

Elk County Water District  
P.O. Box 54  
Elk, California 95432  
Charles Acker, Manager  
Phone: 707-877-3474  
Fax: 707-877-1833  
[cacker@mcn.org](mailto:cacker@mcn.org)

Matt St. John  
5550 Skylane Blvd., Suite A  
Santa Rosa, CA 95403

May 10, 2001

re: Water Quality Information  
Greenwood Creek

Dear Mr. St. John:

The data we are providing in this report is in reference to the water quality of Greenwood Creek. Greenwood Creek is the main water supply source for the Elk County Water District, serving a population of approximately 100 people and about 15 businesses. The district has been tracking water quality as required under state water treatment guidelines as well as the turbidity of the creek itself. The main data in this package pertains to turbidity measured in the creek, the nearby wells, and after filtration. The data provided has been collected on a daily basis since 1993.

The water quality crisis from the district's point of view has to do with turbidity, siltation, and erosion from flooding.

The Greenwood Creek watershed is over 15,000 acres and is primarily forest lands. Logging has occurred since before the turn of the century and has continued at an accelerated rate in the past decades. With little emphasis given to the cumulative effects of timber harvesting, the issue of water quality degradation presents a problem for the district.

The water quality problem became a crisis in 1998 during the "El Nino" flood conditions when erosion caused the stream bank next to the district's wells to shift. The shifting bank and the flood-waters containing high turbidity entered, for the first time, into the main well which resulted in a "Boil Water Order." Since the 1998 floods were a declared disaster, state and federal funding has been provided so the district can remedy the situation.

While elevated siltation levels due to timber operations and other activities has been a long and hotly debated issue, we have here a specific, documented case where water quality was degraded. Erosion and high turbidity during rain events may indicate

we have a degraded watershed. Not only are fish populations affected, but people as well.

I am sorry we are unable to provide this information in electronic form.

Sincerely,



Charles Acker, ECWD Manager

- Name listed above ✓
- Address, etc. included ✓
- Two copies included ✓
- Bibliographic info. as appropriate ✓

*All data has been generated from Elk County Water District reports filed with the Dept. of Health Services, Santa Rosa office and FEMA/OES disaster grants.*

- No computer model available ✓
- Data not available electronically ✓
- Water quality assurance procedures. ✓

*The district monitors timber and development issues within the watershed. A source protection ordinance is in the draft stage. A Sanitary Survey of watershed is in process.*

- Metadata from field. ✓

*Samples are taken during routine daily measurements. Turbidity is measured at the well site under the Highway One at Greenwood Creek.*

- Training in water quality. ✓

*Personnel taking samples are trained and licensed water treatment operators including:*

*Charles Acker, Grade 2 Water Treatment Operator, Department of Health Services,  
Steven Acker, Grade 2 Water Treatment Operator, Department of Health Services,  
Ron Bloomquist, Grade 1 Water Treatment Operator, Department of Health Services.*

**BRELJE & RACE**  
CONSULTING CIVIL ENGINEERS

September 8, 1998

Charles Acker, Manager  
Elk County Water District  
P.O. Box 54  
Elk, CA 95432

**Subject: 1998 "El Nino" Storm Damage  
B&R File No. 2189**

Dear Mr. Acker:

Erosion damage caused by the 1998 "El Nino" storms have affected the water supply of the Elk County Water District (District). The following is a summary of observations, discussions and recommendations.

During my recent review of the District's water system for the preparation of a Master Water Plan, I observed stream bank erosion in Greenwood Creek adjacent to the District's water supply wells. Prior to the stream bank erosion, Well #2, the District's sole winter water supply, provided water that was treated to the health standards and requirements of the State Department of Health Services (DOHS), the state agency that enforces state and federal water quality requirements. Following stream bank erosion, the turbidity of Well #2 increased to levels that could not be treated to DOHS requirements with the District's existing water treatment system. This increase in turbidity occurred in late March and resulted in the issuance of a "Boil Water Order" as required by the DOHS.

Stream bank erosion in Greenwood Creek due to storm damage is the likely cause of the turbidity problem. Prior to this winter, the turbidity levels from Well #2 were low enough to permit the existing water treatment system to produce water meeting DOHS standards. It is apparent that natural filtration that had been occurring between Greenwood Creek and Well #2 was affected by the storm damage.

Since Well #2 is the District's only winter water source, stream bank damage should be repaired to prevent further erosion and increases in turbidity. Unfortunately, it is unlikely that stream bank repairs will restore the natural filtration that previously occurred.

Charles Acker, Manager  
Page 2  
September 8, 1998

In order to restore the quality of the District's winter water supply to the state and federal standards enforced by the DOHS, the installation of treatment facilities is necessary to treat the higher turbidity water now being pumped from Well #2. Microfiltration units are known to provide treatment to DOHS standards at all turbidity levels and are recommended as the best long-term alternative. The estimated cost of microfiltration and related facilities is \$256,000.

The installation of new wells further from Greenwood Creek and drawing water from a deeper aquifer could provide water that would not require the installation of treatment facilities. However, there are no guarantees that new wells could be found and developed that meet both the water quality and quantity needs of the District on a long-term basis.

If you have any questions or would like more information, kindly advise.

Very truly yours,

BRELJE & RACE

  
Thomas K. Yokoi

cc: Ross Mayfield

<b>FEDERAL EMERGENCY MANAGEMENT AGENCY DAMAGE SURVEY REPORT - DATA SHEET</b>	1. DECLARATION NO. FEMA-1203-DR-CA	2. DSR NO. 01451	SUPP TO DSR NO.
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**PART I - PROJECT DESCRIPTION**

APPLICANT NAME/COUNTY ELK COUNTY WATER DISTRICT MENDOCINO		3. PA IDENTIFICATION NO. 045-91000	
10. PROJECT TITLE TURBIDITY IN WELL WATER		4. INSPECTION DATE 11/24/98	5. PROJECT NO. 699
11. DAMAGED FACILITY WELLS NOS 2 AND 3 - GREENWOOD CREEK		6. % COMPLETE 0	7. WORK ACCOM BY C
12. FACILITY LOCATION BELOW HWY 1 BRIDGE SOUTH OF ELK CA		8. FINAL DSR YES <input type="checkbox"/>	9. CATEGORY F

13. DAMAGE DIMENSIONS/DESCRIPTION/SCOPE OF ELIGIBLE WORK  
 DIMENSIONS:  
 DESCRIPTION/SCOPE: HIGH WATER AND HEAVY FLOW IN A CREEK BED CAUSED DAMAGE TO THE NATURAL FILTRATION FOR A WELL LOCATED ON THE STREAM BANK, RESULTING IN HIGH TURBIDITY FOR THE WATER FROM THE WELL. THE STATE (OVER)

14. INSP NO. 9302	15. NAME OF FEDERAL INSPECTOR (Print) E. CHITWOOD	16. AGENCY CODE FEMA	RECOMMENDATION <input checked="" type="radio"/> Y <input type="radio"/> N	ATTACHMENTS 12
18. INSP NO.	NAME OF STATE INSPECTOR (Print)	AGENCY CODE	RECOMMENDATION Y <input type="radio"/> N	ATTACHMENTS
19. NAME OF LOCAL REPRESENTATIVE (Print) Charles Acker			CONCUR <input checked="" type="radio"/> Y <input type="radio"/> N	ATTACHMENTS

**PART II - ESTIMATED COST OF PROPOSED WORK**

ITEM	CODE	MATERIAL AND/OR DESCRIPTION (a)	UNIT OF MEAS (b)	QUANTITY (c)	UNIT PRICE (d)	COST (e)
1	0	N39.12580 W/23.71116				
2	9999	SITE CLEARING	LS	1		4550.00
3	9999	DEONE CONTACT TANK	LS	1		18200.00
4	9999	POLYMER REACTION TANK	LS	1		13650.00
5	9999	PRESSURE FILTER	LS	1		18200.00
6	9999	PIPING MODIFICATION	LS	1		13650.00
7	9999	FILTER, CHEMICAL 1254	LS	1		18200.00
8		(CONTD)				

20. EXISTING INSURANCE TYPE - F: \$ G: \$	21. TOTAL \$ 105105
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**PART III - FLOODPLAIN MANAGEMENT/HAZARD MITIGATION REVIEW**

22. IN OR AFFECTS FLOODPLAIN OR WETLAND F W N	23. FLOODPLAIN LOC 1 2 3 4 5	24. % DAMAGE 1 2 3 4	25. DISASTER HISTORY Y N U	26. LAND USE U1 2 3 4 D1 2 3 4	27. FPM REC 1 2 3 4 5 6 7
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**PART IV - FOR FEMA USE ONLY**

28. AMOUNT ELIG \$	29. ELIGIBLE Y N S V	30. SPECIAL CONSIDERATIONS	31. FLOODPLAIN REVIEW NO.	32. WORKSITE NO.
33. INSURANCE COMMITMENT REQUIRED F. Building: \$ Content: \$ G. Building: \$ Content: \$		34. DURATION (Years) F. B. G. P. C. C.		

35. COMMENTS/CHANGES

FIRST REVIEW (Signature)	DATE	SECOND REVIEW (Signature)	DATE
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## Elk County Water District

P. O. Box 54  
Elk, Calif. 95432

### THE EFFECT OF FLOODING ON ECWD WELLS

The recent storms (January 8 & 9, 1995) gave an example of how Elk's wells and water treatment system react in stormy, high runoff conditions.

The intense rainy period raised the turbidity level in Greenwood Creek to over 1000 ntu for a period of about a day. The turbidity level dropped off after the peak flows from the storm, but still remain high enough that Well #1 cannot be used.

Well #1 is fairly close to the edge of the creek bank, and is directly influenced by the quality (turbidity) of the creek water. This well was originally about 100 feet away from the creek bank, but major storms of 1983 and 1986 eroded much of the bank resulting in elevated turbidity levels in well number one when the creek turbidity is up.

A second well was drilled in October 1984. This well, Well #2, is about 100' from the existing stream bank. The elevation of turbidity levels in Greenwood Creek may be showing a minor correlation in Well #2. Well #2 has a naturally high iron content, which presents a treatment problem. The removal of the iron has been accomplished by installing an advanced treatment system utilizing ozone and sand/anthracite filtration. Dissolved iron becomes oxidized and makes the water cloudy, but is fairly easy to filter out. Turbidity from suspended clay particles (erosion) is much harder to remove. Beyond a low level, the clay particles defeat the current filtration process.

The January 1995 storms affected the water quality in Elk's water somewhat. Additionally, the power outage also had a negative effect. Electricity went out to the treatment plant causing the operations to use a hand chlorination method, which, without the filter pumps, caused the water to get cloudy from iron oxide for a day or so.

There was increased erosion along the stream banks adjacent to the wells from the high flow in the creek. A gabion wall (rock filled baskets) was built in 1987 to protect the stream bank near the wells. The wall has remained in place, but there is erosion both upstream and down stream from the wall. If the erosion is allowed to get worse, it may eventually erode the stream bank enough to reduce the winter water quality in Well #2.

The ECWD is mandated to deliver water quality meeting state and federal standards. Up stream development continues to affect Elk's ability to provide good quality water in that increased flows (from excessive removal of vegetation) causes more erosion and increased turbidity levels that can eventually defeat the treatment process. This could result in a negative public health effect as well as a negative economic effect.

Charles Acker, Manager, ECWD 1-25-95

Elk County Water District  
P.O. Box 54  
Elk, California 95432

December 1, 1998

Explanation of El Nino (Disaster 1203) influence on water quality for the ECWD system:

On March 25, 1998, a Boil Water Order was issued to the residents of Elk. The cause of this incident has a direct correlation to the flooding that was occurring at the time, and the stream bank erosion the flooding caused.

ECWD operates two shallow wells adjacent to Greenwood Creek (Well #1 and Well #2). Well #1 is closer to Greenwood Creek and is surface water influenced. Well #2 is further away from Greenwood Creek and has not been surface water influenced until March of 1998.

Well#1 is used most of the time with good results, except during flood periods, because it has lower iron and manganese levels. During flood periods, Well #2 is used because it had not been flood influenced.

ECWD has had to deal with elevated levels of iron and manganese, particularly from Well #2, but surface water turbidity (from suspended clay particles) had never been a problem until March 1998. Turbidity from surface water needs more advanced treatment than the removal of just iron and manganese has required.

When the El Nino floods eroded the streambank near Well #2, the natural barrier between the surface water and the ground water began to be compromised, allowing surface water to enter the well for the first time. The elevated turbidity levels were not sufficiently treatable by the existing iron and manganese treatment, the turbidity levels in the finished (filtered) water increased, and the Boil Order was issued.

ECWD maintenance personnel tried to resolve the turbidity problem by changing the filter media, a procedure they had previous success with when dealing with iron and manganese problems. The problem was not fully resolved by the filter maintenance alone this time because the problem turned out to be the surface water turbidity entering Well #2.

By adding polymer, first at the well and later near the filters, the initial problem was temporarily resolved. Additionally, the surface water quality improved during the same period, reducing the hazard.

*The system is still vulnerable when further flooding raises the water levels and turbidity levels again.* The addition of polymer is only a temporary solution not fully effective for high turbidity situations. Our engineer at Brelje and Race in Santa Rosa has recommended "micro-filtration" as the best method for safe water in all turbidity situations and has submitted a proposal.

Charles Acker, Manager, ECWD



Elk County Water District  
 Turbidity Levels July 1993 to October 1998  
 Monthly Averages in NTU

<u>1993</u>	<u>Wells</u>	<u>Filter effluent</u>	
July	2.0	.46	
Aug	2.8	.44	
Sept	.35	.44	
Oct	.79	.41	
Nov	.78	.37	
Dec	1.5	.46	
1994			
Jan	.85	.42	
Feb	.92	.47	
Mar	.65	.47	
Apr	.85	.43	
May	.85	.42	
June	1.28	.40	
July	5.93	.31	
Aug	7.25	.35	
Sept	8.8	.30	
Oct	9.06	.27	
Nov	1.47	.38	
Dec	4.52	1.5	*3 high NTU incidents / iron oxide
1995			
Jan	6.42	.61	*treatment interruptions/ high iron oxide
Feb	9.14	.61	
March	11.6	.50	
Apr	13.49	.47	
May	8.46	.40	
June	8.3	.40	
July	6.42	.46	
Aug	5.2	.38	
Sept	8.5	.41	
Oct	8.01	.46	
Nov	8.5	.35	
Dec	13.5	.39	
1996			
Jan	19.5	.45	
Feb	18.5	.47	
Mar	22	.44	
Apr	18	1.38	*filter breakout 7 days
May	12.3	.75	*Iron oxide turbidity



June	4.19	.93	*Filter media changed
July	6.9	.45	
Aug	6.85	.46	
Sept	6.75	.53	
Oct	8.94	.48	
Nov	6.82	.47	
Dec	13.85	.52	
1997			
Jan	13.0	.48	
Feb	9.21	.48	
March	19.5	.41	
Apr	12.0	.46	
May	6.5	.48	
June	3.2	.48	
July	4.5	.48	
Aug	4.2	.46	
Sept	5.5	.52	
Oct	5.9	.48	
Nov	10.1	.48	
Dec	10.5	.56	
1998			
Jan	15.5	.52	
Feb	20.3	.44	
Mar	17.3	1.43	*Boil order 3/24/98 -see Monthly Reports
April	10.18	1.27	*Added polymer treatment 4/15/98
May	1.97	.39	
June	5.0	.49	
July	6.85	.38	
Aug	6.5	.40	
Sept	3.63	.38	
Oct	7.55	.37	

# Elk County Water District

AS OF March 25, 1998

**FAILURE TO FOLLOW THIS ADVISORY COULD  
RESULT IN STOMACH OR INTESTINAL ILLNESS.**

## **BOIL WATER ORDER**

*For residents within the ECWD District*

**DUE TO A FILTRATION MALFUNCTION, THE ELK COUNTY WATER DISTRICT, IN CONJUNCTION WITH THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES, IS ADVISING RESIDENTS OF ELK TO USE BOILED TAP WATER OR BOTTLED WATER FOR DRINKING AND COOKING PURPOSES AS A SAFETY PRECAUTION UNTIL FURTHER NOTICE.**

**ALL TAP WATER USED FOR DRINKING AND COOKING SHOULD BE BOILED RAPIDLY FOR AT LEAST 5 MINUTES TO ASSURE THAT THE WATER IS SAFE TO DRINK.**

Background information:

The Elk County Water District has two shallow wells adjacent to Greenwood Creek. During the winter months, runoff from rains causes the turbidity in Greenwood Creek to rise. ECWD's Well #1 located adjacent to the creek is not used during the winter because of high turbidity (cloudiness) in the water. The Well #2, located further from Greenwood Creek and therefore less influenced by surface water is therefore now in use. Well #2 has a high level of iron which is oxidized and filtered out of the water. There has been a recent failure of the filter to adequately remove the oxidized iron, causing the treated water to get cloudy (turbid). There may also be some influence by surface water into the well.

In order to be in compliance with the Surface Water Treatment Rule, the Department of Health Services has ordered us to issue this Boil Water Order and to repair and revise our treatment system to comply with the Surface Water Treatment Rule. This Boil Order will remain in affect until the problem is corrected.

Elk County Water District Contact;  
Department of Health Services, Santa Rosa

Charles Acker, Manager 877-3474  
Martin Ross: 576-2730

**MONTHLY REPORT  
SURFACE WATER TREATMENT REGULATIONS**

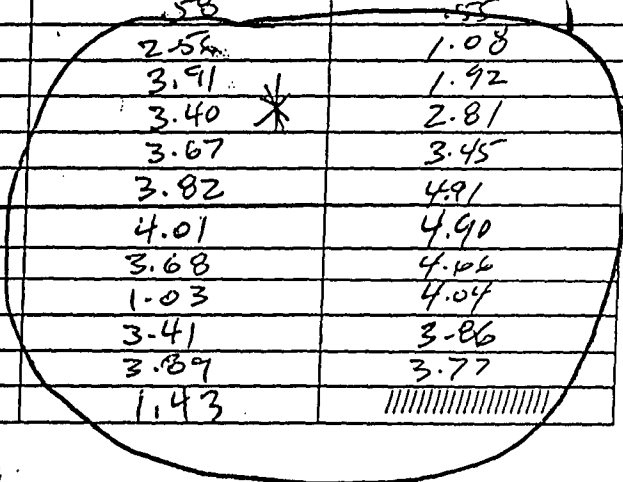
System Name: Elk County Water District System Number: 2300514

Treatment Plant Name: Well #2 Month: MAR Year: 98

Daily Grab Sample Turbidities (NTU)

Date	Creek	Well # <u>2</u>	Filter	Distribution
1	23.0	31.0	.43	.42
2	21.3	32.2	.49	.41
3	16.2	30.4	.55	.47
4	22.3	22.3	.54	.49
5	19.7	26.3	.60	.50
6	17.2	17.2	.58	.52
7	12.8	14.5	.51	.51
8	13.0	16.3	.49	.50
9	12.8	15.7	.52	.48
10	12.1	OFF	.48	.49
11	11.4	2.89	.49	.52
12	24.7	4.02	.50	.51
13	20.3	3.16	.47	.48
14	42.2	9.88	.58	.50
15	44.2	15.5	.49	.49
16	37.8	OFF	.48	.48
17	29.7	10.3	.51	.50
18	24.3	11.1	.62	.53
19	19.7	13.9	.54	.57
20	22.1	12.4	.63	.56
21	11.3	12.8	.58	.55
22	89.8	13.2	2.56	1.08
23	97.1	13.4	3.91	1.92
24	113	22.8	3.40 *	2.81
25	44.3	22.3	3.67	3.45
26	38.7	21.8	3.82	4.91
27	44.3	23.0	4.01	4.90
28	33.1	21.4	3.68	4.06
29	30.7	21.7	1.03	4.04
30	27.8	OFF	3.41	3.86
31	316.0	24.1	3.89	3.77
Averages	//////	17.3	1.43	//////

Elevated turbidity levels



Incidents of turbidity greater than 1.0 NTU: YES! * DAS NOTIFIED 3/24			
Martin Ross notified @ DAS		Boil Order out 3/25	
Date of Incident	3/22	→	3/31
Value	2.56	→	3.41
Duration	10 DAYS IN MARCH continued into April		

**MONTHLY REPORT  
SURFACE WATER TREATMENT REGULATIONS**

System Name: Elk County Water District System Number: 2300514

Treatment Plant Name: Wells 2 & 1 Month: APR Year: 98

Daily Grab Sample Turbidities (NTU)

Date	Creek	Well # <u>2/4</u>	Filter	Distribution
1	270	19.6	OFF	3.85
2	170	18.7	OFF	3.82
3	121	19.3	3.03	3.73
4	31.9	25.5	3.13	3.81
5	23.6	27.3/5.26	3.10	3.71
6	25.1	18.5	2.10	3.62
7	22.7	17.9	2.59	3.82
8	<sup>RA</sup> 23.4	OFF	- OFF-	3.54
9	21.7	5.7	- OFF-	3.71
10	<sup>RAIN</sup> 24.4	15.85	2.72	3.48
11	18.9	20.3	2.87	3.19
12	17.8	12.2	2.81	3.01
13	25.9	20.1	1.67	2.55
14	24.1	16.8	1.82	2.60
15	21.7	<sup>WELL#1: 5.66</sup>	1.54	2.09
16	19.1	1.35	.31	1.20
17	15.5	-	.27	.99
18	15.3	-	.32	1.05
19	14.9	3.09	.44	1.87
20	14.4	-	.49	.86
21	12.9	2.29	.37	.83
22	12.1	OFF	.30	.80
23	<sup>RAIN</sup> 11.7	2.61	.32	.63
24	12.3	1.64	.28	.56
25	8.91	2.08	.45	.52
26	7.27	OFF	.36	.51
27	6.94	2.37	.52	.57
28	6.87	2.54	.51	.40
29	6.77	2.47	.54	.43
30	5.77	2.04	.50	.39
31				
Averages		10.18	1.27	

Polymer added

\*

Switched to well #1 - ADDED polymer 1/mg/l 4/15/98

Incidents of turbidity greater than 1.0 NTU: <u>15 DAYS</u> continuing during "Boil Order"			
Date of Incident	<u>4/3 to 4/15</u>		
Value	<u>1.5 - 3.1</u>		
Duration	<u>15 DAYS</u>		

**BRELJE & RACE**  
CONSULTING CIVIL ENGINEERS

October 15, 1998

Charles Acker, Manager  
Elk County Water District  
P.O. Box 54  
Elk, CA 95432

**Subject: 1998 "El Nino" Storm Damage  
B&R File No. 2189**

Dear Mr. Acker:

Erosion damage caused by the 1998 "El Nino" storms have affected the water supply of the Elk County Water District (District). The following is a summary of observations, discussions and recommendations.

During my recent review of the District's water system for the preparation of a Master Water Plan, I observed stream bank erosion in Greenwood Creek adjacent to the District's water supply wells. Prior to the stream bank erosion, Well #2, the District's sole winter water supply, provided water that was treated to the health standards and requirements of the State Department of Health Services (DOHS), the state agency that enforces state and federal water quality requirements. Following stream bank erosion, the turbidity of Well #2 increased to levels that could not be treated to DOHS requirements with the District's existing water treatment system. This increase in turbidity occurred in late March and resulted in the issuance of a "Boil Water Order" as required by the DOHS.

Stream bank erosion in Greenwood Creek due to storm damage is the likely cause of the turbidity problem. Prior to this winter, the turbidity levels from Well #2 were low enough to permit the existing water treatment system to produce water meeting DOHS standards. It is apparent that natural filtration that had been occurring between Greenwood Creek and Well #2 was affected by the storm damage.

Since Well #2 is the District's only winter water source, stream bank damage should be repaired to prevent further erosion and increases in turbidity. Unfortunately, it is unlikely that stream bank repairs will restore the natural filtration that previously occurred.

In order to restore the quality of the District's winter water supply to the state and federal standards enforced by the DOHS, the installation of treatment facilities is necessary to treat the higher turbidity water now being pumped from Well #2. Modifications to the existing water treatment facilities or the installation of microfiltration units are possible solutions.

With some modifications, the existing water treatment facilities should be able to comply with surface water treatment requirements most of the time. However, there would be a risk of violating DOHS treatment standards since it is not known if the resulting facilities would be able to fully comply with surface water treatment requirements under extremely high and rapidly changing turbidities situations. The preliminary estimated cost of improving the existing

Charles Acker, Manager

Page 2

November 24, 1998

treatment facilities is \$136,500, including a 30% allowance for contingencies, engineering and miscellaneous costs. A cost breakdown follows:

Site Clearing, Grubbing & Grading	\$6,500
New Ozone Contact Tank	26,000
Polymer Reaction Tank	19,500
Pressure Filter Addition	26,000
Piping Modifications & Additions	19,500
Filter, Chemical & Control Building	26,000
Electrical & Control Improvements	<u>13,000</u>
Total	\$136,500

Microfiltration is a new technology that is very reliable for treating surface water with high and rapidly changing turbidities. The State Department of Health Services (DOHS) recognizes the reliability benefits of microfiltration and allows the installation of microfiltration facilities without the pilot study proof of its effectiveness, which is required of other new technology processes. The preliminary estimated cost of microfiltration and related facilities is \$256,000. This cost includes a 30% allowance for contingencies, engineering and miscellaneous costs. A cost breakdown follows:

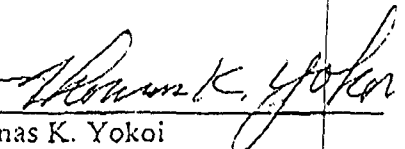
Site Clearing, Grubbing & Grading	\$6,500
New Ozone Contact Tank	26,000
Microfiltration Unit & Appurtenances	165,000
Piping Modifications & Additions	16,900
Chemical & Control Building	26,000
Electrical & Control Improvements	<u>15,600</u>
Total	\$256,000

The installation of new wells further from Greenwood Creek and drawing water from a deeper aquifer could provide water that would not require the installation of treatment facilities. However, there are no guarantees that new wells could be found and developed that meet both the water quality and quantity needs of the District on a long-term basis.

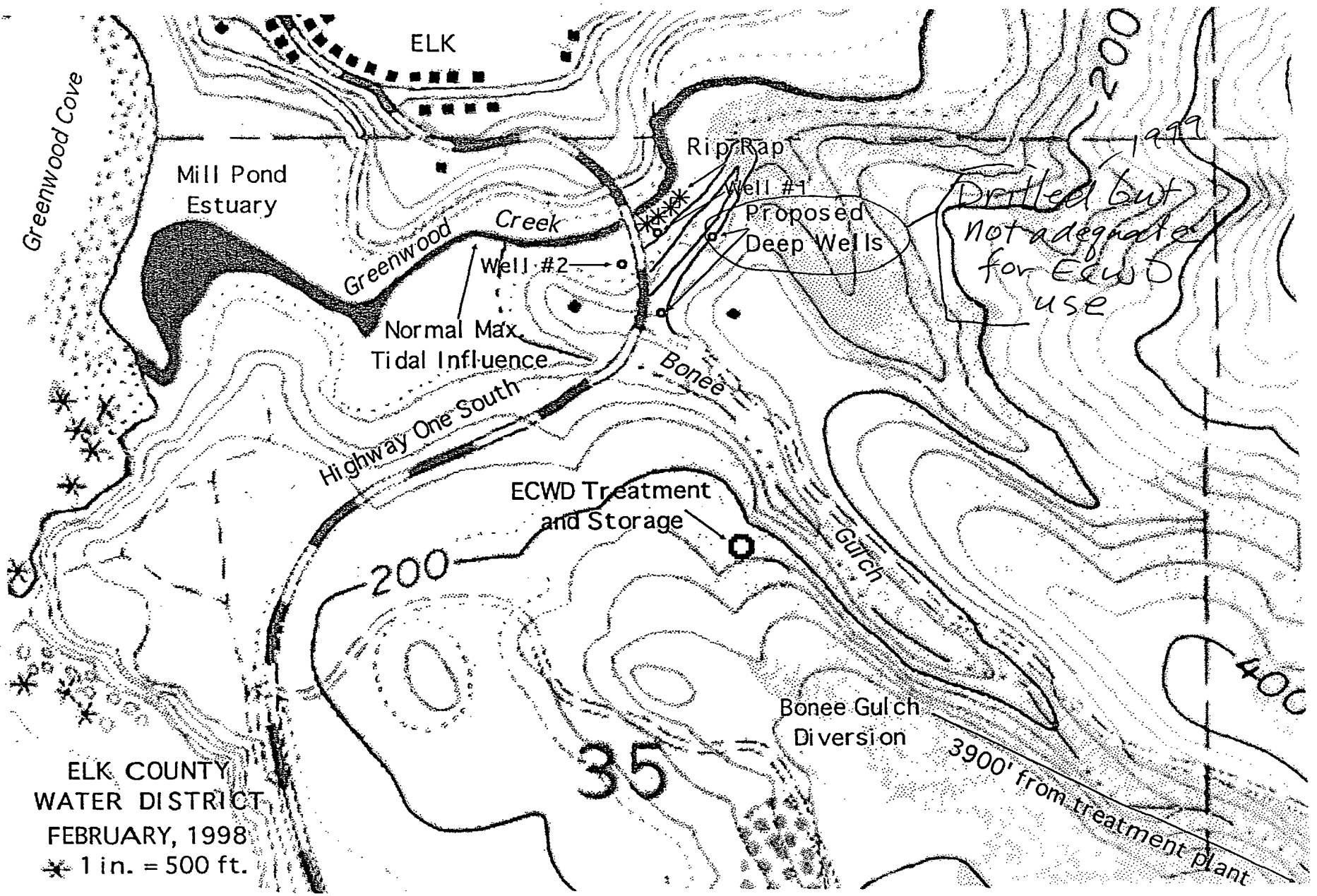
If you have any questions or would like more information, kindly advise.

Very truly yours,

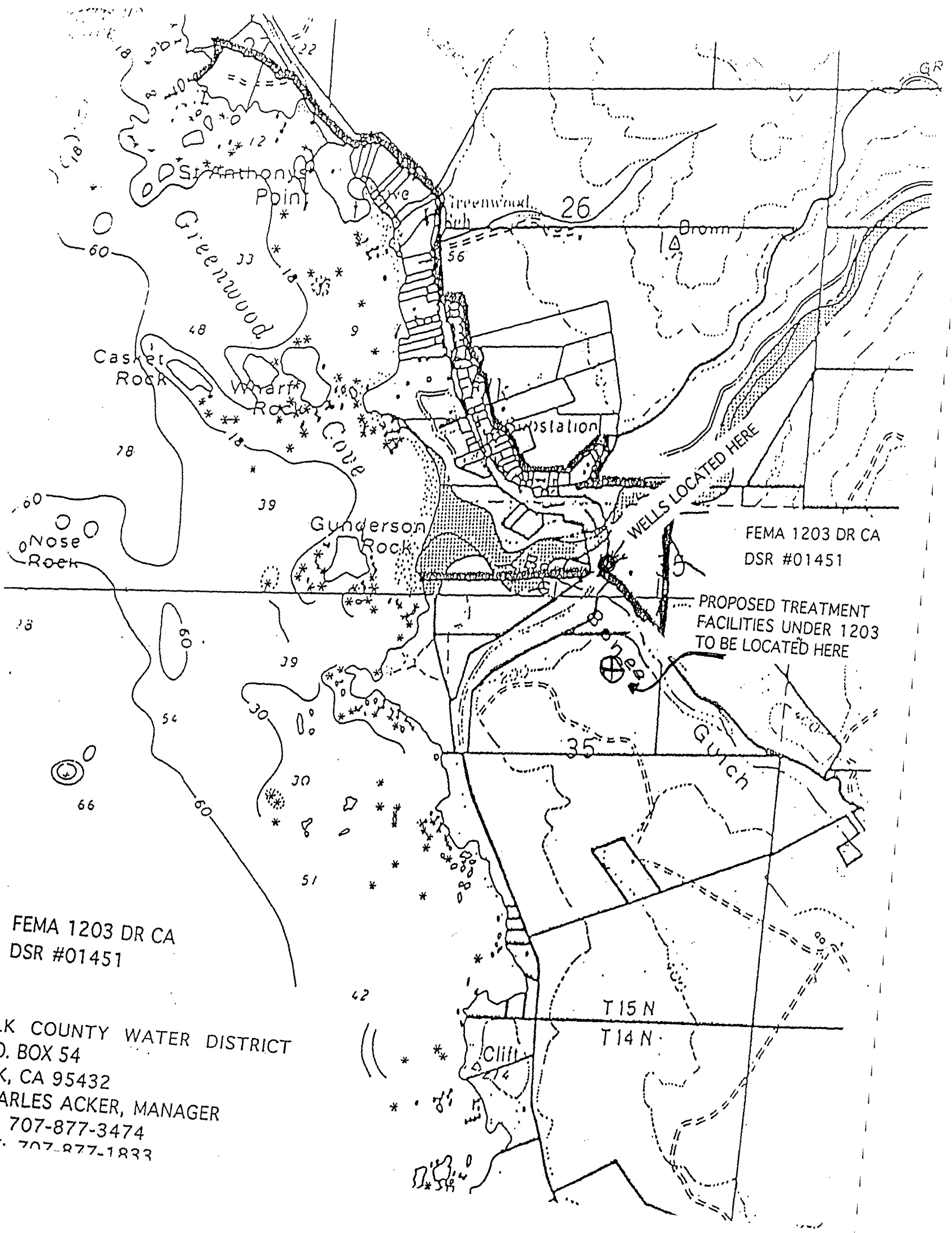
BRELJE & RACE

  
Thomas K. Yokoi

cc: Ross Mayfield



ELK COUNTY  
 WATER DISTRICT  
 FEBRUARY, 1998  
 \* 1 in. = 500 ft.



FEMA 1203 DR CA  
DSR #01451

PROPOSED TREATMENT  
FACILITIES UNDER 1203  
TO BE LOCATED HERE

FEMA 1203 DR CA  
DSR #01451

ELK COUNTY WATER DISTRICT  
P.O. BOX 54  
ELK, CA 95432  
CHARLES ACKER, MANAGER  
PH: 707-877-3474  
FAX: 707-877-1833

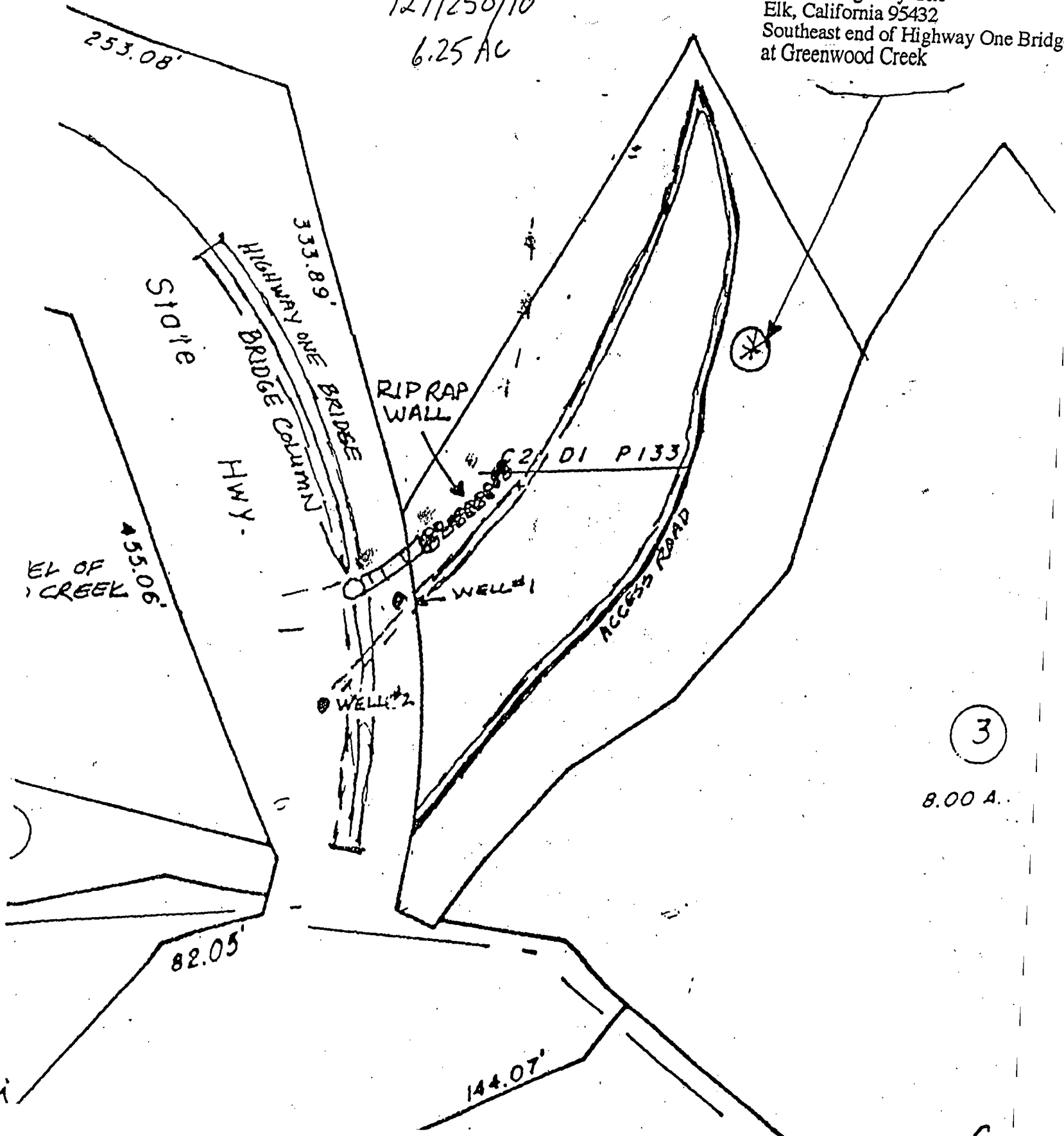


ELK COUNTY WATER DISTRICT: MAP OF WELL SITE DRAWN 1-22-96

CHARLES L. ACKER, GEN. MANAGER  
Ph: 707-877-3474  
fax 707-877-1833

AP# 127-250-11 (recorded 4/8/96)  
3.05 Acres  
Elk County Water District  
Well Access Parcel  
6501 S. Highway One  
Elk, California 95432  
Southeast end of Highway One Bridge  
at Greenwood Creek

127/250/10  
6.25 AC



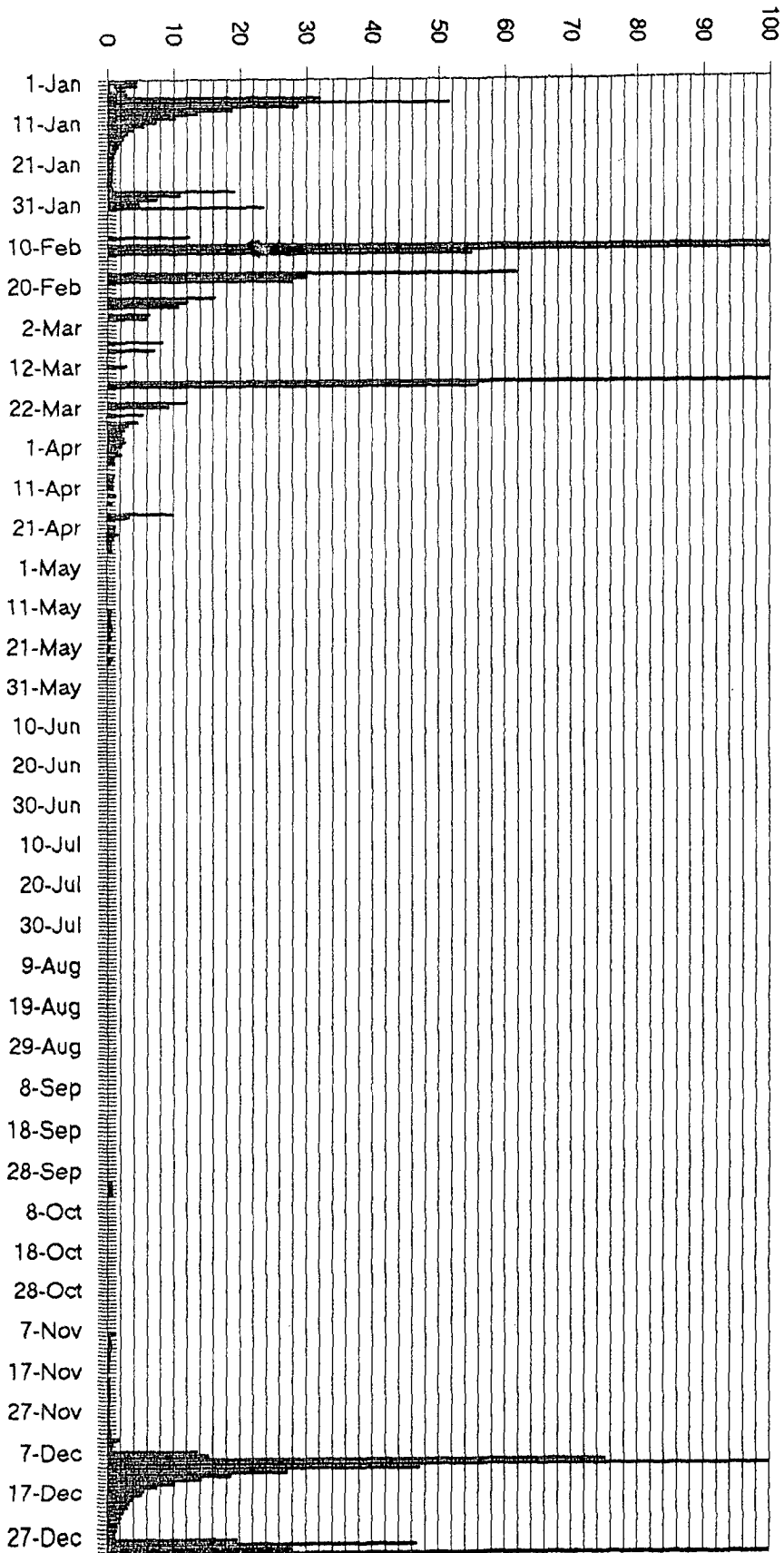
3

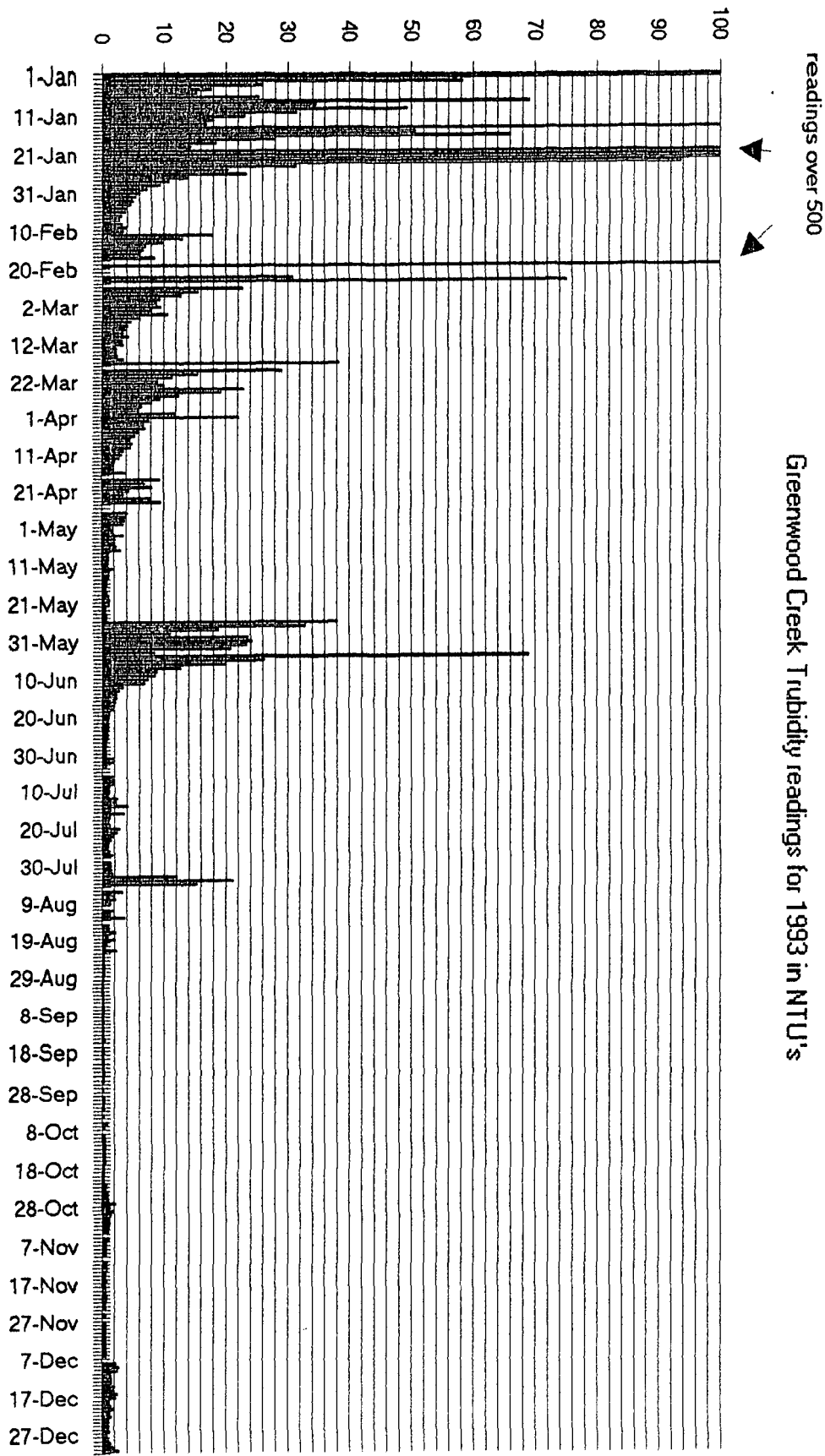
8.00 A.

5

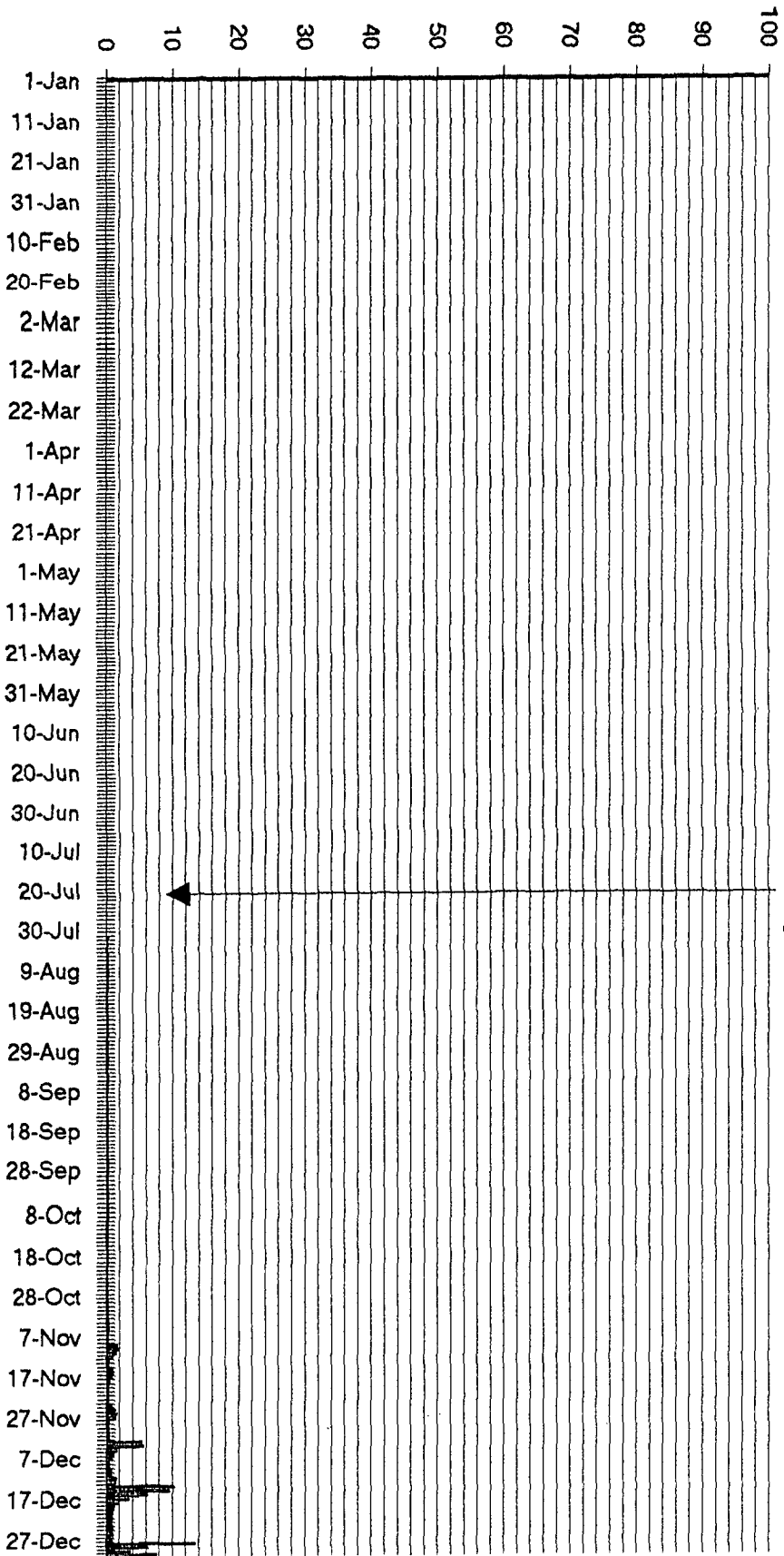
readings over 500 nt/s

Greenwood Creek Turbidity reading 1992

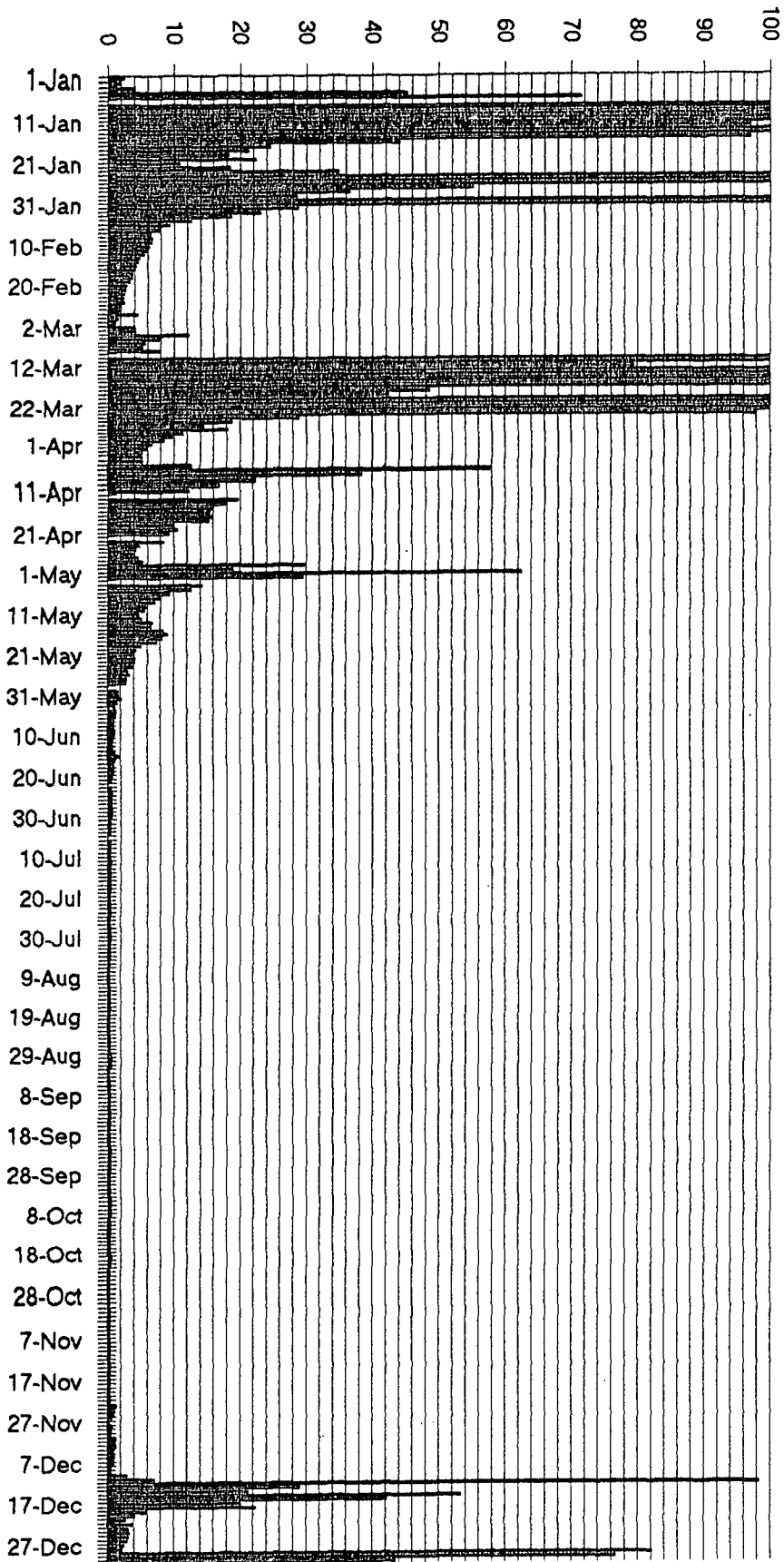




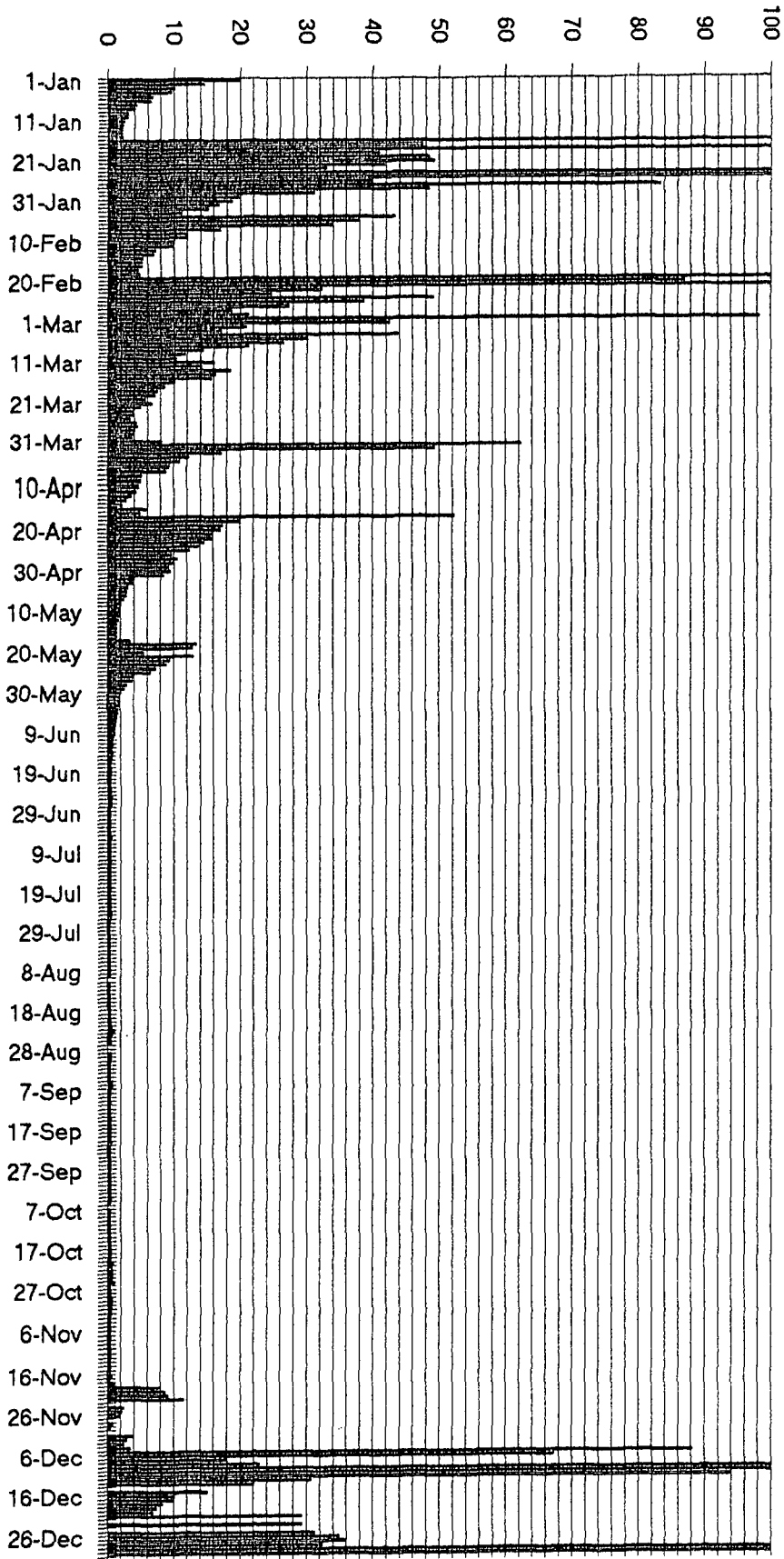
Greenwood Creek Turbidity reading 1994 in NTU's



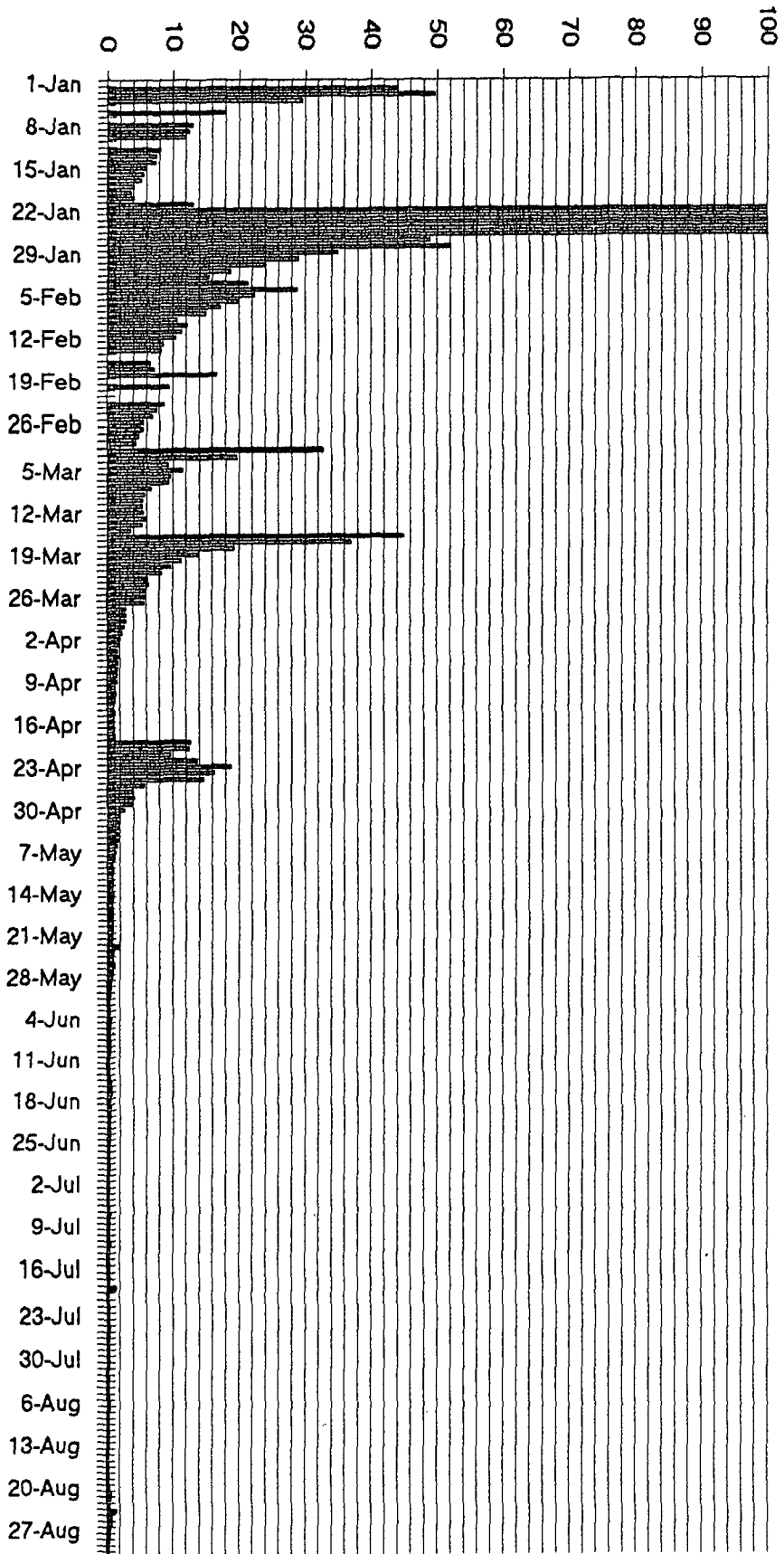
1995 Greenwood Creek Turbidity readings in NTU's



1996 Greenwood Creek Turbidity readings in NTU's

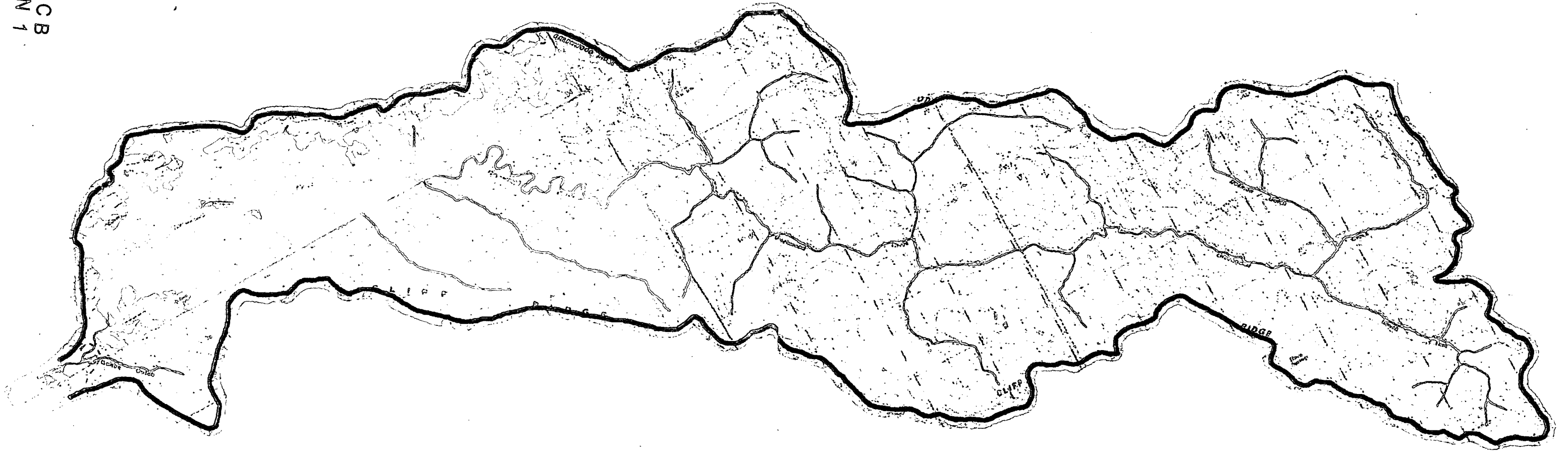


1997 Greenwood Creek Turbidity readings in NTU's



- LAM
- RLT
- FCR
- CRJ
- SAW
- RSG
- KAD

R W Q C B  
 REGION 1  
 MAY 15 2001



ELK COUNTY WATER DISTRICT  
 P.O. BOX 54  
 ELK, CA 95432

GREENWOOD CREEK WATERSHED