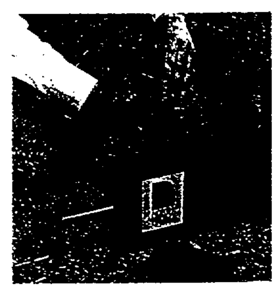


SURELOCK STAPLE GUN

SureLock Staple Gun for Easy Installation of Erosion Control Blankets, Geotextiles and Sod.

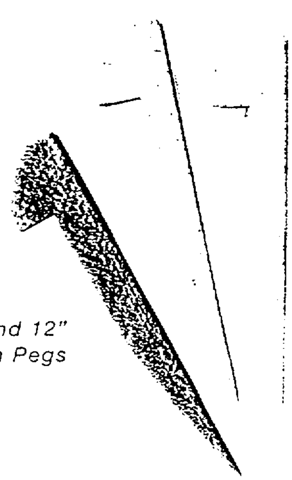
The SureLock gun dramatically reduces installation time and cost. SureLock is designed for trouble-free operation under the toughest conditions. The SureLock's staple chamber is completely enclosed to guard against damaging dirt. And easy loading, cost-effective staple cartridges make SureLock the best method for installing erosion control blankets, sod, and other material that must be secured to the ground.





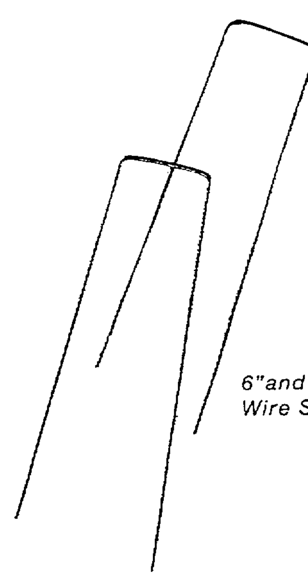
OTHER STANDARD BLANKET FASTENERS
AVAILABLE THROUGH NORTH AMERICAN GREEN

Contact North American Green for further options



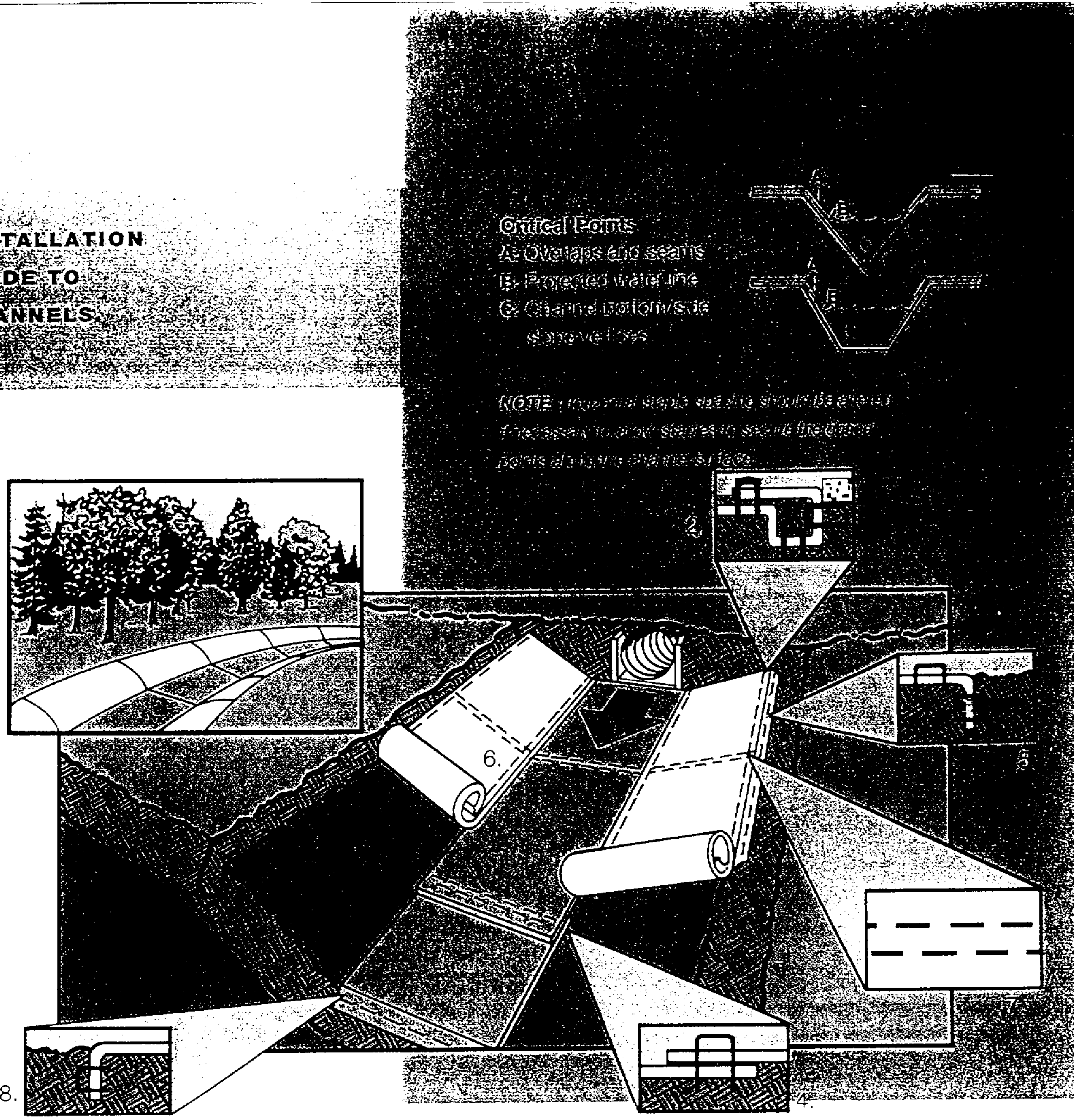
6"and 12"
Wooden Pegs

4"
Plastic Pegs



6"and 8"
Wire Staples

INSTALLATION GUIDE TO CHANNELS



1. Prepare soil before installing blankets, including application of lime, fertilizer, and seed.

2. Begin at the top of the channel by anchoring the blanket in a 6" deep x 6" wide trench. Backfill and compact the trench after stapling.

3. Roll center blanket in direction of water flow on bottom of channel.

4. Place blankets end over end (shingle style) with a 6" overlap. Use a double row of staggered staples 4" apart to secure blankets.

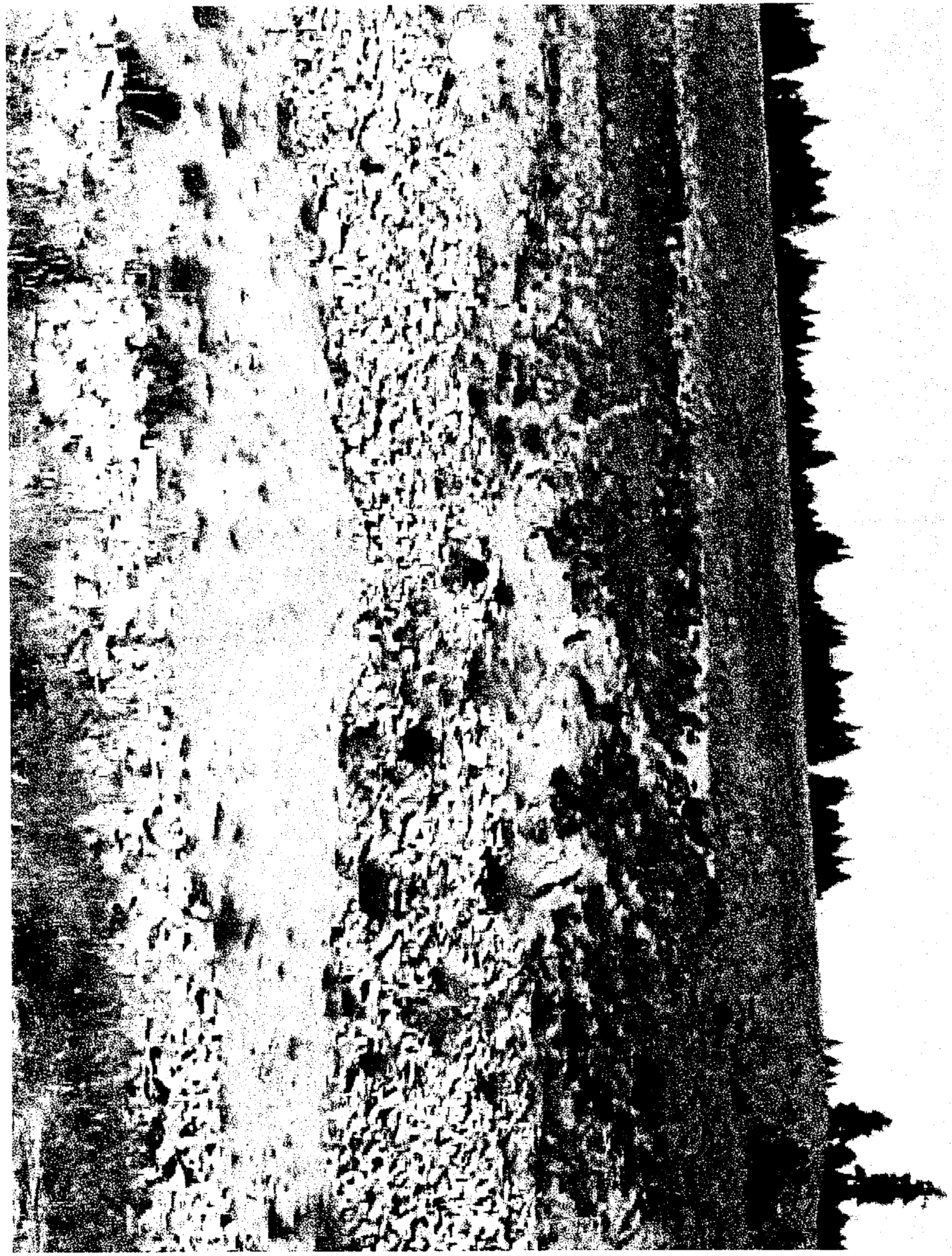
5. Full length edge of blankets at top of side slopes must be anchored in 6" deep x 6" wide trench. Backfill and compact the trench after stapling.

6. Blankets on side slopes must be overlapped 4" over the center blanket and stapled (2" for C350 matting).

7. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4" apart over entire width of the channel. Place a second row 4" below the first row in a staggered pattern.

8. The terminal end of the blankets must be anchored in a 6" deep x 6" wide trench. Backfill and compact the trench after stapling.

REFER TO GENERAL STAPLE PATTERN GUIDE ON PAGE 20 FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.



ATTACHMENT C

EVALUATION OF REVEGETATION DEVELOPMENT ON THE SHERWOOD COVER

INTRODUCTION

A revegetation plan was initiated on the reclaimed Sherwood uranium mill tailing impoundment in 1996. The cover was planted in the fall of 1996 and development of the plant community has been monitored annually beginning in 1997. Two sets of vegetation development criteria for each of the two impoundment areas for bond release were established in this plan, one set for the margin outslopes and one set for the impoundment cover. If either of the two criteria for each area were met, the revegetation program for that area would be deemed successful. The acceptance criteria for the impoundment margin outslopes were:

1. The lower limit of the 80% confidence interval for plant cover of perennial species (including perennial grasses and forbes, shrubs and trees) from the 50 transects exceeds 39%; or,
2. The lower limit of the 80% confidence interval for plant cover of all species exceeds 39% from the 50 transects and the plant cover of perennial species from each of the 50 transects shows increasing trends over a three-year period.

The acceptance criteria for the impoundment cover were:

1. The lower limit of the 80% confidence interval for plant cover of perennial species (including perennial grasses and forbes, shrubs and trees) from the 50 transects exceeds 36%; or,
2. The plan cover of all species exceeds 36% at each of the 50 transects and the average plant cover of perennial species from the 50 transects shows increasing trends over a three-year period.

The impoundment cover and margin outslopes were revegetated in the fall of 1996 and development of the plant community has been monitored annually, beginning in 1997. Personnel from the State of Washington Department of Health, Western Nuclear Inc., and Shepherd Miller Inc. made a site visit on 18 October 1999 for the purpose of observing the status of the revegetated plant community. The purpose of this report is to provide a professional judgement on the status of the impoundment revegetation based on the 1997-99 monitoring data and the observations made during the site visit on 18 October 1999.

Summary of Monitoring Data

Results of the vegetation monitoring are summarized in Table 1. These results show the perennial and total cover values for the impoundment cover and the margin outslopes using all of the data points and excluding areas where vegetation is not necessary for erosional stability (i.e., pond area on the impoundment cover and quartz monzonite bedrock areas for the margin outslopes).

The areas where quartz monzonite exists on the margin outslopes and the area of the intermittent pond along with the discussion that these areas do not need vegetation to meet performance objectives were included transmittals to WDOH. The transmittals, dated October 22, 1999 and May 20, 1999 requested the quartz monzonite areas on the margin outslopes and the impoundment cover area be excluded from the monitoring program. That request is pending.

The lower confidence interval for perennial species for the impoundment cover was 24.0% in 1999 and the lower confidence interval for perennial species for the margin outslopes mean was 26.1% for all areas. These values were 26.8 and 29.6, respectively, when the pond and the quartz monzonite bedrock areas were excluded. While the perennial values were approaching the target levels, especially when the inherently stable areas were excluded from the statistics, both areas were below the targets of 36% and 39%, respectively. Therefore, Criteria 1 has not been met for either area of the impoundment.

Criteria 2 has two parts, 36% total cover for the impoundment cover area (39% for the margin outslopes) and an increase in canopy cover of perennials each year. Total canopy cover in 1999 was 33.8% for all areas of the impoundment cover and 35.8% if the pond is excluded. Canopy cover of perennial species decreased slightly between 1998 and 1999. Therefore, the second part of the criterion was not met. The total canopy cover for the margin outslopes did not reach the perennial target, although the values were very close to 39% (33.7% for all areas and 37.6% for areas excluding quartz monzonite areas). As Table 1 shows, perennials increased on the margin outslopes over the last three years and 37.6% was very close to the target value of 39%.

The relationship between the 1998 and 1999 values for perennial species are somewhat misleading. In the monitoring program, biennial species (plant species with two-year life cycles) were counted as perennials, since they were not annuals (species that complete their life cycles within one year). Yellow sweetclover (Melilotus officinalis) is a biennial species that occurs commonly on revegetated sites throughout the western United States. This species is noted for its very distinct two-year life cycle. It produces very little aboveground biomass, and therefore little canopy cover, in the first year of its cycle and very large amounts of aboveground biomass in the second year. A large part of the increase in perennial canopy cover recorded in 1998, compared to 1997, was from sweetclover. Subsequently, the decrease in canopy cover between 1998 and 1999 was probably not the result of a decrease in canopy cover of perennials, but a decrease in the biennial sweetclover. And this sweetclover decrease was the result of its natural two-year cycle, ***and not the result of any problem with the development of the perennial plant community.***

The monitoring program did not sample canopy cover by species. It sampled by lifeform (annual or perennial). Had canopy cover been recorded by species, perennials would certainly have increased between 1998 and 1999. A similar relationship between the high 1998 cover values and sweetclover exists for the impoundment margin ouslopes.

Summary of Observations

On 18 October 1998, personnel from the State of Washington Department of Health, Western Nuclear Inc., and Shepherd Miller Inc. walked over a large portion of the impoundment cover and along a significant portion of the impoundment margin outslopes. Several observations are of importance.

1. The vegetation on the impoundment cover was composed mostly of perennial species. There was relatively little canopy cover of annuals or biennials. This indicates that the successional development of the plant community is progressing satisfactorily.
2. The ponderosa pine tree saplings were impressive. They had good trunk thickness, height, and canopy cover. There was very low mortality. These observations suggest that the redevelopment of a forest community on the site is well underway.
3. Most of the areas on the slopes that had relatively low herbaceous cover had high cover of shrubs, particularly bitterbrush. This indicates very favorable successional development. The shrubs are particularly effective in stabilizing slopes because of their extensive root systems. Therefore, from erosional stability and successional standpoints, a given percent cover of shrubs is more valuable than an equivalent amount of herbaceous perennials.

   In addition to direct erosion control, these shrubs will also function as sites for islands of stability to form. Herbaceous plants will begin to colonize around them, forming dense stands of vegetation that will gradually expand into the areas between the shrubs.

4. On some areas of the slopes, primarily the sandier sites, there has been some slumping of soil. This was expected. The very encouraging observation at these locations is that there is active colonization by perennial species. This suggests that the cover design is self-healing, relative to small-scale disturbances.

Conclusions

Our conclusions are that 1) a successionally progressive plant community has been established on the impoundment and 2) the plant communities present at the end of the 1999 growing season provide an adequate level of erosional stability. Although the target values for the impoundment cover and margin outslopes have not been met, they have almost been met. When consideration is given for sweetclover cover in 1998, Criteria 2 would be met for the impoundment cover. When consideration is given for the abundance of shrubs on the margin outslopes, the 37.6% canopy cover in 1999 probably exceeds the 39% target functionally (i.e., effectiveness in erosion control).

Table 1. Summary of vegetation monitoring data from the Sherwood Mine impoundment area 1997-99. Values are the lower tails of the 80% confidence intervals of the means for canopy cover.

	Impoundment Surface				Impoundment Margins			
Year	Perennials (all areas)	w/o Pond	[1]All Species (all areas)	w/o Pond	Perennials (all areas)	w/o QM	[2]All Species (all areas)	W/o QM
1997	8.5		12.4		4.5	4.8	11.1	11.5
1998	29.5	32.9	37.9	40.3	24.9	25.2	38.2	39.4
1999	24.0	26.8	33.8	35.8	26.1	29.6	33.7	37.6
Target	36.0		36.0		39.0		39.0	

[1] These data exclude points in the ponded area which is inherently stable without vegetation.

[2] These data exclude points on the margins where quartz monzonite bedrock exists within a foot of the surface. These areas are inherently stable without vegetation.

It is hereby requested that Washington Radioactive Materials License WN-I0133-1 be terminated. The site will be transferred to the long-term custodian and will be regulated under an NRC license in accordance with the approved LTSP. The following is a summary of all existing license conditions and brief summaries regarding how they have been satisfied or are no longer applicable.

Conditions 1 through 8: (Licensee name/address/etc.)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 9: (Authorized use)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 10: (Regulatory requirements)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 11: (Authorized place of use)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 12: (Management)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 13: (Survey instruments)
Delete. Instrumentation is not longer needed or required.

Condition No. 14: (Posting of the property)
Delete. All required posting and monuments are in place, no additional posting is required. LTSP monitoring will ensure preservation of required posting and monuments.

Condition No. 15 through 19: (Previously deleted)

Condition No. 20: (Environmental impacts)
Delete. No additional project related activities will be performed, site is transferred to long-term custodian.

Condition No. 21: (Cultural resources)
Delete. No additional project related activities will be performed, therefore no potential for impact to cultural resources. Site is transferred to long-term custodian.

Condition No. 22: (Environmental monitoring and stabilization)
Delete. All reclamation post-construction stability monitoring has been completed and criteria have been met as per the 9/24/97 MSP and License WN-I0133-1 Condition No.s 22 and 36A. The site is transferred to long-term custodian.

Condition No. 23: (Previously deleted)

Condition No. 24: (Quality assurance)
Delete. All reclamation post-construction stability monitoring has been completed, no effluents from the site exist, no QA program is needed. The site is transferred to long-term custodian.

Condition No. 25: (Previously deleted)

Condition No. 26: (Document retention)
Delete. All reclamation and monitoring requirements have been satisfied, no analyses, monitoring inspections, equipment calibration, will be performed. The site is transferred to long-term custodian.

Condition No. 27: (Previously deleted)

Condition No. 28: (Financial surety requirements)
Delete. The existing surety held by the State of Washington should be transferred to the United States Government. This sum will be supplemented by WNI so that the total surety is equivalent to $250,000 in 1986 dollars The site is transferred to long-term custodian.

Condition No. 29: (License termination)
Delete. Reclamation has been completed and all reclamation and monitoring requirements have been satisfied. The site is transferred to long-term custodian.

Condition No. 30: (Bankruptcy)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 31: (Notification)
Delete. License is terminated and site is transferred to long-term custodian.

Condition No. 32: (Previously deleted)

Condition No. 33: (Previously deleted)

Condition No. 34: (Previously deleted)

Condition No. 35: (Environmental monitoring wells)

Delete. All monitoring requirements have been satisfied. Three wells remain at the request of the long-term custodian and all monitoring requirements are covered by the LTSP and are the responsibility of the long-term custodian under the new NRC license.

Condition No. 36: (Monitoring and Stabilization Plan)

Delete. All reclamation requirements have been satisfied. License is terminated and site is transferred to long-term custodian.

Step 1: Licensee Documentation of Completed Remedial and Decommissioning Actions

1.0 INTRODUCTION

All necessary and required reclamation and decommissioning actions have been successfully completed at the Sherwood Project Uranium Mill in preparation for termination of Radioactive Materials License No. WN-I0133-1, issued by the Washington Department of Health (WDOH). All site reclamation and decommissioning actives have been performed in accordance with the requirements of WAC 246-252. In addition all requirements pertaining to 10 CFR Part 51.22 and Part 51.60 have been satisfied. This submittal documents the results of all reclamation and decommissioning actions at the Sherwood Project in conformance with the Nuclear Regulatory Commission (NRC) Office of State Programs (OSP), Procedure No. SA-900, Termination of Uranium Mill Licenses in Agreement States, Appendix B, Step 1(NRC-OSP;1999).

The reclamation and decommissioning actions at the site include:

- Mill decommissioning, demolition and disposal in the mill tailing pond and associated soils clean up and radiological verification
- Tailings pond reclamation
- Compliance with ground water protection standards
- Monitoring and documentation of reclamation performance during stability monitoring period

2.0 MILL DECOMMISSIONING AND RADIOLOGICAL VERIFICATION

Mill decommissioning, demolition, and disposal as well as clean up of radiological materials and verification testing were performed in accordance with the approved Mill Decommissioning Plan (MDP; WNI, April 27, 1992 as amended). The MDP was revised 15 times:

- Revision No. 1 was submitted on June 26, 1992 and consisted of responses to WDOH review comments concerning the original version of the Sherwood MDP. This revision was approved by WDOH on July 23,1992, and allowed WNI to proceed with Mill decommissioning.
- Revisions 2 and 3 (dated July 31, 1992 and September 23, 1992, respectively) concerned the mill site burial location. WDOH approved these revisions on January 25, 1993.
- Revision 4 (dated July 2, 1993) summarized all previous revisions and addenda. No approval by WDOH was necessary.
- Revision No. 5 (dated September 30, 1994) provided for additional decommissioning of auxiliary facilities (i.e., facilities not directly involved with ore processing) within the restricted area boundary. WDOH approved this revision on October 25, 1994, authorized WNI to proceed with this additional demolition schedule.
- Revisions No. 6 through No. 15 related to the Radiological Cleanup and Verification Program.
  - Revisions No. 6, 7, 8, 9, and 10 (submitted on October 31, 1994, February 8, 1995; March 13,1995; August 8, 1995; and September 1, 1995, respectively), all approved by the WDOH on March 22, 1995 via Amendment No 18.
  - Revision No. 11 (dated December 1, 1995), approved by the WDOH on December 15, 1995.
  - Revision No. 12 (dated January 22, 1996), approved by the WDOH on February 14, 1996.
  - Revision No. 13 (dated February 7, 1996), approved by the WDOH on April 11, 1996.
  - Revision No. 14 (dated April 3, 1996), approved by the WDOH on May 6, 1996.
  - Revision No. 15 (dated June 19, 1996), approved by the WDOH on July26, 1996.

From November of 1992 through early 1995, the mill and auxiliary facilities were demolished and all materials that could not be released for unrestricted use were disposed in the north end of the tailing pond where no tailing solids had been deposited. Reclamation of this portion of the tailing pond is described in the Sherwood Project Tailings Reclamation Plan (TRP; WNI, 1994). Completion of mill decommissioning was documented in the Sherwood Project Mill Decommissioning Construction Completion Report, which was submitted to WDOH on May 15, 1997. The WDOH concurred with the results of this report and deleted all License Conditions (License Condition No. 32) and related references (by amendment of License Condition 36A) for mill decommissioning on November 6, 1997 and were removed from the License via Amendment No. 31 on March 12, 1998.

Clean up of all radiological materials and soils above regulatory limits at the mill site were disposed in the tailing impoundment and clean up was verified in accordance with the relevant portions of the approved MDP (e.g., Radiological Verification Program; WNI, 1999 as amended). Soils clean up and verification commenced in 1995 and final verification was completed in the summer of 1996. Successful completion of the Radiological Verification Program was documented in the Sherwood Project Radiological Verification Completion Report (WNI, 1996), submitted to the WDOH on July 31, 1996. Successful completion of mill decommissioning was documented in the Sherwood Project Mill Decommissioning Construction Completion Report (WNI, 1997), which was submitted to WDOH on May 15, 1997. All aspects of mill decommissioning, including radiological verification of soils clean up, were approved and all decommissioning requirements and references were removed from the License via Amendment No. 31 on March 12, 1998.

3.0 TAILINGS RECLAMATION

Reclamation actions for the tailing pond were performed in accordance with the approved TRP (WNI, 1994 as amended). There were four subsequent revisions to the technical specifications and drawings:

- Revision No. 1, submitted to WDOH on June 12, 1996
- Revision No. 2, submitted to WDOH on September 12, 1996
- Revision No. 3, submitted to WDOH on September 18, 1996
- Revision No. 4, submitted to WDOH on November 11, 1996

All of these revisions were approved by the WDOH in one single administrative action on December 18, 1996 and incorporated into the License (Conditions No. 34 and 36A) via Amendment No. 30.

Reclamation construction began on July 7, 1995. Tailings reclamation actions included:

- Regrading of the tailing
- Placement of contaminated soils and mill materials that could not be released for unrestricted use in the tailing
- Construction of surface water diversion structures
- Removal of water and liner from the solution holding pond and disposal in the tailing pond
- Placement of the final cover
- Placement of erosion protection systems including riprap and establishment of vegetation over the reclaimed tailing

Reclamation construction was completed in November of 1996. Documentation of mill tailing reclamation was submitted to the WDOH as the Sherwood Project Tailing Reclamation Construction Completion Report on June 27, 1997. Via letter dated September 27, 1999, WDOH stated that "mill decommissioning and tailing reclamation activities at the Sherwood Project site are complete and acceptable in meeting regulatory and license requirements" and deleted all remaining license conditions relating to tailing reclamation (i.e., License Condition No. 34 and amended references in Condition No. 36A) via Amendment No 32 (September 27, 1999).

4.0 GROUND WATER COMPLIANCE

Monitoring of ground water quality has been performed at the Sherwood Project since operations began in 1978 with semi-annual data reporting. With the application for license renewal dated May 1, 1980, semi-annual reporting was required by May 1 and November 1 of each year, as incorporated in to the License via Amendment No. 5 on December 31, 1980 (License Condition No 43). WNI submitted semi-annual Environmental Monitoring Reports (sometimes called Environmental Surveillance Reports) in the first week of May and November every year from 1978 through 1987. With Amendment No. 10 on May 10, 1988 (and as corrected on October 30, 1988) reporting of environmental data, including ground water, was required annually by May 1 of the following year (License Condition No.s 25 and 26). Annual reporting of ground water monitoring data in the Annual Environmental Monitoring Reports were submitted on May 1 of each year from 1988 through 1999.

As a component of the Sherwood Project TRP, WNI developed a Ground Water Protection Plan (GWP; Appendix P to 1994 TRP) which presented the results of a comprehensive site hydrogeologic and geochemical investigation. Included in this GWP were:

- A geologic investigation of the Sherwood Project area
- A tailing impoundment investigation
- A basin hydrologic evaluation
- A ground water protection evaluation

Based on the results of the geologic, tailing and basin hydrologic investigations, the ground water protection evaluation developed compliance monitoring criteria for verifying continued ground water compliance. On December 4, 1995, WNI submitted the Sherwood Project Ground Water Protection Plan Technical Integration Report (WNI, 1995) in support of the TRP, which provided an integrated summary of the information and data provided in the GWP and the Sherwood Project Revegetation System Evaluation (RSE; WNI, 1995a). The GWP, which incorporated data and concepts developed in the RSE, was approved in conjunction with approval of the TRP on December 12, 1996.

With the deletion of environmental monitoring program requirements for ground water on December 18, 1996 via Amendment No. 30 (License Condition No. 22), WDOH accepted the results and conclusions of the Ground Water Protection Plan (GWP; Appendix P to the 1994 TRP). At that time WDOH replaced the ground water environmental requirements with the ground water monitoring system and compliance criteria developed in the GWP that were included in the Sherwood Project Monitoring and Stabilization Plan (MSP; WNI, 1996a and 1997a). In deleting the ground water environmental monitoring requirements and shifting to stabilization monitoring requirements, WDOH acknowledged that there were no ground water compliance issues at the Sherwood Project and that only confirmation of continued compliance through stability monitoring was required.

5.0 POST-CONSTRUCTION MONITORING AND STABILIZATION

On February 28, 1996 WNI submitted to WDOH the Sherwood Project MSP to provide environmental monitoring procedures and compliance criteria that verified reclamation performance. Via Amendment No. 30 (December 18, 1996; License Condition No. 22) and again with Amendment No. 31 (March 12, 1998; License Condition No. 22 and by reference, Condition No. 36A), WDOH deleted environmental monitoring requirements and required WNI to implement the MSP.

As mentioned above in Section 3.0, WDOH deleted License Condition No. 34 on September 27, 1999 via Amendment No 32 to reflect approval of all tailing reclamation activities. However, a portion of License Condition No. 34 included engineering protocol requirements needed for the MSP-post construction. Therefore, a new License Condition (License Condition No. 37) was added to the License at that time, preserving these requirements in the License.

The MSP addressed:

- monitoring media parameters frequencies;
- monitoring methodology;
- stability acceptance criteria; and
- corrective action

The revised license required continued annual reporting for ground water, vegetation and semi-annual reporting for surface stabilization.

5.1 Ground Water Monitoring

Ground water monitoring has been performed as per the MSP-post construction since 1997. Results of ground water stability monitoring performed under the MSP were reported to the WDOH on the following dates:

- April 22, 1997 (Ground Water: Verbal notification of indicator parameter values in well MW-4)

- May 20, 1997 (Ground Water: Transmitting results of confirmation sampling)
- October 22, 1997 (Ground Water: Compliance monitoring notification)
- May 1, 1998 (Annual Report for 1997)
- August 31, 1999 (Annual Report for 1998 with data from January through June of 1999)
- November 15, 1999 (Final Monitoring and Stabilization Plan Report)

Ground water monitoring results confirm that all hazardous constituents remain below applicable standards and that ground water conditions remain stable within the range expected due to seasonal variance. Therefore, ground water monitoring requirements have been satisfied and, with the exception of a one-time final confirmation sampling for hazardous constituents at license termination, all ground water monitoring has been completed. It is anticipated that this final sampling will be performed in November or December of 1999.

5.2 Structural Stability Monitoring

Structural stability monitoring prescribed by the MSP included monitoring of the following areas:

- Tailing impoundment surface cover.
- Drainage diversion channels.
- Tailings impoundment margins
- Tailings impoundment embankment
- Additional areas of disturbance.
- Surrounding drainage basin.

Structural stability monitoring was performed, as per the MSP, by a licensed professional engineer experienced with the design, construction, and performance evaluation of erosion protection practices. Reports documenting the results of semi-annual structural stability inspections were submitted semi-annually to WDOH on the following dates:

- May, 1997 (Spring 1997 Inspection Report)
- February 12, 1998 (Fall 1997 Inspection Report)
- October 6, 1998 (Spring 1998 Inspection Report)
- January 5, 1999 (Fall 1998 Inspection Report)
- June 21, 1999 (Spring 1999 Inspection Report)
- November 15, 1999 (Final Monitoring and Stabilization Plan Report)

The results of all semi-annual inspections confirmed that no corrective actions were required to maintain reclamation design stability for all elements of the reclaimed facility. The consistent results of structural stability monitoring verify that the reclaimed site is and will continue to perform as designed. Therefore, all applicable standards and requirements for reclamation structural stability performance have been satisfied.

5.3 Revegetation Monitoring

Revegetation monitoring of the tailing impoundment surface and margins was monitored because vegetative cover was an integral component effecting the reclaimed tailing impoundment erosional stability. As per the MSP, vegetation monitoring was performed by a qualified professional experienced with plant identification, vegetation sampling methodologies, and statistical evaluation of vegetation data. Monitoring was performed once annually during peak annual plant growth, typically in July. Reports documenting the results of annual vegetation monitoring have been submitted to the WDOH on the following dates:

- February 12, 1998 (1997 Vegetation Monitoring and Success Evaluation)
- October 6, 1998 (1998 Vegetation Monitoring Program)
- October 22, 1999 (1999 Vegetation Monitoring Program)
- November 15, 1999 (Final Monitoring and Stabilization Plan Report)

The relevant and necessary criteria for ensuring successful establishment of vegetation on the appropriate portions of the reclaimed tailing impoundment and margins have been satisfied.

Therefore, all reclamation and decommissioning actions at the Sherwood Project have been satisfactorily completed in accordance with all applicable regulatory requirements. All necessary and required documentation of reclamation and decommissioning action results has been presented to WDOH for approval. This documentation is identified in this submittal.

6.0 REFERENCES

Paschurnegg, Sheila. 1998. Fall 1997 Inspection Report. February 12, 1998.

1998a. Spring 1998 Inspection Report. October 6, 1998.

1999. Fall 1998 Inspection Report. January 5, 1999.

1999a. Spring 1999 Inspection Report. June 16, 1999.

1999b. Final Monitoring and Stabilization Plan Report. November 15, 1999.

NRC, 1999. Office of State Programs; Termination of Uranium Mill Licenses in Agreement States. Procedure Number: SA-900. April 20, 1999

WDOH, 1999. Letter from Gary Robertson (WDOH) to WNI. September 27, 1999.

WNI, 1992. Sherwood Mill Decommissioning Plan. April 27, 1992

1993. 1992 Annual Environmental Monitoring Report. May 3, 1993.

1994. 1993 Annual Environmental Monitoring Report. May 2, 1994.

1994a. Sherwood Project Radiological Verification Program. October 31, 1994.

1994b. Sherwood Project Tailings Reclamation Plan. December 22, 1994

1995. Sherwood Project Ground Water Protection Plan Technical Integration Report. December 4, 1995.

1995a. Sherwood Project Revegetation System Evaluation. September 15, 1995.

1996. Sherwood Project Radiological Verification Completion Report. July 31, 1996.

1996a. Sherwood Project Monitoring and Stabilization Plan. February, 1996.

1997. Sherwood Project Mill Decommissioning Construction Completion Report. May 15, 1997.

1997a. Sherwood Project Monitoring and Stabilization Plan. September 24, 1997.

1998. 1997 Vegetation Monitoring and Success Evaluation. February 12, 1998.

1998a. 1998 Vegetation Monitoring Program. October 6, 1998.

1999b. 1999 Vegetation Monitoring Program. October 22, 1999.

1999c. Final Monitoring and Stabilization Plan Report. November 15, 1999.

The following outlines the termination process steps for termination of uranium mill licenses in Agreement States according to the NRC Office of State Programs (NRC-OSP; 4/20/99. SA-900, Appendix B).

1. **Step 1: Licensee Documentation of Completed Remedial and Decommissioning Actions.** This step is completed and is presented in Tab 5 of this submittal

2. **Step 2: Review of Completed Closure Actions by the Agreement State.** Step 2 in the guidance document requires the State to document their review and concurrence that all remedial actions are complete and submit this documentation to the NRC for concurrence. This needs to be updated to include the MSP Completion Report review.

3. **Step 3: Long-Term Surveillance Funding.** Step 3 from the guidance requires the State, in consultation with the DOE, to determine the amount of the LTSP. The final LTSP fund should be $250,000 in 1978 dollars which is estimated to be $627,400 as of February 2000. In addition, WDOH should prepare for transfer of the current fund that it is holding to the US Government. When WDOH has determined the amount in the current fund which will be transferred to the US Government, the amount that WNI will need to provide will be know.

4. **Step 4: Preparation of the Long-Term Surveillance Plan (LTSP).** Step 4 is the preparation of the LTSP. DOE has completed the LTSP and will transmit it to the NRC for review by the end of November or early December, 1999. The LTSP will be reviewed by the NRC – see Step 7 below.

5. **Step 5: Site Ready for License Termination.** Step 5 is a formal notification that the site is ready for license termination. This has been done as part of Step 1.

6. **Step 6: Termination of the Specific License.** Step 6 is the NRC review of the State documentation, which is completed in Step 2. The NRC review consists of their review of the State Completion Review Report as well as determination that the state program is in good standing

7. **Step 7: Termination of the Specific License/Issuance of the General License.** Step 7 has several parts. The first is the NRC approval of the LTSP. The second step is the formal transfer of all LTSP funds to the US Government. The last part is for the DOE to accept the license for the site.

WESTERN NUCLEAR, INC SHERWOOD PROJECT SUPPLEMENTAL ENVIRONMENTAL REPORT

This Supplemental Environmental Report (SER) is provided in anticipation of license termination for the Western Nuclear, Inc. (WNI) Sherwood Project Radioactive Materials License I0133-1 issued by the Washington Department of Health (WDOH). This report satisfies the requirements of WAC 246-252-030, Criterion 9. WNI has completed all reclamation and closure requirements for the Sherwood Project uranium mill and tailing facilities and, pending approval of the Monitoring and Stabilization Plan Completion Report (submitted 11/15/99), NRC concurrence with the WDOH Technical Evaluation Report (TER) and NRC approval of the Long Term Surveillance Plan (LTSP) developed by the US Department of Energy (DOE), requests that all license conditions be deleted and the license be transferred to the long-term custodian (DOE).

The site decommissioning and reclamation objectives included providing for the protection of public health, safety and the environment from potential hazards associated with byproduct material using approved methods and reducing concentrations to as low as reasonably achievable (ALARA) considering practicable alternatives.

Most of the licensing actions over the operational life of the Sherwood Project and during the course of reclamation were eligible for categorical exclusion from environmental review requirements. These exclusions were justified pursuant to the criteria for categorical exclusion in 10 CFR Part 51.22(c)(11). Most of these licensing actions were eligible for categorical exclusion because: (i) there was no significant change in the types or significant increase in the amounts of any effluent that may be released offsite; (ii) there was no significant increase in the individual or cumulative occupational radiation exposure; (iii) there was no significant construction impact, and (iv) there was no significant increase in the potential for, or consequences from, radiological accidents.

In addition, for most of the Site reclamation activities incorporated as requirements into the license via specific amendment, environmental reports (ER), as required by 10 CFR

Part 51.60(b)(2) were not required. This is consistent with the role of reclamation and closure activities in reducing site discharges, effluents and exposures and providing increased levels of protection of public health, safety and the environment.

The principle environmental documents developed to date are:

- Environmental Assessment: Sherwood Uranium Project, Steven County, WA, May 22, 1974
- Final Environmental Statement, Sherwood Uranium Project, Spokane Indian Reservation, 1976. U.S. Department of the Interior, Bureau of Indian Affairs. Portland Washington.
- Submittal of SEPA checklist to WDOH by WNI, March 24, 1988, in support of license renewal application.
- SEPA determination of Non-significance for WNI Sherwood Project License Renewal, March 30, 1988
- SEPA determination of Non-significance for WNI Sherwood Project uranium mill tailing reclamation and site closure (Phase I), June 11, 1992.
- Sherwood Project Environmental Report and SEPA Checklist, 1994. Shepherd Miller, Inc. December 1994, as required by WDOH for all Washington licensees.
- SEPA determination of Non-significance for WNI Sherwood Project uranium mill tailing reclamation and site closure (Phase II), September 21, 1995.

In addition, several plans and reports have been developed in the course of operations and reclamation that address the relative environmental impacts associated with site actions. These plans and reports include:

- Sherwood Project Mill Decommissioning Plan, 1992. Western Nuclear, Inc. April 27, 1992.
- Sherwood Project Mill Decommissioning Plan, Revisions #6, Addendum, Radiological Verification Program, 1994. Shepherd Miller, Inc. October 31, 1994.

- Sherwood Project Tailing Reclamation Plan; Vols. 1-7, 1994. Shepherd Miller, Inc. December 1994.
- Sherwood Project Radiological Verification Completion Report, 1996. Shepherd Miller, Inc. July 1996.
- Sherwood Project Mill Decommissioning Construction Completion Report, 1997. Shepherd Miller, Inc., May 1997.
- Sherwood Project Tailing Reclamation Construction Completion Report, 1997. Shepherd Miller, Inc., June 1997.
- Sherwood Project Monitoring and Stabilization Plan, 1998. Shepherd Miller, Inc. April 1998.
- Sherwood Project Monitoring and Stabilization Plan Completion Report, 1999. Shepherd Miller, Inc. November, 1999.

These documents fulfill all environmental reporting requirements associated with operation and closure of the Sherwood Project uranium mill and mill tailings facility, as required by WAC 246-252-030, Criterion 9 and as required by 10 CFR Part 51.22 and Part 51.60. As per NRC Guidance to the NRC Staff on The License Termination Process for Conventional Uranium Mill Licensees (NRC, 1998) "because the environmental impacts associated with reclamation and decommissioning of a uranium mill site will already have been assessed by the NRC [or Agreement State] staff prior to license termination, licensees seeking license termination can submit a supplemental ER summarizing site decommissioning and reclamation objectives, activities, and results.". This submittal satisfies this requirement.

These documents describe the historic site actions, the environment potentially affected, appropriate alternatives to those actions and analyses of those alternatives. These documents demonstrate that all applicable environmental quality standards have been met at the Sherwood Project. There are no impacts to the environment associated with the proposed action of license termination and transfer to the long-term custodian.

Therefore, it is requested that WDOH, once it has accepted and approved the Monitoring and Stabilization Plan Completion Report, delete all license conditions and initiate the processes of transferring the license to the long-term custodian. It is understood that the Nuclear Regulatory Commission (NRC) must approve the Long-Term Surveillance Plan (LTSP) developed by the long-term custodian before license transfer can be completed.

DISPOSITION OF RADIOACTIVE MATERIAL CERTIFICATE

LICENSEE (Institution, Firm, Hospital, Person, etc.)

WESTERN NUCLEAR, INC.
P.O. BOX 358
WELLPINIT, WA 99040

LICENSE NUMBER: WN-
WN-I0133-1

LICENSE EXPIRATION DATE:
UPON LICENSE TERMINATION

ADDRESS(ES) Where radioactive material has been used (if same as above, write 'SAME')

SAME

INDIVIDUAL RADIOACTIVE MATERIAL USER(S)

CERTIFICATION
THE LICENSEE AND ANY INDIVIDUAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE LICENSEE CERTIFY THAT
(check appropriate item(s) below):

NO RADIOACTIVE MATERIAL HAS BEEN PROCURED AND/OR POSSESSED BY LICENSEE.

OR

ALL RADIOACTIVE MATERIAL (as listed below) PROCURED AND/OR POSSESSED UNDER YOUR RADIOACTIVE MATERIAL LICENSE HAS BEEN:

XXX DISPOSED AS 11e(2) BYPRODUCT MATERIAL IN THE URANIUM MILL TAILINGS DISPOSAL AREA
TRANSFERRED (state to whom transferred, their address, phone number, radioactive material license number and issuing agency)
DISPOSED AS LOW-LEVEL WASTE

LIST SEALED SOURCE(S) SEPARATELY, INCLUDING MODELS AND SERIAL NUMBERS.

RADIOACTIVE MATERIAL	FORM	HOW DISPOSED OR TO WHOM TRANSFERRED

SIGNATURE OF CERTIFYING OFFICIAL

DATE 11/3/98

PRINTED OR TYPED NAME OF OFFICIAL AND TITLE:
LARRY J. CORTE, MANAGER, WESTERN NUCLEAR, INC.