

**Coso Monitoring Program**  
**October 1995 Through September 1996**

by  
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*Public Works Department*

**JANUARY 1997**

**NAVAL AIR WEAPONS STATION**  
**CHINA LAKE, CA 93555-6100**



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# Naval Air Weapons Station

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## FOREWORD

This report presents the status of the Coso Monitoring Program conducted for the period October 1995 through September 1996 by the Naval Air Weapons Station (NAWS), China Lake, Calif. The investigation, funded under the NAWS Coso Geothermal Development Program, is being conducted to provide baseline information on hydrology and surface geothermal activity in the Coso Hot Springs area.

This report was reviewed for technical accuracy by Allan M. Katzenstein and Steven C. Bjornstad (NAWS 83G00D).

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| <b>13. ABSTRACT</b> (Maximum 200 words)<br>(U) The Coso Monitoring Program is a continuing effort in support of the Navy's geothermal resources within the Coso Known Geothermal Resource Area (Coso KGRA). A substantial body of reports has been established on this project (15 technical publications) and the project is essentially the same year to year, therefore much of the text of each report reiterates previously published information. This year's report concentrates on data presentation and interpretation; the reader is referred to the 1993/1994 summary report (NAWS-CL TP 006) for detailed descriptions of the overall project and the individual sites monitored. |                                                                     |                                                                    |                                                                       |
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## INTRODUCTION

The Coso Monitoring Program was initiated in 1978 to gather baseline data on the surface and near-surface geothermal activity at Devils Kitchen and Coso Hot Springs located inside the boundaries of the Naval Air Weapons Station (NAWS), China Lake, Calif., the main thermal sites within the Coso Known Geothermal Resource Area (Coso KGRA). This report represents the nineteenth year of continuous data collection.

The format of the report for the current reporting period hasn't been changed from last year's report. A substantial body of reports has been established on this project (15 technical publications) and the project is essentially the same year to year, therefore much of the text of each report reiterates previously published information. This year's report concentrates on data presentation and interpretation and the reader is referred to the 1993/1994 summary report (Reference 1) for detailed descriptions of the overall project and the individual sites monitored.

Seasonal and diurnal variations of the thermal activity in these hot spring areas continue to be evident. Overall, the level of activity has been very stable during this reporting period.

Monitoring sites of the Coso Hot Springs area and type of data collected at each site are presented in Table 1. The location of each site is shown in Figure 1.

TABLE 1. Monitoring Functions and Locations.

| Monitored sites                     | Continuous steam flow | Wellhead pressure | Periodic water level | Periodic water temperature | Water level photography | Water chemistry | Ambient temperature | Barometric pressure | Relative humidity | Wind speed and direction |
|-------------------------------------|-----------------------|-------------------|----------------------|----------------------------|-------------------------|-----------------|---------------------|---------------------|-------------------|--------------------------|
| Schober's Resort<br>(Wells 4A-2, 3) | X                     |                   |                      |                            |                         |                 |                     |                     |                   |                          |
| Well 4A-4                           |                       |                   | X <sup>a</sup>       | X                          |                         |                 |                     |                     |                   |                          |
| Well 4H-4                           | X                     |                   |                      |                            |                         |                 |                     |                     |                   |                          |
| Well 4P-1                           |                       |                   | X <sup>b</sup>       | X                          |                         | X               |                     |                     |                   |                          |
| Well 4H-8<br>(Coso No. 1)           |                       | X <sup>c</sup>    |                      | X                          |                         | X               |                     |                     |                   |                          |
| Devils Kitchen                      | X                     |                   |                      |                            |                         | X               |                     |                     |                   |                          |
| Observation Well No. 1              |                       |                   | X <sup>b</sup>       | X                          |                         | X               |                     |                     |                   |                          |
| Observation Well No. 2              |                       |                   | X <sup>b</sup>       |                            |                         |                 |                     |                     |                   |                          |
| South Pool                          |                       |                   | X <sup>b</sup>       | X                          | X                       | X               |                     |                     |                   |                          |
| Weather Station                     |                       |                   |                      |                            |                         |                 | X                   | X                   | X                 | X                        |

<sup>a</sup>Less than weekly monitoring.<sup>b</sup>Weekly monitoring.<sup>c</sup>Weekly shut-in wellhead pressures.



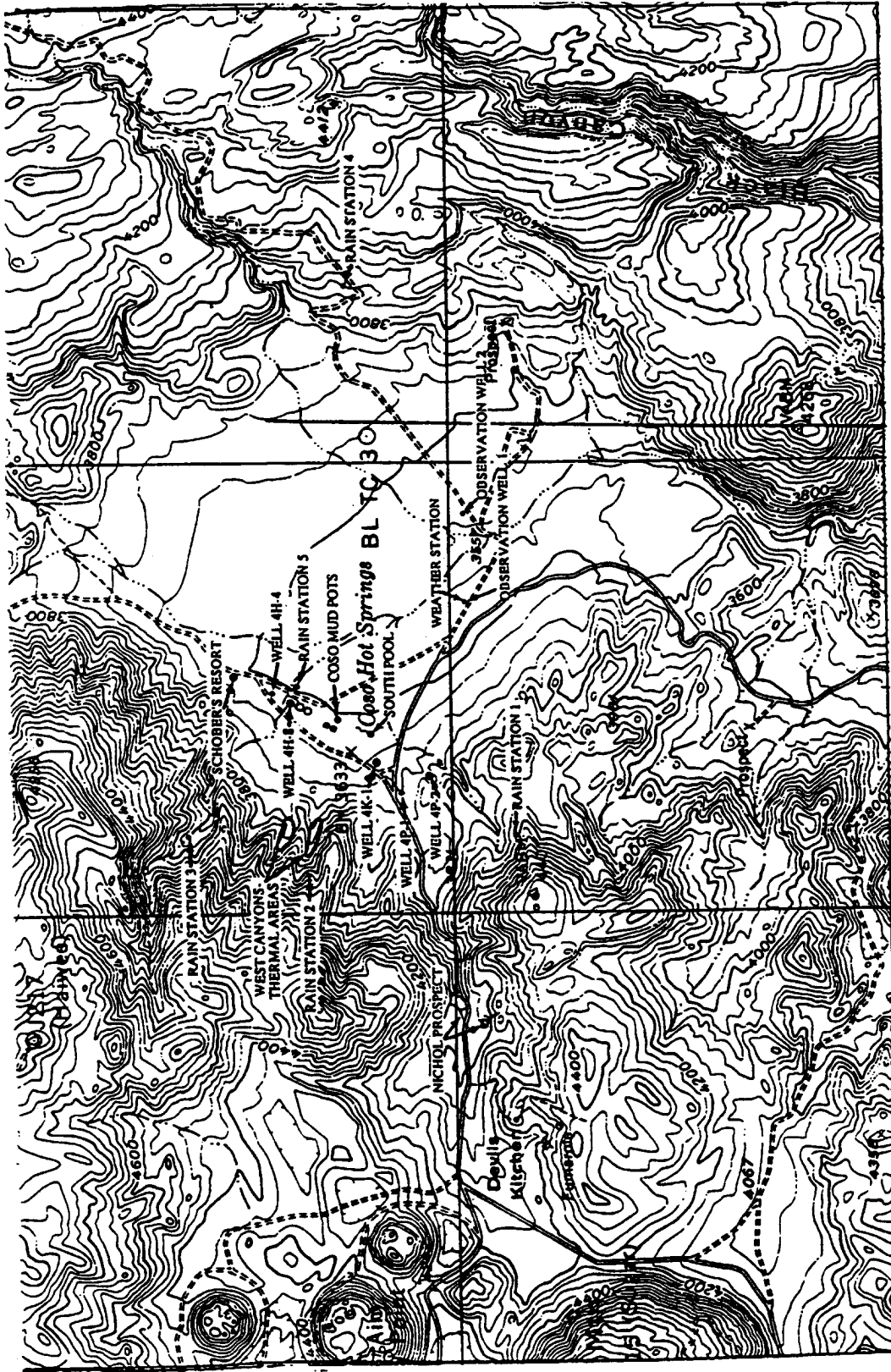


FIGURE 1. Coso Known Geothermal Resource Area Monitoring Sites.

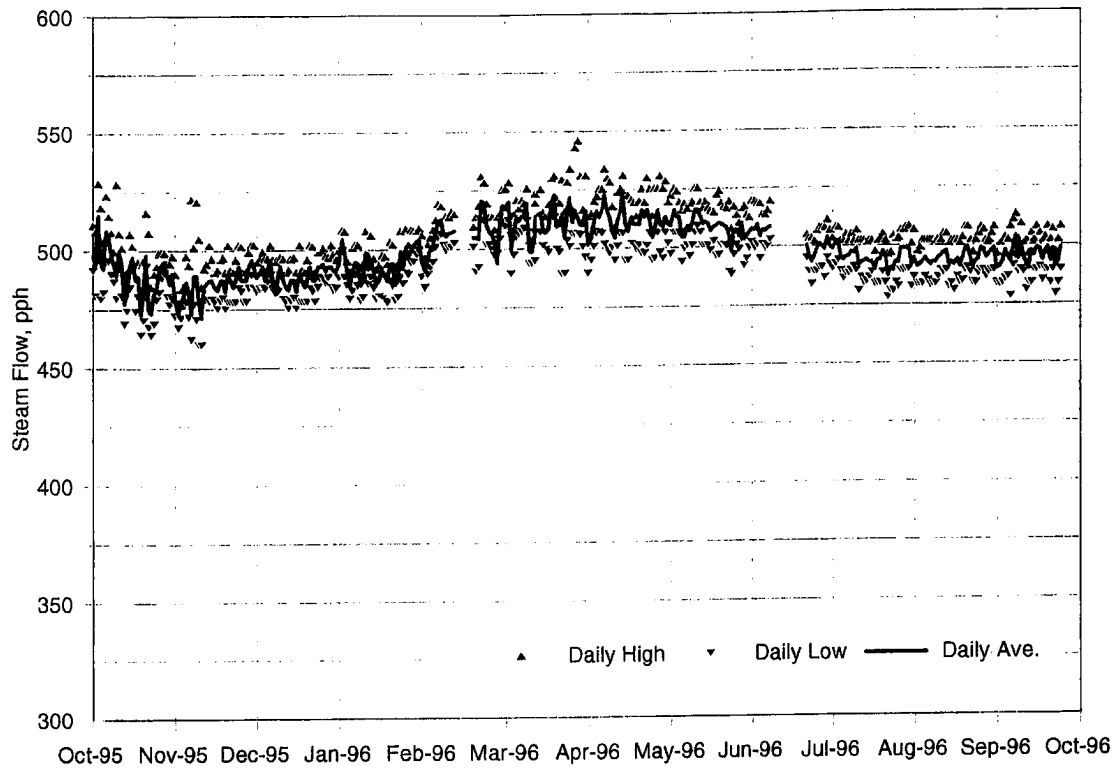


FIGURE 2. Devils Kitchen Steam Flow, October 1995 Through September 1996.

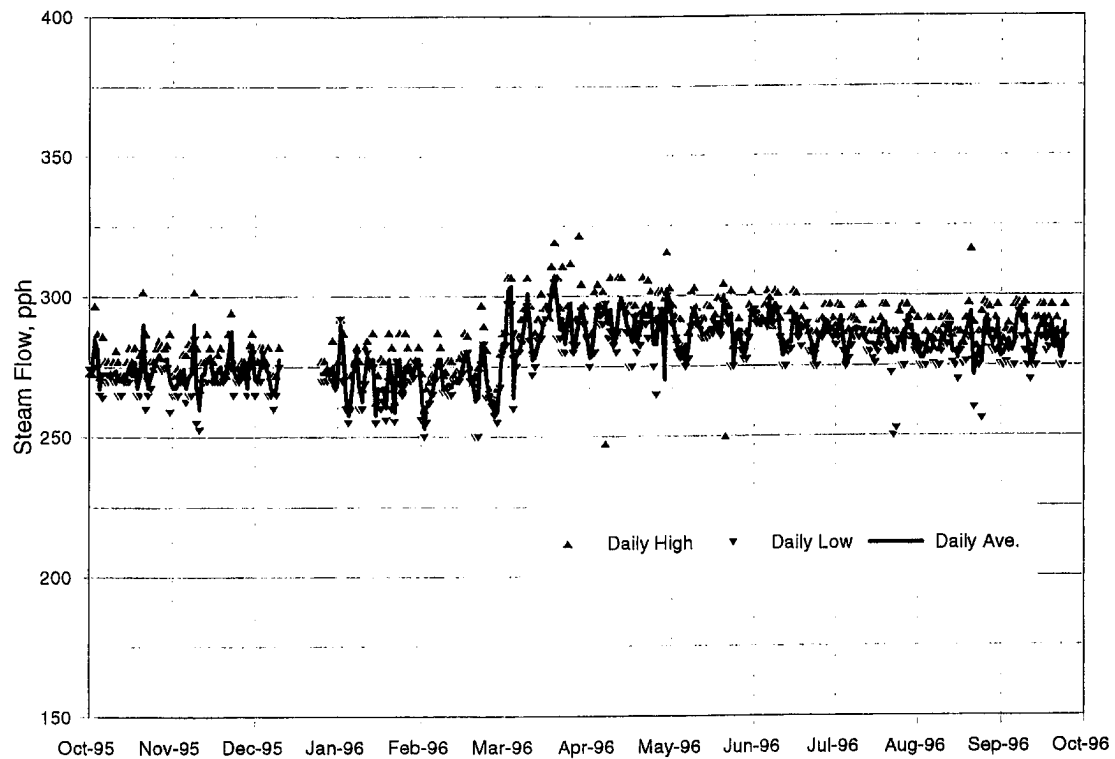


FIGURE 3. Well 4H-4 Steam Flow, October 1995 Through September 1996.

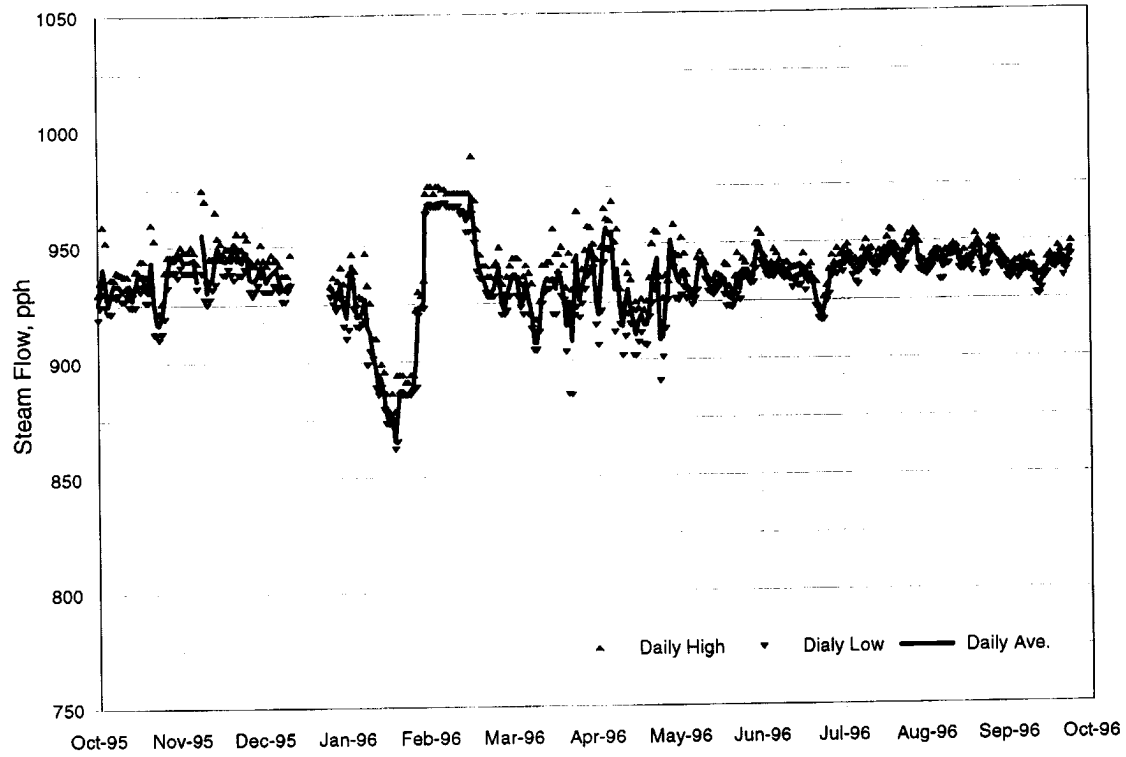


FIGURE 4. Wells 4A-2 and 4A-3 Steam Flow, October 1995 Through September 1996.

## **COSO HOT SPRINGS MUDFIELD PHOTOGRAPHIC RECORD**

A weekly photographic record was initiated in January 1978 to document the fluctuation in fluid levels in several of the more prominent mud pots in the Coso KGRA. Over the years the photo record has provided a clear picture of this hot springs thermal activity. It has demonstrated the sensitivity of the hot springs to both seasonal weather changes and individual weather events, such as summer thunderstorms. It has also chronicled the changes in thermal activity that occurred throughout the Coso Hot Springs area in the late 1980s. This weekly photo record was continued through this reporting period and is catalogued and stored at the Geothermal Program Office.

Selected photographs, Figures 5 through 13, show the typical level of thermal activity in the hot springs area throughout the past year.



FIGURE 5. Resort Mud Pot Area, August 1996.

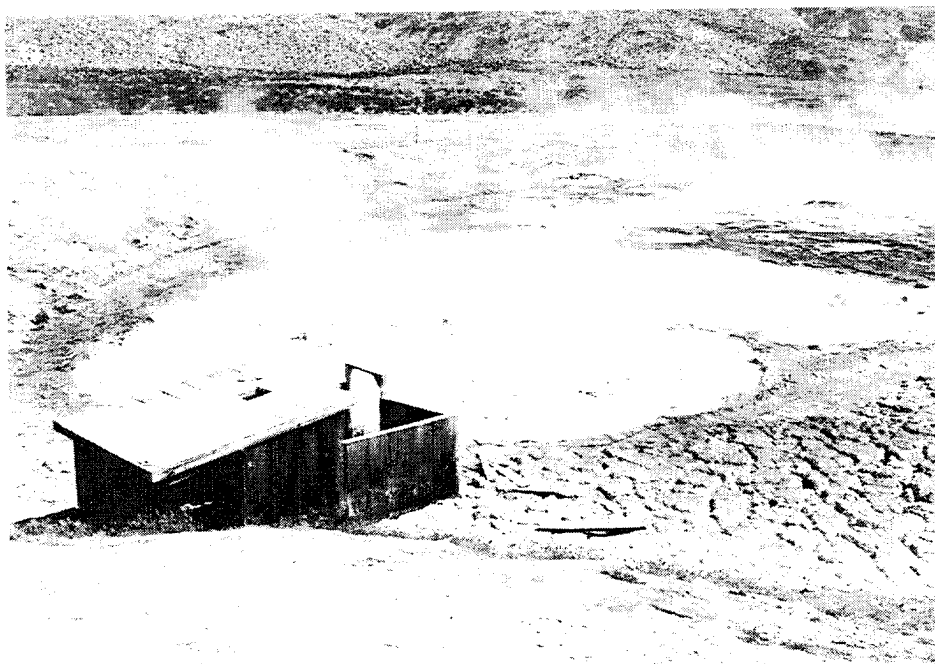


FIGURE 6. South Pool, High Water Level, May 1996.

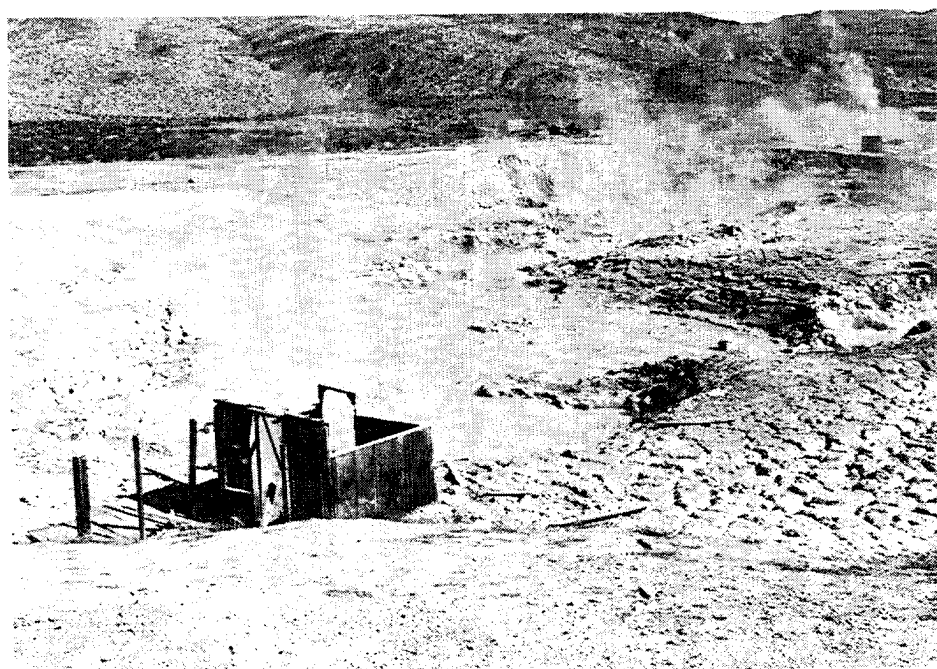


FIGURE 7. South Pool, Low Water Level, September 1996.

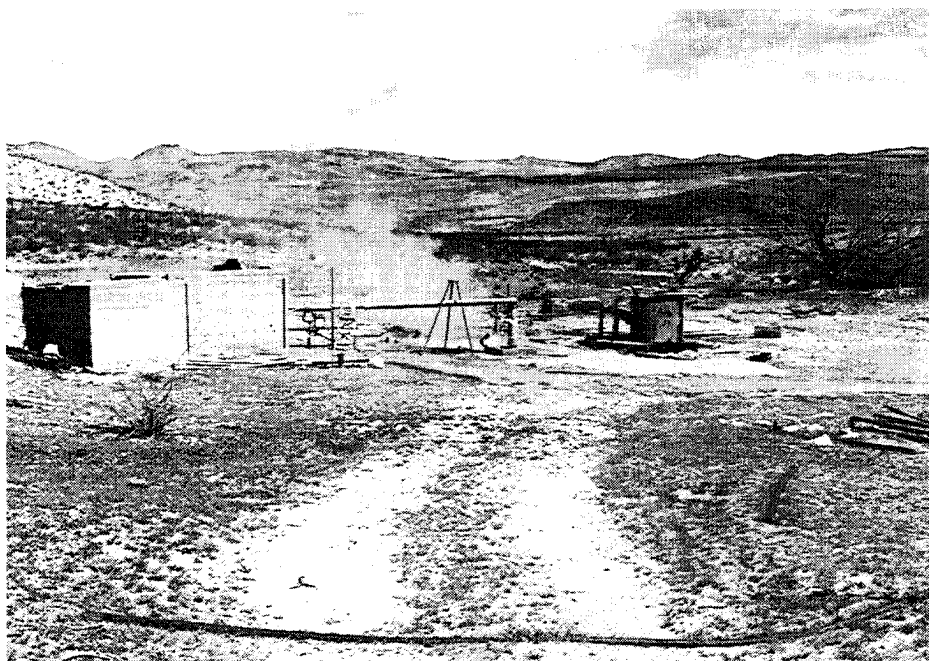


FIGURE 8. Schober's Resort Area, March 1996.



FIGURE 9. West Canyon, Looking West Up Canyon, March 1996.

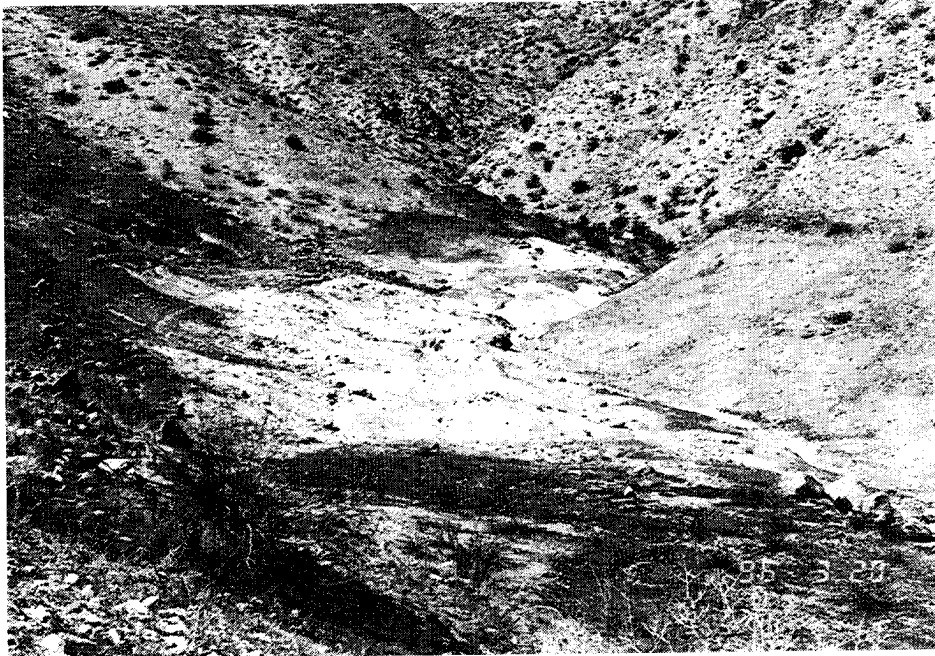


FIGURE 10. Northern West Canyon Land Slump, March 1996.

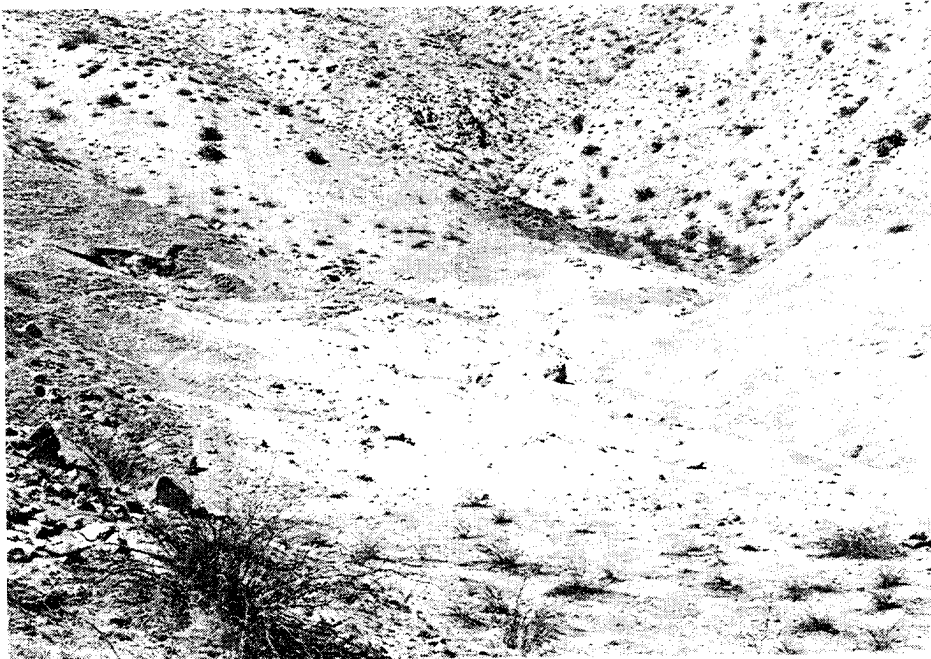


FIGURE 11. Northern West Canyon Land Slump, October 1996.





FIGURE 12. Nichol Prospect Warm Pool, March 1996.

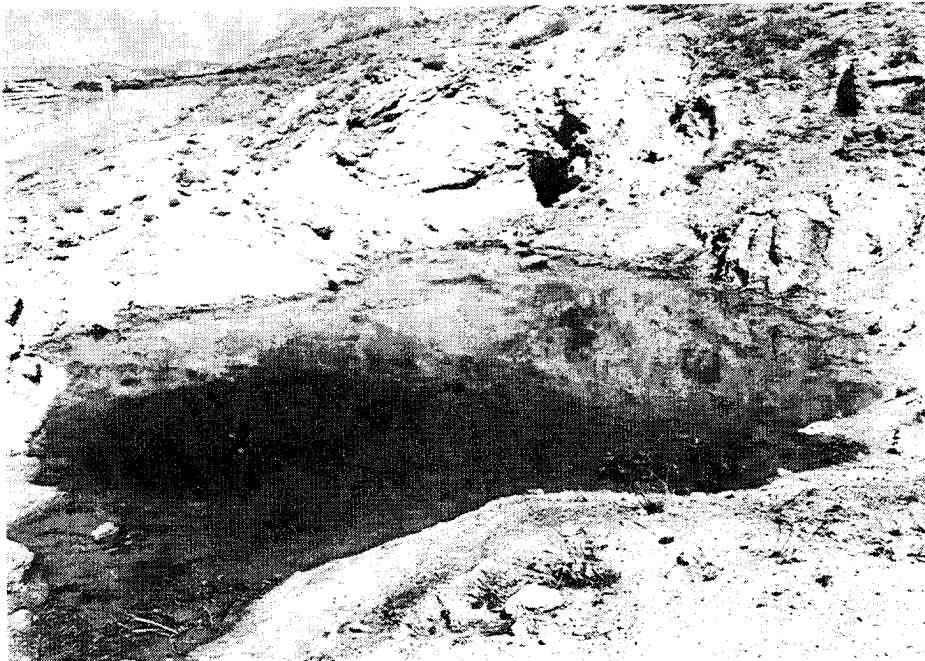


FIGURE 13. Nichol Prospect Warm Pool, August 1996.



## WATER LEVEL MONITORING

### OBSERVATION WELLS

Groundwater levels are monitored in four wells. Weekly measurements are taken at wells 4P-1, OB-1 and OB-2, while the water level of another well, Coso No. 1 (4H-8), is determined indirectly from temperature logs and weekly wellhead pressure readings. These level data are listed in Table 2. Figure 14 shows a summary graph of Coso observation well water levels from 1980 to the present. Depth to water data have been translated to true elevation.

The fluid level elevation in well 4P-1 continues to gradually rise, from 3590.5 feet above sea level (ASL) at the beginning of the monitoring program in 1978 to 3613.3 feet ASL at the end of September 1996. Well 4P-1 is a hot, steam condensate well and is located on the upthrown side of the Coso Hot Springs fault, about 150 feet from the fault line, toward the south end of the hot springs area. It is completed in alluvial fill material. As discussed in Reference 2, this well appears to tap a small perched aquifer that is not directly connected to the regional aquifer.

Observations wells OB-1 and OB-2 are water wells located in the Upper Coso Basin, about three-quarters of a mile east of the fault line. Both of these wells are completed in sedimentary, valley fill material. The water level elevation in OB-1 continues the decline described in previous reports, dropping from about 3432 feet ASL in 1988 to about 3386.8 feet ASL by September 1996. The water level in OB-2, however, rose about 10 feet during 1989 and 1990. This level appears to have stabilized at about 3365 feet ASL.

Coso No. 1 is located toward the north end of the Coso Hot Springs fault and is completed in bedrock. The fluid level in Coso No. 1 declined slightly from 3473 to about 3465 feet ASL between 1978 and October 1987. At that lowered fluid level, the well began to boil. The fluid level dropped rapidly to about 3410 feet ASL by September 1988, and the wellbore became plugged with salt and scale. Coso No. 1 was rehabilitated in 1993 and shut-in to reduce boiling and scaling. The current fluid level (determined from the temperature gradient log) is at about 3300 feet ASL.

Shut-in wellhead pressures for Coso No. 1 are recorded weekly from both the 4-inch wellbore and the 7-inch intermediate casing around the wellbore. The wellbore is completed to 370 feet in bedrock, while the intermediate casing is set to 194 feet at the alluvium/bedrock interface. Table 3 is a listing of the current year's recorded pressures. Figure 15 is a summary graph of these pressures from November 1993 to the present.

TABLE 2. Observation Well Water Level Data.

| Date      | Water level elevations,<br>ft, AMSL        |        |        |                           |
|-----------|--------------------------------------------|--------|--------|---------------------------|
|           | Ground level at well location,<br>ft, AMSL |        |        | Ground level,<br>ft, AMSL |
|           | 4P-1                                       | OB-1   | OB-2   | Coso 1                    |
|           | 3662.0                                     | 3570.0 | 3560.0 | 3615.0                    |
|           | Water level measurements                   |        |        | Water level <sup>a</sup>  |
|           | 4P-1                                       | OB-1   | OB-2   | Coso 1                    |
| 10 Oct 95 | 3612.1                                     | 3387.9 | 3366.6 | 3300.0                    |
| 17 Oct 95 | 3612.1                                     | 3386.8 | 3366.6 |                           |
| 24 Oct 95 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 31 Oct 95 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 7 Nov 95  | 3610.9                                     | 3386.8 | 3365.5 |                           |
| 14 Nov 95 | 3610.9                                     | 3386.8 | 3365.5 |                           |
| 24 Nov 95 | 3610.9                                     | 3386.8 | 3365.5 |                           |
| 28 Nov 95 | 3612.1                                     | 3386.8 | 3364.3 |                           |
| 5 Dec 95  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 12 Dec 95 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 3 Jan 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 9 Jan 96  | 3612.1                                     | 3385.6 | 3365.5 |                           |
| 16 Jan 96 | 3612.1                                     | 3385.6 | 3365.5 |                           |
| 24 Jan 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 31 Jan 96 | 3612.1                                     | 3386.8 | 3365.3 |                           |
| 7 Feb 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 14 Feb 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 21 Feb 96 | 3612.1                                     | 3386.8 | 3364.3 |                           |
| 28 Feb 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 6 Mar 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 13 Mar 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 20 Mar 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 27 Mar 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 3 Apr 96  | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 10 Apr 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 18 Apr 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 25 Apr 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 2 May 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 9 May 96  | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 15 May 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 23 May 96 | 3612.1                                     | 3386.8 | 3364.3 |                           |
| 29 May 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 5 Jun 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 12 Jun 96 | 3612.1                                     | 3386.8 | 3364.3 |                           |
| 20 Jun 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 26 Jun 96 | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 3 Jul 96  | 3612.1                                     | 3386.8 | 3365.5 |                           |
| 10 Jul 96 | 3612.1                                     | 3385.6 | 3365.5 |                           |
| 17 Jul 96 | 3610.9                                     | 3385.6 | 3365.5 |                           |
| 24 Jul 96 | 3610.9                                     | 3385.6 | 3365.5 |                           |
| 1 Aug 96  | 3610.9                                     | 3385.6 | 3365.5 |                           |
| 7 Aug 96  | 3613.3                                     | 3385.6 | 3365.5 |                           |
| 14 Aug 96 | 3613.3                                     | 3386.6 | 3365.5 |                           |
| 21 Aug 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 28 Aug 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 4 Sep 96  | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 11 Sep 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 18 Sep 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |
| 26 Sep 96 | 3613.3                                     | 3386.8 | 3365.5 |                           |

<sup>a</sup> Coso 1 water level is determined indirectly from temperature logs and weekly wellhead pressure readings.

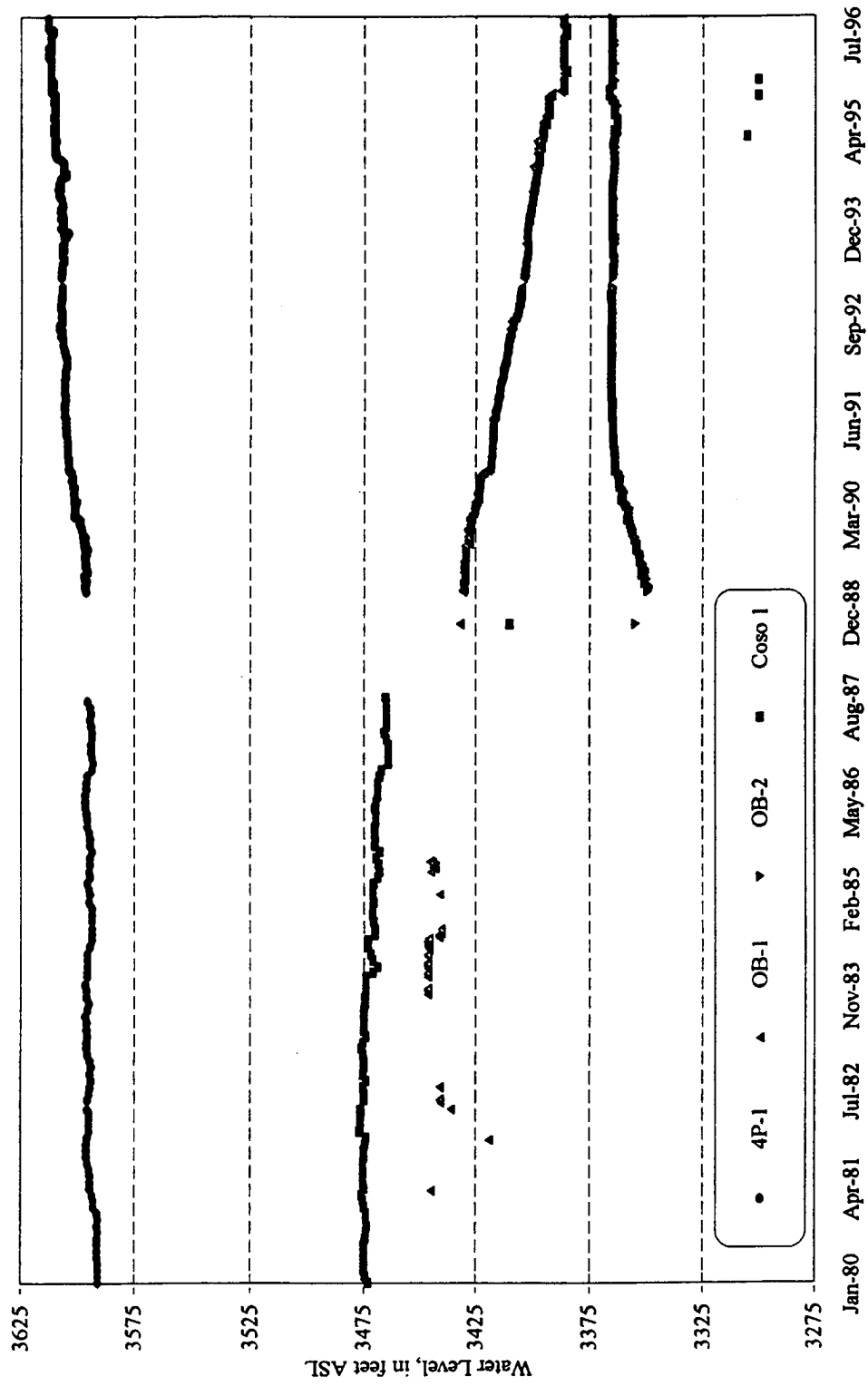


FIGURE 14. Water Levels in Coso Observation Wells, January 1980 Through September 1996.

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TABLE 3. Shut-in Wellhead Pressure, Coso No. 1.

| Date      | 7-inch casing, psig | 4-inch casing, psig |
|-----------|---------------------|---------------------|
| 10 Oct 95 | 21.5                | 20.0                |
| 17 Oct 95 | 22.0                | 20.0                |
| 24 Oct 95 | 22.0                | 20.0                |
| 31 Oct 95 | 22.0                | 20.0                |
| 7 Nov 95  | 22.0                | 20.0                |
| 14 Nov 95 | 22.0                | 20.0                |
| 24 Nov 95 | 22.0                | 20.0                |
| 28 Nov 95 | 22.0                | 20.0                |
| 5 Dec 95  | 22.0                | 20.0                |
| 12 Dec 95 | 24.0                | 20.0                |
| 3 Jan 96  | 24.0                | 20.0                |
| 9 Jan 96  | 24.0                | 20.0                |
| 16 Jan 96 | 24.0                | 20.0                |
| 24 Jan 96 | 24.0                | 20.0                |
| 31 Jan 96 | 24.5                | 20.0                |
| 7 Feb 96  | 24.5                | 20.0                |
| 14 Feb 96 | 24.5                | 20.0                |
| 21 Feb 96 | 24.5                | 20.0                |
| 28 Feb 96 | 24.0                | 19.6                |
| 6 Mar 96  | 24.0                | 20.0                |
| 13 Mar 96 | 24.5                | 20.0                |
| 20 Mar 96 | 24.5                | 20.0                |
| 27 Mar 96 | 24.5                | 20.5                |
| 3 Apr 96  | 24.5                | 20.5                |
| 10 Apr 96 | 24.5                | 20.5                |
| 18 Apr 96 | 24.5                | 20.5                |
| 25 Apr 96 | 24.5                | 20.5                |
| 2 May 96  | 25.0                | 20.0                |
| 9 May 96  | 24.5                | 20.5                |
| 15 May 96 | 24.5                | 20.5                |
| 23 May 96 | 24.5                | 20.0                |
| 29 May 96 | 24.5                | 20.5                |
| 5 Jun 96  | 24.5                | 20.5                |
| 12 Jun 96 | 25.0                | 20.0                |
| 20 Jun 96 | 24.5                | 20.5                |
| 26 Jun 96 | 24.5                | 20.5                |
| 3 Jul 96  | 24.5                | 20.5                |
| 10 Jul 96 | 24.5                | 20.5                |
| 17 Jul 96 | 24.5                | 20.5                |
| 24 Jul 96 | 24.5                | 20.5                |
| 1 Aug 96  | 24.5                | 20.5                |
| 7 Aug 96  | 24.5                | 20.5                |
| 14 Aug 96 | 24.5                | 20.5                |
| 21 Aug 96 | 24.5                | 20.5                |
| 28 Aug 96 | 25.0                | 20.5                |
| 4 Sep 96  | 24.5                | 20.5                |
| 11 Sep 96 | 24.5                | 20.5                |
| 18 Sep 96 | 24.5                | 20.0                |
| 26 Sep 96 | 24.5                | 20.5                |

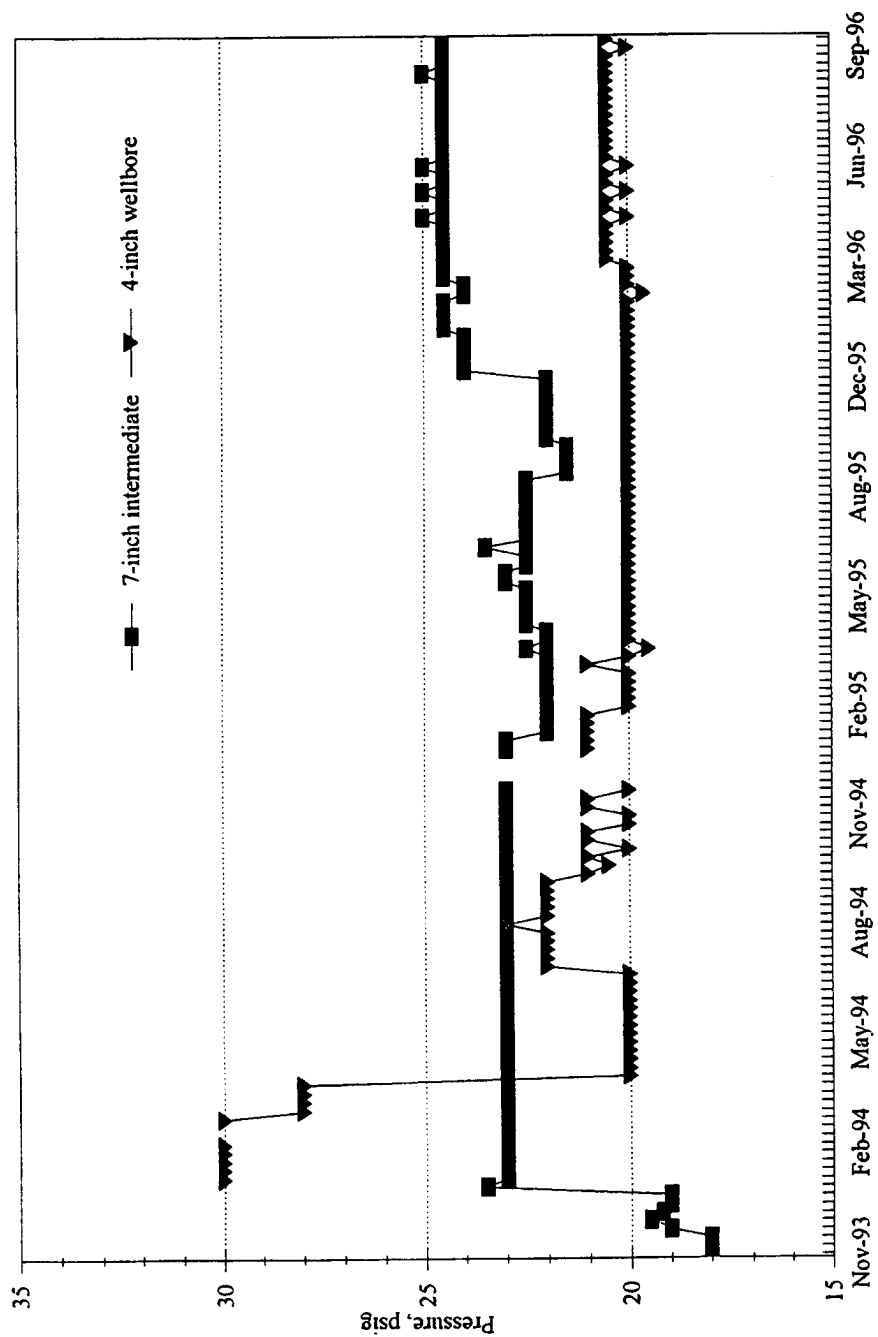


FIGURE 15. Shut-in Wellhead Pressure, Coso No. 1, November 1993 Through September 1996.

**SOUTH POOL**

The South Pool water level has continued the pattern of seasonal fluctuations throughout this reporting period, ranging from a low of 3612.2 feet in October 1995 to a high of 3620.4 feet in March of 1996 (Table 4). The pool's temperature is periodically measured, as conditions permit. Water temperatures for this period continued to average above 200 degrees Fahrenheit. The temperature and water elevations of the pool for January 1988 through September 1996, the period of increased activity, are shown graphically in Figure 16, while the pool elevation recorded for the entire monitoring program period is shown in Figure 17.

TABLE 4. South Pool Elevation and Temperature Changes.

| Date      | Elevation,<br>ft | Temperature,<br>°F | Date      | Elevation,<br>ft | Temperature,<br>°F |
|-----------|------------------|--------------------|-----------|------------------|--------------------|
| 10 Oct 95 | 3616.4           | 200                | 18 Apr 96 | 3620.0           | 211                |
| 17 Oct 95 | 3616.3           | 198                | 25 Apr 96 | 3620.1           | 209                |
| 24 Oct 95 | 3616.2           | 199                | 2 May 96  | 3620.4           | 208                |
| 31 Oct 95 | 3616.5           | 187                | 9 May 96  | 3619.6           | 208                |
| 7 Nov 95  | 3616.9           | 190                | 15 May 96 | 3619.5           | 207                |
| 14 Nov 95 | 3616.9           | 190                | 23 May 96 | 3619.0           | 206                |
| 21 Nov 95 | 3617.2           | 189                | 29 May 96 | 3619.4           | 205                |
| 28 Nov 95 | 3617.2           | 182                | 5 Jun 96  | 3619.1           | 204                |
| 5 Dec 95  | 2617.2           | 183                | 12 Jun 96 | 3619.4           | 204                |
| 12 Dec 95 | 3617.2           | 182                | 20 Jun 96 | 3618.5           | 210                |
| 3 Jan 96  | 3618.1           | 190                | 26 Jun 96 | 3618.3           | no data            |
| 9 Jan 96  | 3618.4           | no data            | 3 Jul 96  | 3618.1           | 204                |
| 16 Jan 96 | 3618.6           | 195                | 10 Jul 96 | 3617.9           | 205                |
| 24 Jan 96 | 3618.8           | 212                | 17 Jul 96 | 3617.6           | 207                |
| 31 Jan 96 | 3619.0           | no data            | 24 Jul 96 | 3617.3           | 206                |
| 7 Feb 96  | 3619.0           | 205                | 1 Aug 96  | 3617.0           | 203                |
| 14 Feb 96 | 3619.1           | 202                | 7 Aug 96  | 3617.1           | 201                |
| 21 Feb 96 | 3619.3           | 205                | 14 Aug 96 | 3616.7           | 203                |
| 28 Feb 96 | 3619.7           | 205                | 21 Aug 96 | 3616.6           | 201                |
| 6 Mar 96  | 3619.7           | 206                | 28 Aug 96 | 3616.4           | 207                |
| 13 Mar 96 | 3619.4           | 204                | 4 Sep 96  | 3616.2           | no data            |
| 20 Mar 96 | 3620.0           | 205                | 11 Sep 96 | 3616.3           | 211                |
| 27 Mar 96 | 3620.4           | 207                | 18 Sep 96 | 3616.3           | 211                |
| 3 Apr 96  | 3620.0           | 210                | 26 Sep 96 | 3616.3           | 211                |
| 10 Apr 96 | 3619.6           | 209                |           |                  |                    |

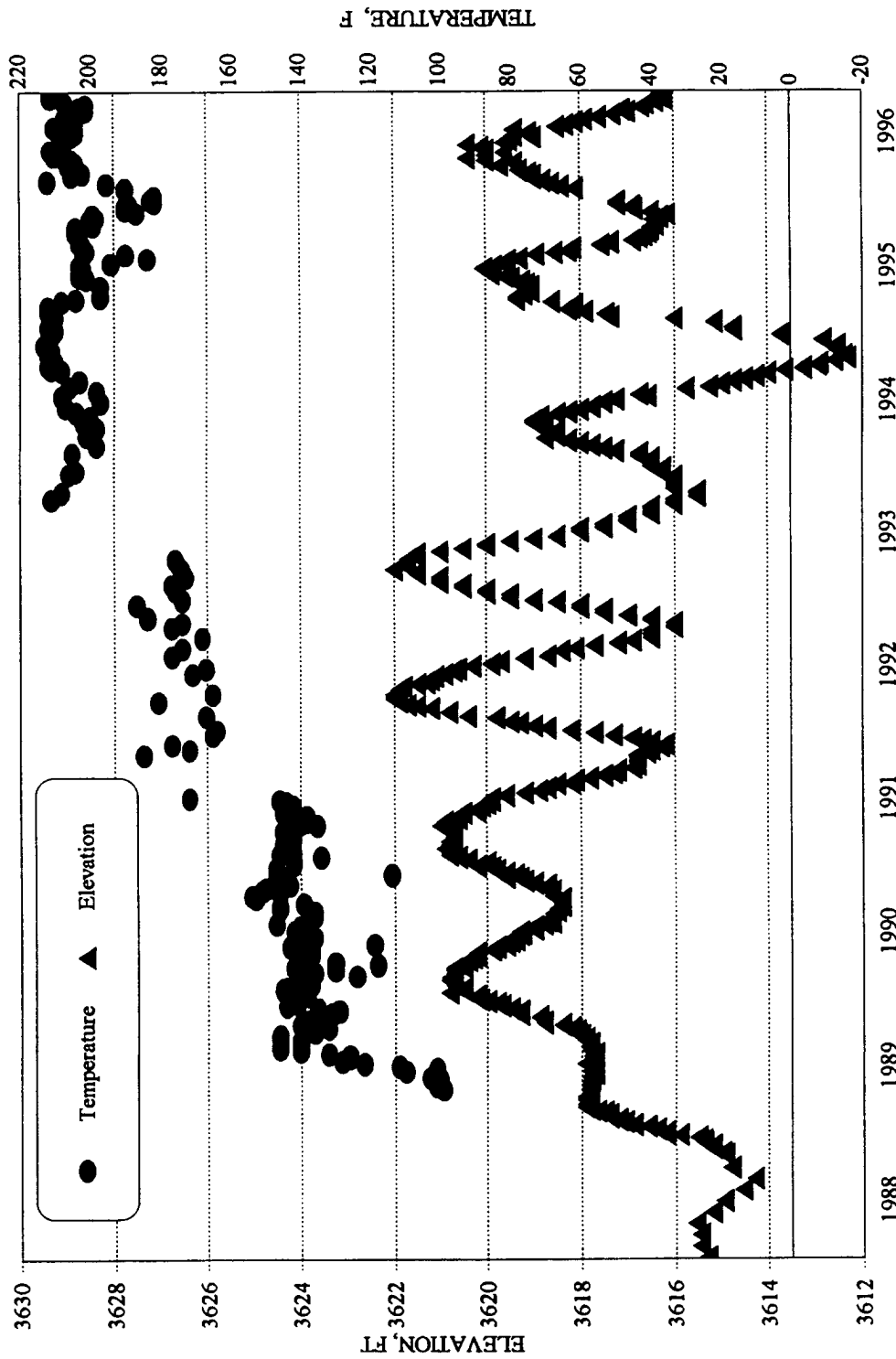


FIGURE 16. South Pool Elevation and Temperature, January 1988 Through September 1996.

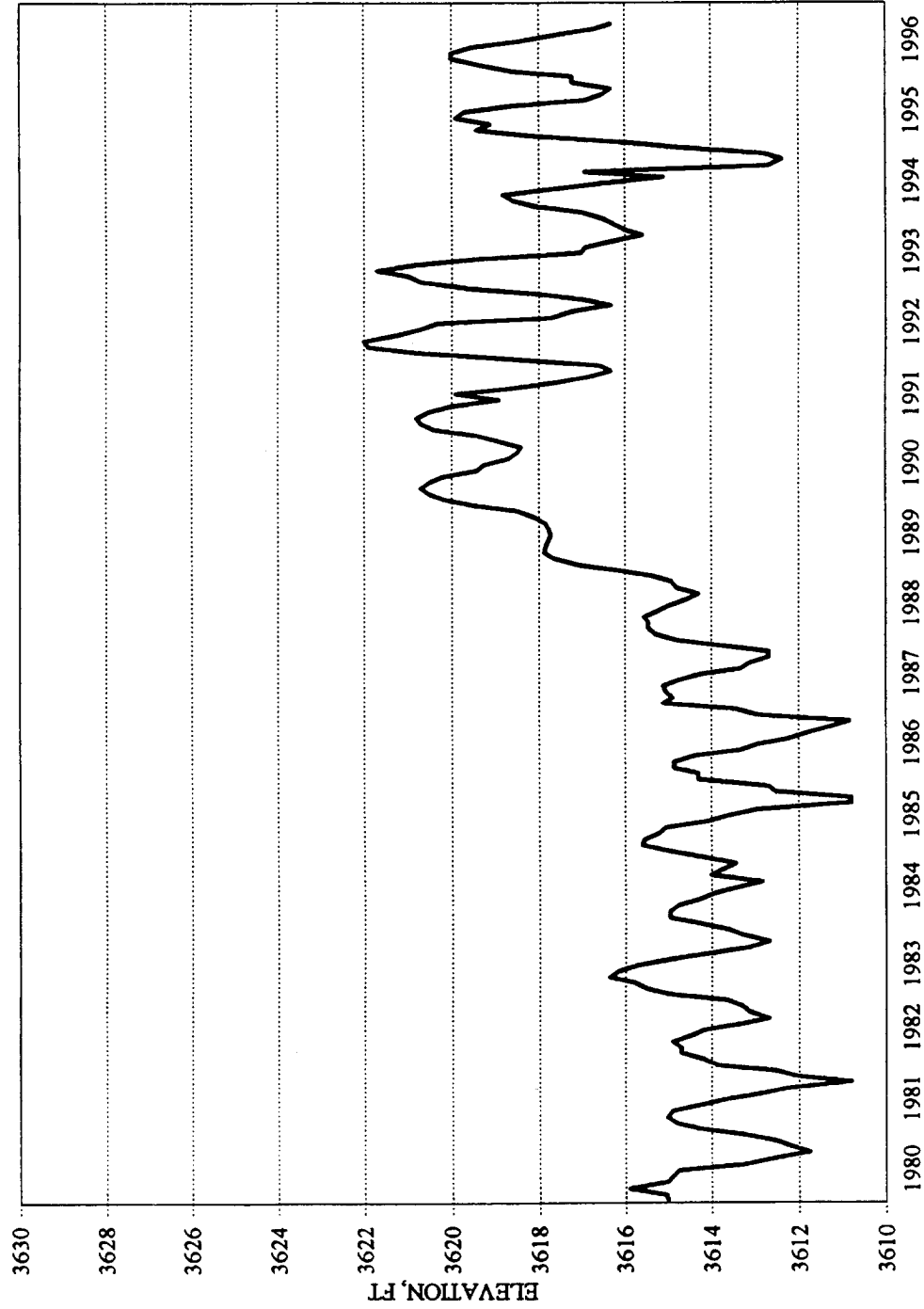


FIGURE 17. South Pool Elevations, January 1980 Through September 1996.



## RAINFALL AT COSO RESORT AREA AND ROSE VALLEY

Rainfall in the Coso Hot Springs basin is monitored at five rain station sites, as mapped in Figure 1. Instrumentation at each site consists of a battery-operated long-term strip recorder that is triggered by a tipping bucket. The Rose Valley data are collected at the Los Angeles Department of Water and Power Haiwee Reservoir Plant. This year there were no interruptions in rainfall data collection.

Data from the Coso rain stations and the Rose Valley data from the Haiwee power plant are presented in Table 5 and Figure 18. Comparative rainfall data for the Indian Wells Valley (IWV), Rose Valley, and Coso Basin for the period 1967 through 1995 are shown in Table 6 and Figure 19. IWV data were gathered at Armitage Field, Naval Air Warfare Center Weapons Division (NAWCWPNS), and provided by a NAWCWPNS meteorologist.

TABLE 5. Rainfall Recorded at the Coso Rain Stations and Rose Valley.

| Coso Hot Springs area |                                         |      |      |      |      | Rose Valley |               |
|-----------------------|-----------------------------------------|------|------|------|------|-------------|---------------|
| Date                  | Tipping bucket stations (rainfall, in.) |      |      |      |      | Date        | Rainfall, in. |
|                       | 1                                       | 2    | 3    | 4    | 5    |             |               |
| 03 Oct 95             |                                         | 0.02 |      |      |      |             |               |
| 26 Nov 95             | 0.01                                    |      |      |      |      |             |               |
| 12 Dec 95             | 0.07                                    |      |      |      |      | 12 Dec 95   | 0.05          |
| 17 Dec 95             |                                         |      | 0.01 |      |      | 13 Dec 95   | 0.40          |
| 18 Dec 95             |                                         |      | 0.09 |      |      | 14 Dec 95   | 0.08          |
| 23 Dec 95             | 0.03                                    |      |      |      |      | 23 Dec 95   | 0.34          |
| 24 Dec 95             | 0.10                                    |      |      |      |      |             |               |
| 30 Dec 95             |                                         |      | 0.15 |      |      |             |               |
| 31 Dec 96             |                                         |      | 0.03 |      |      |             |               |
| 21 Jan 96             |                                         |      | 0.04 |      |      | 19 Jan 96   | 0.82          |
| 16 Jan 96             | 0.01                                    |      |      |      |      | 25 Jan 96   | 0.03          |
| 30 Jan 96             |                                         | 0.02 |      |      |      | 28 Jan 96   | 0.12          |
| 31 Jan 96             |                                         | 0.18 | 0.38 |      |      |             |               |
| 01 Feb 96             |                                         |      | 0.04 |      | 0.02 | 31 Jan 96   | 0.01          |
| 17 Feb 96             |                                         |      |      | 0.01 |      | 01 Feb 96   | 0.20          |
| 19 Feb 96             | 0.02                                    | 0.03 | 0.01 |      |      | 02 Feb 96   | 0.01          |
| 20 Feb 96             | 0.04                                    | 0.14 | 0.20 |      |      | 20 Feb 96   | 0.48          |
| 23 Feb 96             |                                         |      |      |      | 0.02 | 21 Feb 96   | 0.20          |
| 26 Feb 96             | 0.05                                    |      |      |      |      |             |               |
| 28 Feb 96             |                                         | 0.04 | 0.02 |      |      |             |               |
| 01 Mar 96             | 0.01                                    |      |      |      |      |             |               |
| 02 Mar 96             |                                         |      |      |      | 0.03 |             |               |
| 07 Mar 96             |                                         |      |      | 0.08 |      | 05 Mar 96   | 0.06          |

TABLE 5. (Contd.)

| Coso Hot Springs area |                                         |      |      |      |      | Rose Valley |                  |
|-----------------------|-----------------------------------------|------|------|------|------|-------------|------------------|
| Date                  | Tipping bucket stations (rainfall, in.) |      |      |      |      | Date        | Rainfall,<br>in. |
|                       | 1                                       | 2    | 3    | 4    | 5    |             |                  |
| 09 Mar 96             | 0.06                                    |      |      |      |      |             |                  |
| 10 Mar 96             | 0.07                                    |      |      |      |      |             |                  |
| 12 Mar 96             |                                         | 0.08 | 0.04 |      |      |             |                  |
| 13 Mar 96             |                                         | 0.11 | 0.21 | 0.07 |      | 13 Mar 96   | 0.06             |
| 17 Mar 96             |                                         |      |      |      | 0.02 | 14 Mar 96   | 0.13             |
| 18 Mar 96             |                                         |      |      |      | 0.09 | 15 Mar 96   | 0.05             |
| 19 Mar 96             | 0.04                                    |      |      |      |      |             |                  |
| 29 Mar 96             | 0.06                                    |      |      |      |      |             |                  |
| 02 Apr 96             |                                         |      | 0.02 |      |      |             |                  |
| 07 Apr 96             |                                         |      |      |      | 0.04 |             |                  |
| 14 Apr 96             | 0.02                                    |      |      |      |      | 01 Apr 96   | 0.01             |
| 17 Apr 96             |                                         |      | 0.01 |      |      | 17 Apr 96   | 0.02             |
| 21 Apr 96             |                                         |      |      |      | 0.02 | 18 Apr 96   | 0.11             |
| 25 May 96             |                                         |      | 0.06 |      |      | 25 May 96   | 0.12             |
| 29 May 96             |                                         |      |      |      | 0.01 | 26 May 96   | 0.13             |
| 26 Jun 96             | 0.02                                    | 0.03 |      |      | 0.03 | 27 Jun 96   | 0.01             |
| 12 Jul 96             |                                         | 0.03 |      |      |      | 13 Jul 96   | 0.26             |
| 30 Jul 96             |                                         |      |      |      | 0.01 | 28 Jul 96   | 0.10             |
| 14 Aug 96             | 0.01                                    |      |      |      | 0.01 |             |                  |
| 14 Sep 96             | 0.01                                    |      |      |      |      |             |                  |
| 19 Sep 96             | 0.01                                    |      | 1.31 |      |      |             |                  |
| TOTAL                 | 0.64                                    | 0.68 | 1.13 | 0.16 | 0.30 | TOTAL       | 3.8              |

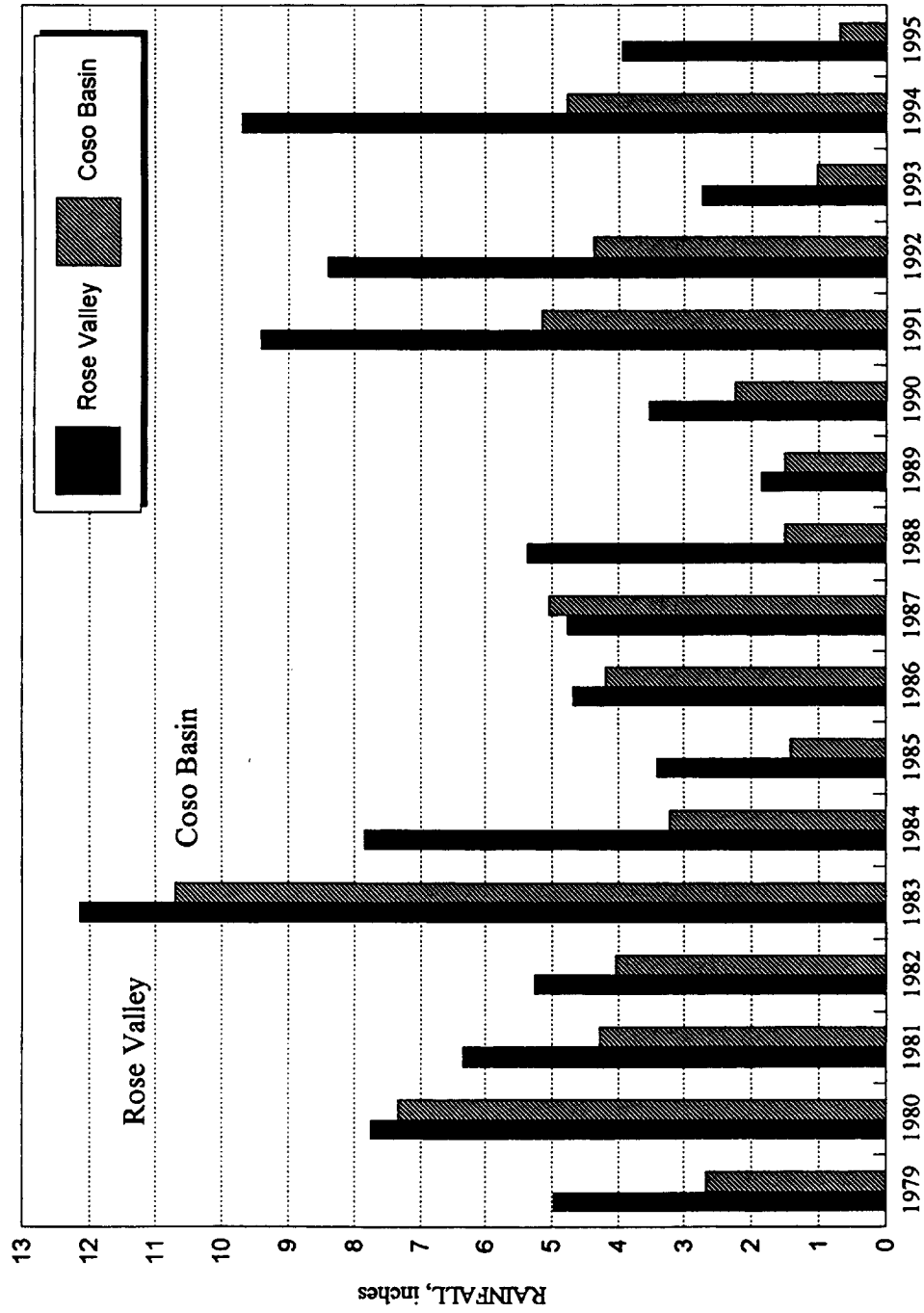


FIGURE 18. Comparison of Total Rainfall at Coso Basin and Rose Valley, 1979 Through 1995.

TABLE 6. IWV, Rose Valley, and Coso Basin Rainfall.

| Year | IWV   | Rose Valley | Coso Basin |
|------|-------|-------------|------------|
| 1967 | 4.28  | 4.32        |            |
| 1968 | 3.16  | 3.26        |            |
| 1969 | 5.55  | 8.80        |            |
| 1970 | 3.74  | 6.45        |            |
| 1971 | 1.47  | 2.87        |            |
| 1972 | 1.24  | 1.90        |            |
| 1973 | 2.58  | 4.56        |            |
| 1974 | 7.46  | 9.19        |            |
| 1975 | 1.64  | 2.79        |            |
| 1976 | 3.74  | 8.50        |            |
| 1977 | 4.67  | 8.34        |            |
| 1978 | 10.68 | 12.61       |            |
| 1979 | 5.56  | 4.97        | 2.67       |
| 1980 | 6.31  | 7.75        | 7.34       |
| 1981 | 4.49  | 6.34        | 4.28       |
| 1982 | 4.73  | 5.26        | 4.05       |
| 1983 | 10.56 | 12.14       | 10.70      |
| 1984 | 5.95  | 7.84        | 3.23       |
| 1985 | 1.29  | 3.42        | 1.42       |
| 1986 | 3.68  | 4.68        | 4.19       |
| 1987 | 4.43  | 4.77        | 5.04       |
| 1988 | 3.76  | 5.36        | 1.51       |
| 1989 | 0.94  | 1.85        | 1.51       |
| 1990 | 1.78  | 3.53        | 2.24       |
| 1991 | 7.83  | 9.41        | 5.15       |
| 1992 | 8.10  | 8.40        | 4.38       |
| 1993 | 0.94  | 2.83        | 1.04       |
| 1994 | 6.76  | 9.69        | 4.78       |
| 1995 | 7.88  | 3.80        | 0.69       |

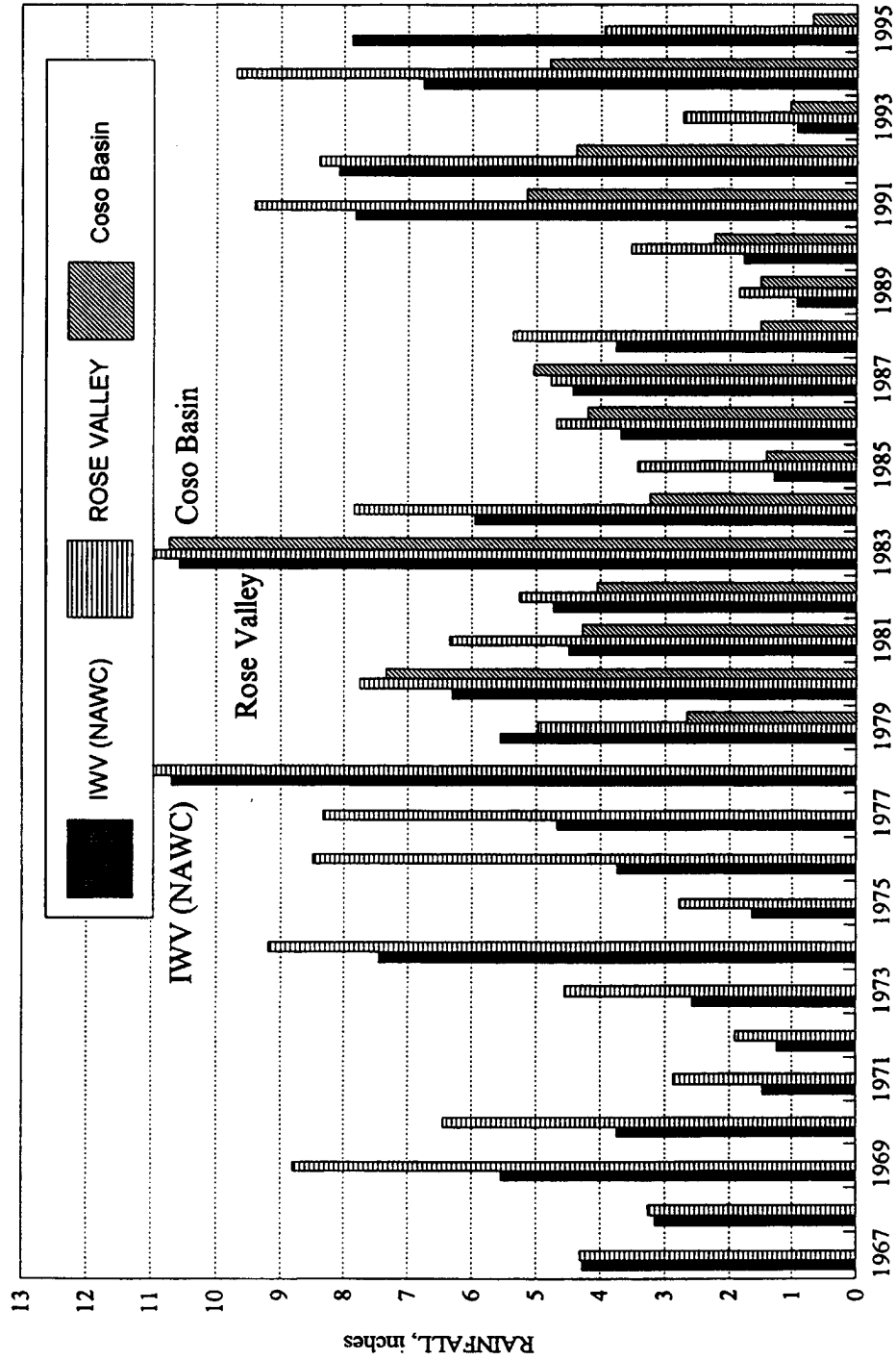


FIGURE 19. Comparison of Total Rainfall at IWV, Rose Valley, and Coso Basin Sites, 1967 Through 1995.

**COSO HOT SPRINGS MINI-WEATHER  
RECORDING STATION**

Barometric pressure, ambient temperature, relative humidity, and wind speed and wind direction are recorded at Weather Station One, located adjacent to observation well OB-1. In March 1996 this station was integrated into the base-wide weather monitoring network. During this transition the data from January 1996 through March 1996 were lost. This site is now maintained by NAWCWPNS Geophysics Operation personnel.

Barometric pressure, ambient temperature, and relative humidity were collected hourly at Weather Station One from 19 January 1994 through 30 September 1996; these data have been consolidated into a graph (Figure 20). Actual hourly data are expansive and will not be published. It is available from the Geothermal Program Office upon request.

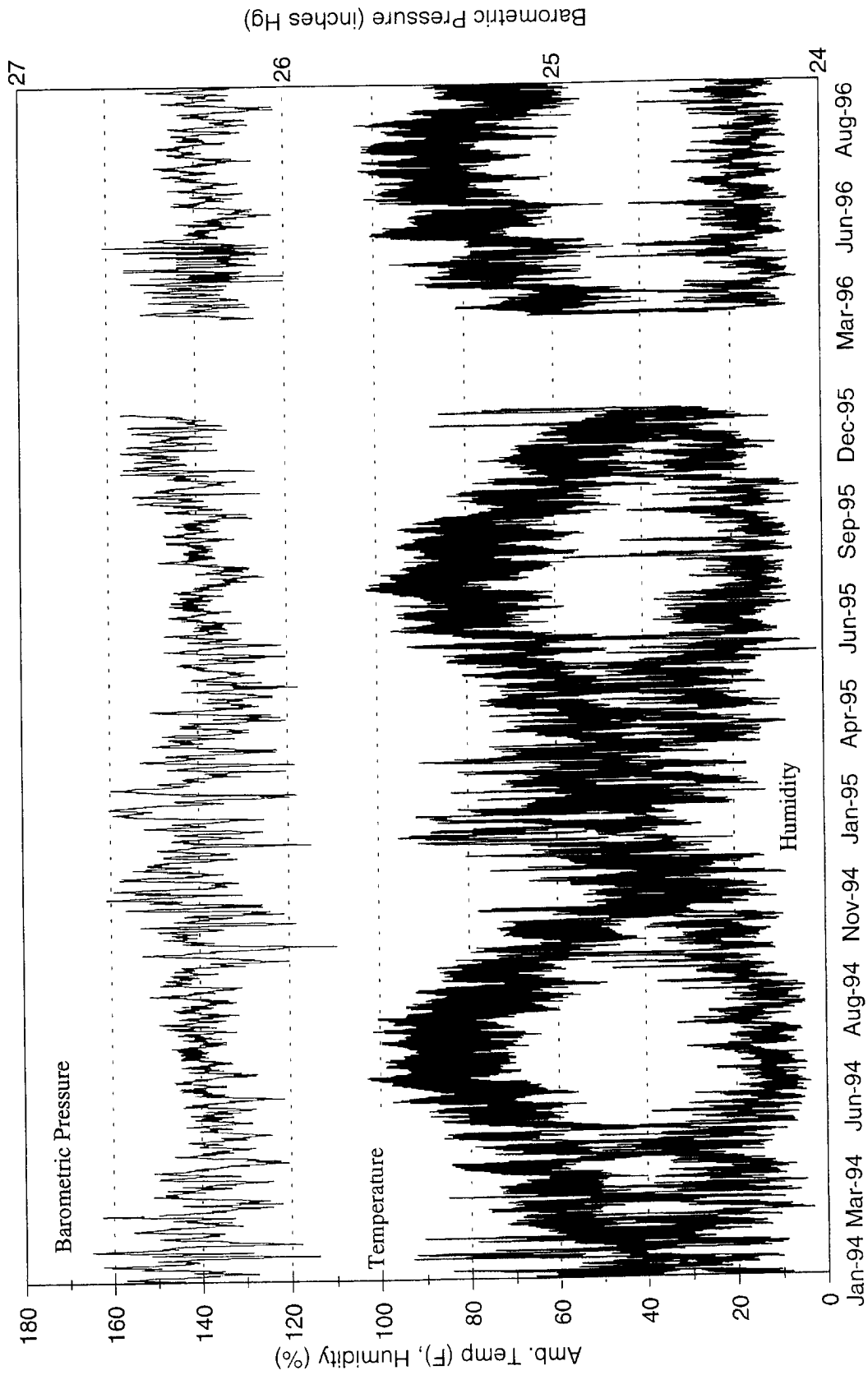


FIGURE 20. Weather Station One, Hourly Data, 19 January 1994 Through 30 September 1996.

# WATER ANALYSIS OF COSO HOT SPRINGS AREA

Water samples were collected from several sites in the Coso Hot Springs area. These samples were analyzed for a suite of geothermal constituents by NAWCWPNS' Environmental Analysis Facility. The results are provided in Table 7. Wells 4K-1, Coso No. 1 (4H-4), 4P-1, and 4K-1, as well as sites at Devils Kitchen, South Pool, West Canyon, Nichol Pool, Nichol Prospect and the West Canyon were analyzed.

TABLE 7. Chemical Analysis of Coso Area Surface and Near-Surface Thermal Waters.

| Constituents | Units    | 4A-1<br>2/28/96 | 4K-1<br>2/28/96 | 4P-1<br>2/28/96 | Coso Well<br>No. 1<br>2/28/96 | Devils<br>Kitchen<br>2/28/96 | Nichol<br>Pool<br>2/28/96 | South<br>Pool<br>2/28/96 | West<br>Canyon<br>2/28/96 |
|--------------|----------|-----------------|-----------------|-----------------|-------------------------------|------------------------------|---------------------------|--------------------------|---------------------------|
| Aluminum     | mg/L     | a               | 0.06            | 0.07            | 0.31                          | 15.2                         | 2.54                      | 61.4                     | 0.22                      |
| Antimony     | mg/L     | a               | a               | a               | 8.80                          | a                            | a                         | a                        | a                         |
| Arsenic      | mg/L     | a               | a               | 0.07            | 4.47                          | 0.16                         | 0.76                      | 0.44                     | a                         |
| Barium       | mg/L     | 0.09            | a               | 0.11            | 0.09                          | a                            | 0.09                      | a                        | 0.06                      |
| Bicarbonate  | mg/L     | 84.30           | 41.50           | 86.90           | 223                           | a                            | a                         | a                        | 1.32                      |
| Boron        | mg/L     | 0.05            | 0.205           | 0.09            | 1.35                          | 3.35                         | 49.3                      | 9.12                     | 0.11                      |
| Bromide      | mg/L     | a               | 0.160           | 0.191           | 3.56                          | a                            | 3.42                      | a                        | a                         |
| Calcium      | mg/L     | 27.00           | 3.21            | 92.00           | 3.10                          | 55.3                         | 48.9                      | 148                      | 78.5                      |
| Carbonate    | mg/L     | 0.269           | 0.854           | 0.290           | 1520                          | a                            | a                         | a                        | a                         |
| Chloride     | mg/L     | 2.00            | 4.27            | 18.9            | 881                           | 3.34                         | 1140                      | 5.16                     | 6.51                      |
| Conductivity | µmhos/cm | 350             | 238             | 1400            | 18400                         | 5180                         | 5060                      | 3070                     | 1250                      |
| Copper       | mg/L     | a               | a               | a               | a                             | a                            | 0.05                      | 0.55                     | a                         |
| Fluoride     | mg/L     | 0.04            | 1.29            | a               | 69.00                         | a                            | 0.086                     | a                        | 0.158                     |
| Hydroxide    | mg/L     | 0.012           | 0.008           | 0.012           | 25.388                        | 0.000                        | 0.000                     | 0.000                    | 0.000                     |
| Iron         | mg/L     | 0.09            | 1.66            | 0.99            | 0.14                          | 51.50                        | 30.5                      | 141                      | 2.98                      |
| Lithium      | mg/L     | a               | 0.06            | 0.08            | 51.5                          | 0.08                         | 3.59                      | 0.11                     | 0.05                      |
| Magnesium    | mg/L     | 0.13            | 0.12            | 0.83            | a                             | 21.4                         | 8.05                      | 64.00                    | 13.2                      |
| Manganese    | mg/L     | 0.06            | a               | 0.46            | a                             | 1.44                         | 1.16                      | 4.28                     | 3.02                      |
| Mercury      | mg/L     | a               | 0.00109         | 0.00438         | a                             | a                            | 0.00115                   | a                        | 0.00067                   |
| pH           | pH units | 7.84            | 7.65            | 7.86            | 11.17                         | 2.00                         | 2.40                      | 2.50                     | 4.94                      |
| Potassium    | mg/L     | 2.33            | 7.19            | 80.00           | 270                           | 32.5                         | 115                       | 24.2                     | 30.3                      |
| Selenium     | mg/L     | 0.05            | 1.41            | 0.05            | 1.92                          | a                            | 0.903                     | a                        | a                         |
| Silica       | mg/L     | 84.2            | 118             | 125             | 3340                          | 277                          | 316                       | 241                      | 263                       |
| Sodium       | mg/L     | 54.8            | 41.9            | 163             | 3860                          | 37                           | 720                       | 41.00                    | 108                       |
| Strontium    | mg/L     | 0.33            | a               | 1.36            | 0.89                          | 0.08                         | 0.16                      | 0.06                     | 0.20                      |
| Sulfate      | mg/L     | 98.3            | 63.3            | 532             | 1510                          | 1110                         | 478                       | 1880                     | 557                       |
| TDS          | mg/L     | 327             | 429             | 1460            | 14900                         | 1640                         | 2980                      | 2930                     | 1160                      |
| Thallium     | mg/L     | a               | a               | a               | 0.04                          | a                            | a                         | a                        | a                         |
| Zinc         | mg/L     | a               | 0.15            | 0.35            | 2.76                          | 0.14                         | 0.15                      | 1.34                     | 0.12                      |

<sup>a</sup> None detected.



**TEMPERATURE RECORDINGS OF THE COSO RESORT AREA WELLS**

The temperature logs from Wells 4K-1, 4P-1, and Coso No. 1 are graphed in Figure 21, with the data listed in Tables 8 through 10. These data were recorded using the TD Probe System, manufactured by Natural Progress Instruments, Dallas, Texas.

TABLE 8. Temperature Recordings at Well 4K-1.

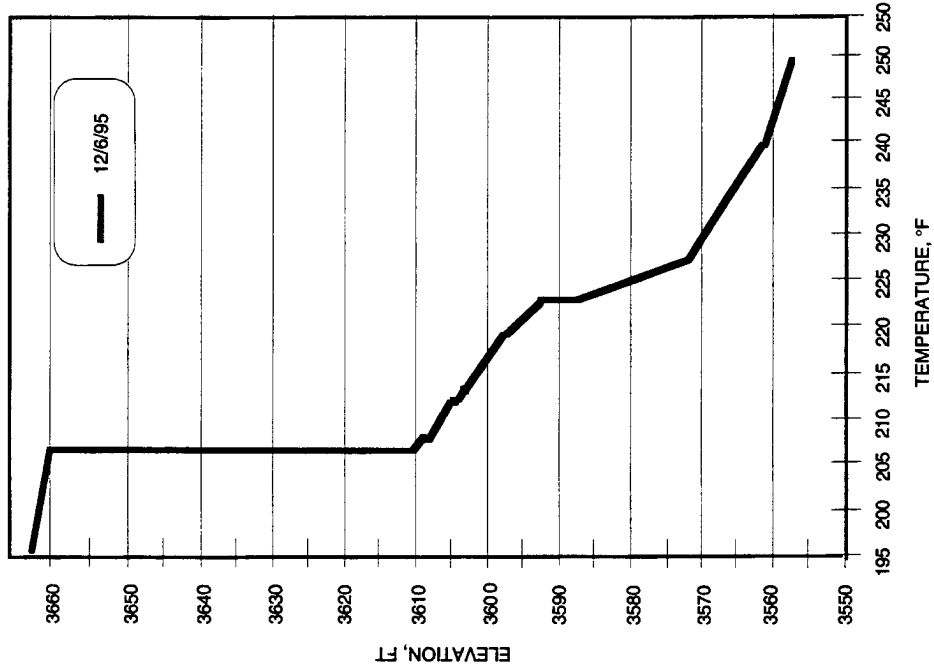
| Depth, ft | Elevation, ft AMSL | Temperature °F<br>on 12/06/96 |
|-----------|--------------------|-------------------------------|
| 0         | 3658               | 206.0                         |
| -5        | 3653               | 206.0                         |
| -10       | 3648               | 206.0                         |
| -15       | 3643               | 206.0                         |
| -20       | 3638               | 206.0                         |
| -25       | 3633               | 206.0                         |
| -30       | 3628               | 206.0                         |
| -35       | 3623               | 206.0                         |
| -40       | 3618               | 206.0                         |
| -45       | 3613               | 206.0                         |
| -50       | 3608               | 206.0                         |
| -51       | 3607               | 206.0                         |
| -52       | 3606               | 206.0                         |
| -53       | 3605               | 207.9                         |
| -54       | 3604               | 208.9                         |
| -55       | 3603               | 208.9                         |
| -60       | 3598               | 211.0                         |
| -65       | 3593               | 211.0                         |
| -70       | 3588               | 211.0                         |
| -75       | 3583               | 212.1                         |
| -80       | 3578               | 212.1                         |

TABLE 9. Temperature Recordings at Well 4P-1.

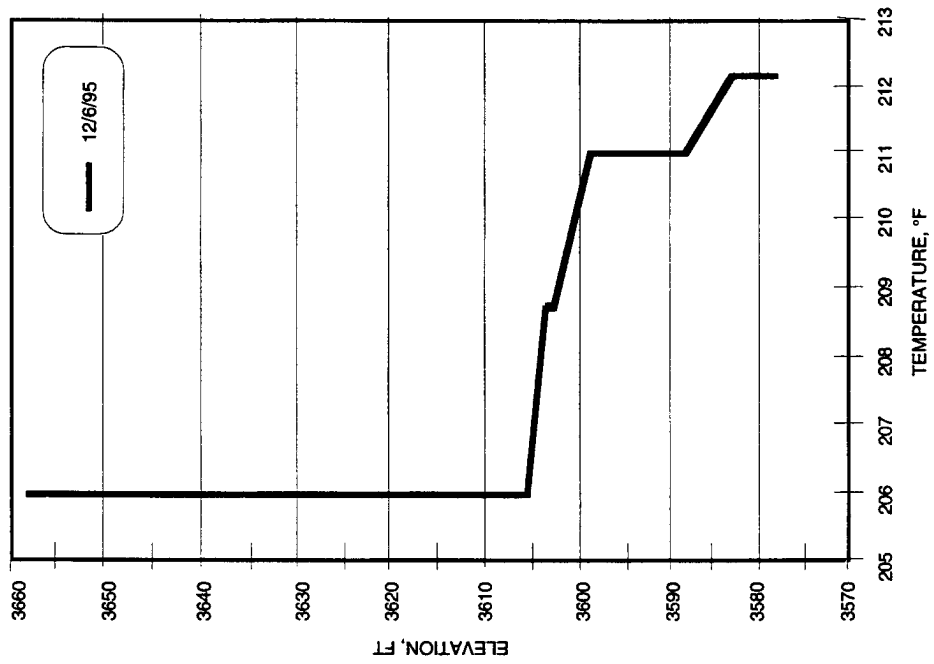
| Depth, ft | Elevation, ft AMSL | Temperature °F<br>on 12/6/96 |
|-----------|--------------------|------------------------------|
| 0         | 3662               | 195.7                        |
| -5        | 3657               | 205.8                        |
| -10       | 3652               | 205.8                        |
| -15       | 3647               | 205.8                        |
| -20       | 3642               | 205.8                        |
| -25       | 3637               | 205.8                        |
| -30       | 3632               | 205.8                        |
| -35       | 3627               | 205.8                        |
| -40       | 3622               | 205.8                        |
| -45       | 3617               | 205.8                        |
| -50       | 3612               | 205.8                        |
| -51       | 3611               | 205.8                        |
| -52       | 3610               | 206.9                        |
| -53       | 3609               | 207.9                        |
| -54       | 3608               | 207.9                        |
| -55       | 3607               | 208.9                        |
| -56       | 3606               | 211.0                        |
| -57       | 3605               | 211.0                        |
| -58       | 3604               | 212.1                        |
| -59       | 3603               | 212.1                        |
| -60       | 3602               | 213.2                        |
| -65       | 3597               | 219.0                        |
| -70       | 3592               | 222.8                        |
| -75       | 3587               | 222.8                        |
| -80       | 3582               | 224.2                        |
| -85       | 3577               | 225.5                        |
| -90       | 3572               | 226.9                        |
| -95       | 3567               | 234.7                        |
| -100      | 3562               | 239.9                        |
| -102      | 3560               | 243.7                        |
| -105      | 3557               | 249.9                        |

TABLE 10. Temperature Recordings at Coso No. 1.

| Depth, ft | Elevation, ft AMSL | Temperature °F<br>on 12/6/96 |
|-----------|--------------------|------------------------------|
| 0         | 3615               | 251.5                        |
| -10       | 3605               | 251.5                        |
| -20       | 2595               | 251.5                        |
| -30       | 2585               | 252.0                        |
| -40       | 2575               | 252.0                        |
| -50       | 2565               | 252.0                        |
| -60       | 2555               | 252.0                        |
| -70       | 2545               | 252.0                        |
| -80       | 2535               | 252.1                        |
| -90       | 2525               | 252.1                        |
| -100      | 2515               | 252.1                        |
| -110      | 2505               | 252.1                        |
| -120      | 2495               | 252.1                        |
| -130      | 2485               | 252.2                        |
| -140      | 2475               | 252.2                        |
| -150      | 2465               | 252.2                        |
| -160      | 2455               | 252.2                        |
| -170      | 2445               | 252.2                        |
| -180      | 2435               | 252.2                        |
| -190      | 2425               | 252.3                        |
| -200      | 2415               | 252.3                        |
| -210      | 2405               | 252.3                        |
| -220      | 2395               | 252.3                        |
| -230      | 2385               | 252.4                        |
| -240      | 2375               | 252.4                        |
| -250      | 2365               | 252.4                        |
| -260      | 2355               | 252.4                        |
| -270      | 2345               | 252.4                        |
| -280      | 2335               | 252.4                        |
| -290      | 2325               | 252.4                        |
| -300      | 2315               | 252.4                        |
| -305      | 2310               | 252.4                        |
| -310      | 2305               | 252.4                        |
| -315      | 2300               | 252.4                        |
| -320      | 2295               | 255.8                        |
| -321      | 2294               | 257.3                        |
| -322      | 2293               | 257.7                        |
| -323      | 2292               | 258.8                        |
| -324      | 2291               | 259.0                        |
| -325      | 2290               | 259.4                        |
| -326      | 2289               | 259.6                        |
| -327      | 2288               | 259.9                        |
| -328      | 2287               | 260.1                        |
| -329      | 2286               | 260.1                        |
| -330      | 2285               | 260.7                        |
| -331      | 2284               | 261.0                        |
| -332      | 2283               | 261.3                        |
| -335      | 2282               | 261.9                        |
| -340      | 2281               | 263.0                        |
| -345      | 2276               | 264.3                        |
| -350      | 2271               | 264.9                        |
| -355      | 2266               | 265.4                        |
| -356      | 2267               | 265.8                        |

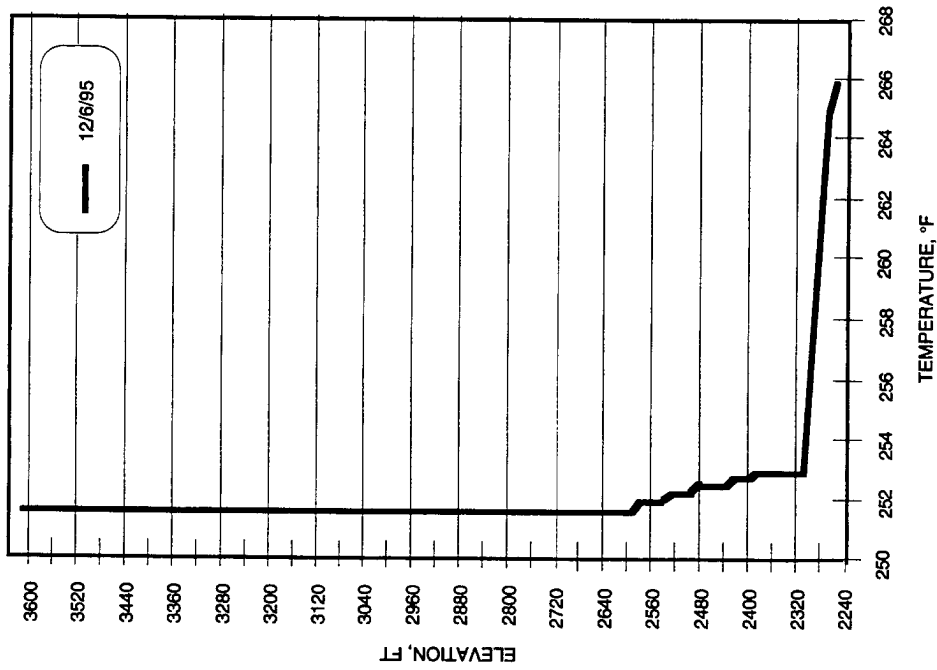


b. Well 4P-1 Temperature Gradient Log.



a. Well 4K-1 Temperature Gradient Log.

FIGURE 21. Temperature Profiles.



c. Coso No. 1 Temperature Gradient Log.

FIGURE 21. (Contd.)

## OTHER GEOTHERMAL ACTIVITY AT COSO HOT SPRINGS

### WEST CANYONS

The two west canyons are located approximately 0.7 km west of the Coso Resort area and on a course perpendicular to the strike-slip fault that runs north and south through the Coso Hot Springs area (Figure 1).

The southerly canyon (Figure 9), which has rain station No. 2 located at the west end, consists of hydrothermal alteration and scattered thermal activity both in the canyon and a wide area at the mouth of the canyon. The geology of this canyon indicates an extensive period of thermal activity, as well as historic fluctuation of these thermal features. The prominent area of activity in the canyon includes an active steam vent bordering a vigorously boiling pool. At a greater distance up the canyon are two diminutive steam vents, small springs and fossil hot spring terrace deposits. Thermal activity in these areas is sporadic, depending upon climatic conditions. No notable changes in the level of thermal activity have occurred here during this reporting period.

The northerly west canyon (Figures 10, 11) holds an extensive area of hydrothermal alteration and fossil hot spring deposits. Present thermal activity is limited to warm-to-hot ground with a small number of steam vents. The earth slump, first noted in NAWS-CL TP 001, has continued to stabilize during the past year. Much of the slump area is warm-to-hot, with steam emanating from multiple vents, specifically along the face of the slump. The small pools of mud and steam condense, noted in last years summary, are still present to the west of the slump.

One of the indicators of newly heated ground is the die-off of vegetation. The distribution of plant life in these canyons has stayed essentially unchanged. As a whole, these sites appear to be unchanged from last year.

## DISCUSSION AND SUMMARY

The data recovered from each of the steam flow monitoring sites: Devils Kitchen, Well 4H-4, and Schober's Resort are considerably less erratic this year than the data recovered in the past several years. This may be due to the new recording equipment and a formal periodic maintenance and calibration schedule, although this apparent stability could also be due to a stabilization of the thermal flux in the hot springs area. Continued monitoring of these sites may better define this issue.

The water level in well 4P-1 slowly continues to rise—about 21 feet since the beginning of the monitoring program in 1978. Most of this water level rise has occurred since 1989. The water in this well is predominately a steam condensate and probably represents a small perched water table.

In contrast to well 4P-1, the water level in well OB-1 continues to drop slightly. Well OB-1 is located adjacent to the south side of Coso Wash and is clearly set in valley fill sediments, so it is unclear why the level has dropped some 40 feet since 1988. While water analyses indicate a partial geothermal fluid component, the predominant water source is clearly inflow of meteoric water from the mountains to the north and east. The groundwater around well OB-1 may still be responding to relatively low rainfall conditions in the region from 1985 through 1990, or the groundwater may just be seeking equilibrium with groundwater on the north side of the wash (represented by well OB-2).

As discussed in previous monitoring reports, the water level in Coso No. 1 is clearly influenced by the thermal activity along the hot springs fault. The level has dropped about 175 feet since 1984 due to a significant influx of heat and boiling-off of water. Since the wellhead was repaired and the well shut in, the water level appears to have stabilized.

There has been no significant change in thermal activity at the South Pool this past year. The water level continues to fluctuate seasonally, as does the water temperature, which exhibits about a fifteen degree (F) seasonal variation.

### Additional observations:

During this reporting period, the central Coso Fault thermal area has remained very stable. The thermal area includes the old corrosion array, the Coso Resort mudfield, the South Pool, and the smaller pool and pots in between. No new mud pots have appeared here and the existing mud pots, craters, and fumaroles have not changed in appearance.

The surface ground temperatures at previously recognized hot spots both around the Upper Coso Wash Valley and along the periphery of the Coso Fault system have remained stable during the monitoring period. A hot spot is identified by warm-to-hot near-surface temperatures, discolored (cooked) soil, and/or die-off of vegetation. The shallow-rooted grasses, scrubs and deep-rooted creosote bushes that grew in these hot spots have remained the same since the last monitoring period. Some specific vegetation recovery areas are: along the fault line North of

Schober's Resort, in the northerly west canyon, around and south of well 4P-1, and in several areas in the valley east of Schober's Resort.

This year's data, particularly data obtained from the surface pools, pots, fumaroles, and hot spots, indicate seasonal fluctuation in temperatures and water levels; however, no significant increase or decrease of activity is occurring or has occurred during this monitoring period. Continuance of this monitoring program will enable us to determine if this stable trend continues.



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**Appendix**

**DAILY STEAM FLOW**

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 10/01/95                                     | 511        | 492       | 498       |  | 10/01/95                                | 296        | 278       | 283       |  | 10/01/95                                | 930        | 919       | 926       |  |
| 10/02/95                                     | 509        | 481       | 494       |  | 10/02/95                                | 288        | 270       | 278       |  | 10/02/95                                | 935        | 924       | 929       |  |
| 10/03/95                                     | 529        | 497       | 515       |  | 10/03/95                                | 333        | 279       | 304       |  | 10/03/95                                | 960        | 930       | 941       |  |
| 10/04/95                                     | 519        | 480       | 496       |  | 10/04/95                                | 323        | 269       | 290       |  | 10/04/95                                | 953        | 925       | 934       |  |
| 10/05/95                                     | 504        | 482       | 493       |  | 10/05/95                                | 275        | 262       | 268       |  | 10/05/95                                | 929        | 922       | 925       |  |
| 10/06/95                                     | 524        | 496       | 509       |  | 10/06/95                                | 310        | 272       | 289       |  | 10/06/95                                | 937        | 921       | 929       |  |
| 10/07/95                                     | 515        | 496       | 507       |  | 10/07/95                                | 304        | 279       | 297       |  | 10/07/95                                | 936        | 929       | 934       |  |
| 10/08/95                                     | 508        | 490       | 498       |  | 10/08/95                                | 291        | 274       | 281       |  | 10/08/95                                | 940        | 929       | 934       |  |
| 10/09/95                                     | 500        | 487       | 494       |  | 10/09/95                                | 285        | 270       | 280       |  | 10/09/95                                | 939        | 930       | 934       |  |
| 10/10/95                                     | 529        | 480       | 490       |  | 10/10/95                                | 283        | 267       | 275       |  | 10/10/95                                | 939        | 927       | 932       |  |
| 10/11/95                                     | 508        | 493       | 499       |  | 10/11/95                                | 300        | 281       | 290       |  | 10/11/95                                | 938        | 927       | 932       |  |
| 10/12/95                                     | 502        | 481       | 495       |  | 10/12/95                                | 299        | 277       | 292       |  | 10/12/95                                | 938        | 929       | 934       |  |
| 10/13/95                                     | 489        | 469       | 478       |  | 10/13/95                                | 278        | 261       | 269       |  | 10/13/95                                | 933        | 924       | 929       |  |
| 10/14/95                                     | 491        | 474       | 481       |  | 10/14/95                                | 282        | 263       | 270       |  | 10/14/95                                | 931        | 924       | 928       |  |
| 10/15/95                                     | 508        | 484       | 494       |  | 10/15/95                                | 300        | 274       | 285       |  | 10/15/95                                | 940        | 924       | 932       |  |
| 10/16/95                                     | 502        | 492       | 497       |  | 10/16/95                                | 303        | 292       | 299       |  | 10/16/95                                | 940        | 933       | 938       |  |
| 10/17/95                                     | 495        | 474       | 488       |  | 10/17/95                                | 292        | 282       | 286       |  | 10/17/95                                | 945        | 931       | 937       |  |
| 10/18/95                                     | 496        | 481       | 489       |  | 10/18/95                                | 286        | 277       | 283       |  | 10/18/95                                | 945        | 933       | 938       |  |
| 10/19/95                                     | 482        | 464       | 473       |  | 10/19/95                                | 277        | 259       | 265       |  | 10/19/95                                | 938        | 926       | 932       |  |
| 10/20/95                                     | 496        | 470       | 483       |  | 10/20/95                                | 297        | 259       | 278       |  | 10/20/95                                | 938        | 926       | 930       |  |
| 10/21/95                                     | 517        | 493       | 498       |  | 10/21/95                                | 348        | 295       | 320       |  | 10/21/95                                | 960        | 931       | 944       |  |
| 10/22/95                                     | 508        | 467       | 474       |  | 10/22/95                                | 332        | 265       | 283       |  | 10/22/95                                | 953        | 913       | 925       |  |
| 10/23/95                                     | 485        | 464       | 473       |  | 10/23/95                                | 280        | 262       | 269       |  | 10/23/95                                | 922        | 913       | 917       |  |
| 10/24/95                                     | 491        | 469       | 481       |  | 10/24/95                                | 282        | 272       | 275       |  | 10/24/95                                | 922        | 910       | 917       |  |
| 10/25/95                                     | 494        | 479       | 484       |  | 10/25/95                                | 289        | 277       | 281       |  | 10/25/95                                | 926        | 912       | 919       |  |
| 10/26/95                                     | 499        | 482       | 490       |  | 10/26/95                                | 299        | 279       | 288       |  | 10/26/95                                | 940        | 919       | 928       |  |
| 10/27/95                                     | 500        | 488       | 495       |  | 10/27/95                                | 303        | 292       | 296       |  | 10/27/95                                | 946        | 933       | 939       |  |
| 10/28/95                                     | 499        | 491       | 495       |  | 10/28/95                                | 299        | 292       | 296       |  | 10/28/95                                | 946        | 939       | 945       |  |
| 10/29/95                                     | 495        | 481       | 490       |  | 10/29/95                                | 296        | 283       | 291       |  | 10/29/95                                | 946        | 939       | 944       |  |
| 10/30/95                                     | 495        | 477       | 486       |  | 10/30/95                                | 299        | 281       | 287       |  | 10/30/95                                | 946        | 939       | 945       |  |
| 10/31/95                                     | 498        | 480       | 490       |  | 10/31/95                                | 337        | 290       | 296       |  | 10/31/95                                | 948        | 937       | 946       |  |
| 11/01/95                                     | 491        | 472       | 480       |  | 11/01/95                                | 296        | 263       | 280       |  | 11/01/95                                | 951        | 941       | 946       |  |
| 11/02/95                                     | 478        | 467       | 473       |  | 11/02/95                                | 274        | 258       | 265       |  | 11/02/95                                | 948        | 939       | 944       |  |
| 11/03/95                                     | 484        | 471       | 478       |  | 11/03/95                                | 282        | 261       | 270       |  | 11/03/95                                | 948        | 939       | 944       |  |
| 11/04/95                                     | 485        | 476       | 481       |  | 11/04/95                                | 281        | 269       | 274       |  | 11/04/95                                | 948        | 939       | 944       |  |
| 11/05/95                                     | 498        | 478       | 486       |  | 11/05/95                                | 293        | 269       | 280       |  | 11/05/95                                | 950        | 939       | 944       |  |
| 11/06/95                                     | 494        | 472       | 484       |  | 11/06/95                                | 292        | 257       | 280       |  | 11/06/95                                | 948        | 939       | 945       |  |
| 11/07/95                                     | 522        | 462       | 474       |  | 11/07/95                                | 294        | 244       | 254       |  | 11/07/95                                | 943        | 932       | 936       |  |
| 11/08/95                                     | 502        | 477       | 489       |  | 11/08/95                                | 300        | 259       | 279       |  | 11/08/95                                |            |           |           |  |
| 11/09/95                                     | 521        | 471       | 489       |  | 11/09/95                                | 334        | 299       | 314       |  | 11/09/95                                | 975        | 939       | 956       |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 11/10/95                                     | 505        | 460       | 478       |  | 11/10/95                                | 313        | 237       | 273       |  | 11/10/95                                | 970        | 927       | 948       |  |
| 11/11/95                                     | 485        | 460       | 472       |  | 11/11/95                                | 262        | 235       | 248       |  | 11/11/95                                | 936        | 925       | 931       |  |
| 11/12/95                                     | 493        | 479       | 485       |  | 11/12/95                                | 283        | 260       | 268       |  | 11/12/95                                | 945        | 927       | 935       |  |
| 11/13/95                                     | 495        | 479       | 486       |  | 11/13/95                                | 284        | 265       | 272       |  | 11/13/95                                | 945        | 932       | 936       |  |
| 11/14/95                                     | 503        | 479       | 487       |  | 11/14/95                                | 305        | 279       | 289       |  | 11/14/95                                | 966        | 934       | 946       |  |
| 11/15/95                                     | 497        | 479       | 487       |  | 11/15/95                                | 292        | 279       | 287       |  | 11/15/95                                | 954        | 945       | 950       |  |
| 11/16/95                                     | 491        | 478       | 485       |  | 11/16/95                                | 279        | 262       | 273       |  | 11/16/95                                | 952        | 945       | 947       |  |
| 11/17/95                                     | 492        | 475       | 483       |  | 11/17/95                                | 267        | 258       | 263       |  | 11/17/95                                | 947        | 938       | 944       |  |
| 11/18/95                                     | 497        | 479       | 487       |  | 11/18/95                                | 290        | 264       | 275       |  | 11/18/95                                | 950        | 938       | 944       |  |
| 11/19/95                                     | 497        | 480       | 487       |  | 11/19/95                                | 290        | 271       | 282       |  | 11/19/95                                | 950        | 941       | 946       |  |
| 11/20/95                                     | 491        | 475       | 483       |  | 11/20/95                                | 272        | 259       | 265       |  | 11/20/95                                | 947        | 938       | 944       |  |
| 11/21/95                                     | 503        | 478       | 490       |  | 11/21/95                                | 294        | 264       | 273       |  | 11/21/95                                | 951        | 936       | 952       |  |
| 11/22/95                                     | 492        | 478       | 487       |  | 11/22/95                                | 280        | 277       | 279       |  | 11/22/95                                | 956        | 945       | 950       |  |
| 11/23/95                                     | 491        | 478       | 485       |  | 11/23/95                                | 278        | 263       | 269       |  | 11/23/95                                | 949        | 938       | 945       |  |
| 11/24/95                                     | 496        | 478       | 487       |  | 11/24/95                                | 271        | 263       | 266       |  | 11/24/95                                | 949        | 938       | 943       |  |
| 11/25/95                                     | 503        | 484       | 493       |  | 11/25/95                                | 300        | 267       | 283       |  | 11/25/95                                | 956        | 940       | 948       |  |
| 11/26/95                                     | 502        | 483       | 487       |  | 11/26/95                                | 313        | 271       | 293       |  | 11/26/95                                | 954        | 940       | 948       |  |
| 11/27/95                                     | 491        | 478       | 487       |  | 11/27/95                                | 275        | 258       | 266       |  | 11/27/95                                | 945        | 931       | 936       |  |
| 11/28/95                                     | 492        | 478       | 487       |  | 11/28/95                                | 309        | 257       | 262       |  | 11/28/95                                | 943        | 929       | 936       |  |
| 11/29/95                                     | 500        | 484       | 493       |  | 11/29/95                                | 271        | 256       | 262       |  | 11/29/95                                | 942        | 931       | 936       |  |
| 11/30/95                                     | 503        | 489       | 496       |  | 11/30/95                                | 290        | 268       | 279       |  | 11/30/95                                | 945        | 933       | 938       |  |
| 12/01/95                                     | 503        | 484       | 493       |  | 12/01/95                                | 306        | 285       | 292       |  | 12/01/95                                | 951        | 938       | 942       |  |
| 12/02/95                                     | 496        | 483       | 489       |  | 12/02/95                                | 289        | 257       | 274       |  | 12/02/95                                | 945        | 931       | 941       |  |
| 12/03/95                                     | 497        | 484       | 490       |  | 12/03/95                                | 271        | 254       | 260       |  | 12/03/95                                | 942        | 931       | 935       |  |
| 12/04/95                                     | 500        | 484       | 493       |  | 12/04/95                                | 281        | 261       | 268       |  | 12/04/95                                | 945        | 931       | 937       |  |
| 12/05/95                                     | 497        | 484       | 487       |  | 12/05/95                                | 284        | 267       | 274       |  | 12/05/95                                | 947        | 931       | 939       |  |
| 12/06/95                                     | 497        | 487       | 492       |  | 12/06/95                                | 276        | 270       | 273       |  | 12/06/95                                | 945        | 933       | 940       |  |
| 12/07/95                                     | 503        | 489       | 496       |  | 12/07/95                                | 284        | 259       | 278       |  | 12/07/95                                | 945        | 933       | 940       |  |
| 12/08/95                                     | 496        | 484       | 487       |  | 12/08/95                                | 260        | 253       | 256       |  | 12/08/95                                | 942        | 931       | 936       |  |
| 12/09/95                                     | 496        | 483       | 482       |  | 12/09/95                                | 262        | 248       | 254       |  | 12/09/95                                | 938        | 926       | 932       |  |
| 12/10/95                                     | 497        | 483       | 489       |  | 12/10/95                                | 269        | 247       | 257       |  | 12/10/95                                | 938        | 926       | 931       |  |
| 12/11/95                                     | 497        | 489       | 493       |  | 12/11/95                                | 285        | 267       | 276       |  | 12/11/95                                | 938        | 931       | 933       |  |
| 12/12/95                                     | 497        | 479       | 487       |  | 12/12/95                                | 299        | 283       | 283       |  | 12/12/95                                | 947        | 933       | 934       |  |
| 12/13/95                                     | 491        | 478       | 485       |  | 12/13/95                                | 287        | 271       | 282       |  | 12/13/95                                |            |           |           |  |
| 12/14/95                                     | 492        | 475       | 483       |  | 12/14/95                                | 284        | 239       | 253       |  | 12/14/95                                |            |           |           |  |
| 12/15/95                                     | 497        | 479       | 487       |  | 12/15/95                                | 303        | 240       | 273       |  | 12/15/95                                |            |           |           |  |
| 12/16/95                                     | 497        | 480       | 487       |  | 12/16/95                                | 303        | 278       | 296       |  | 12/16/95                                |            |           |           |  |
| 12/17/95                                     | 491        | 475       | 483       |  | 12/17/95                                | 281        | 276       | 279       |  | 12/17/95                                |            |           |           |  |
| 12/18/95                                     | 503        | 478       | 490       |  | 12/18/95                                | 279        | 275       | 277       |  | 12/18/95                                |            |           |           |  |
| 12/19/95                                     | 492        | 478       | 487       |  | 12/19/95                                | 287        | 274       | 279       |  | 12/19/95                                |            |           |           |  |
| 12/20/95                                     | 491        | 478       | 485       |  | 12/20/95                                | 295        | 277       | 286       |  | 12/20/95                                |            |           |           |  |
| 12/21/95                                     | 496        | 478       | 487       |  | 12/21/95                                | 281        | 267       | 276       |  | 12/21/95                                |            |           |           |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 12/22/95                                     | 503        | 484       | 493       |  | 12/22/95                                | 275        | 265       | 269       |  | 12/22/95                                |            |           |           |  |
| 12/23/95                                     | 502        | 483       | 487       |  | 12/23/95                                | 285        | 269       | 275       |  | 12/23/95                                |            |           |           |  |
| 12/24/95                                     | 491        | 478       | 487       |  | 12/24/95                                | 270        | 262       | 267       |  | 12/24/95                                |            |           |           |  |
| 12/25/95                                     | 500        | 484       | 493       |  | 12/25/95                                | 285        | 264       | 272       |  | 12/25/95                                |            |           |           |  |
| 12/26/95                                     | 500        | 488       | 493       |  | 12/26/95                                | 292        | 277       | 283       |  | 12/26/95                                |            |           |           |  |
| 12/27/95                                     | 501        | 488       | 494       |  | 12/27/95                                | 303        | 285       | 291       |  | 12/27/95                                | 933        | 928       | 932       |  |
| 12/28/95                                     | 498        | 486       | 491       |  | 12/28/95                                | 303        | 281       | 296       |  | 12/28/95                                | 937        | 925       | 931       |  |
| 12/29/95                                     | 497        | 488       | 493       |  | 12/29/95                                | 295        | 276       | 284       |  | 12/29/95                                | 930        | 922       | 927       |  |
| 12/30/95                                     | 503        | 484       | 493       |  | 12/30/95                                | 295        | 288       | 293       |  | 12/30/95                                | 935        | 924       | 930       |  |
| 12/31/95                                     | 499        | 483       | 491       |  | 12/31/95                                | 319        | 283       | 298       |  | 12/31/95                                | 941        | 928       | 933       |  |
| 01/01/96                                     | 496        | 484       | 491       |  | 01/01/96                                | 291        | 277       | 284       |  | 01/01/96                                | 934        | 915       | 924       |  |
| 01/02/96                                     | 500        | 488       | 494       |  | 01/02/96                                | 289        | 277       | 284       |  | 01/02/96                                | 926        | 910       | 919       |  |
| 01/03/96                                     | 509        | 500       | 505       |  | 01/03/96                                | 334        | 280       | 309       |  | 01/03/96                                | 939        | 914       | 931       |  |
| 01/04/96                                     | 508        | 488       | 499       |  | 01/04/96                                | 331        | 290       | 315       |  | 01/04/96                                | 947        | 935       | 942       |  |
| 01/05/96                                     | 496        | 485       | 491       |  | 01/05/96                                | 291        | 262       | 284       |  | 01/05/96                                | 940        | 923       | 933       |  |
| 01/06/96                                     | 491        | 479       | 485       |  | 01/06/96                                | 264        | 251       | 260       |  | 01/06/96                                | 925        | 915       | 919       |  |
| 01/07/96                                     | 501        | 483       | 490       |  | 01/07/96                                | 296        | 261       | 277       |  | 01/07/96                                | 929        | 915       | 920       |  |
| 01/08/96                                     | 503        | 489       | 495       |  | 01/08/96                                | 302        | 292       | 297       |  | 01/08/96                                | 928        | 917       | 922       |  |
| 01/09/96                                     | 503        | 485       | 494       |  | 01/09/96                                | 311        | 296       | 302       |  | 01/09/96                                | 947        | 918       | 927       |  |
| 01/10/96                                     | 493        | 479       | 485       |  | 01/10/96                                | 305        | 264       | 282       |  | 01/10/96                                | 933        | 899       | 915       |  |
| 01/11/96                                     | 495        | 480       | 487       |  | 01/11/96                                | 283        | 262       | 271       |  | 01/11/96                                | 926        | 905       | 912       |  |
| 01/12/96                                     | 508        | 488       | 499       |  | 01/12/96                                | 316        | 280       | 297       |  | 01/12/96                                | 910        | 901       | 903       |  |
| 01/13/96                                     | 498        | 485       | 492       |  | 01/13/96                                | 321        | 307       | 311       |  | 01/13/96                                | 910        | 889       | 897       |  |
| 01/14/96                                     | 507        | 488       | 496       |  | 01/14/96                                | 309        | 295       | 301       |  | 01/14/96                                | 894        | 886       | 887       |  |
| 01/15/96                                     | 497        | 484       | 491       |  | 01/15/96                                | 324        | 293       | 306       |  | 01/15/96                                | 899        | 889       | 892       |  |
| 01/16/96                                     | 492        | 479       | 486       |  | 01/16/96                                | 362        | 318       | 336       |  | 01/16/96                                | 896        | 880       | 886       |  |
| 01/17/96                                     | 494        | 480       | 487       |  | 01/17/96                                | 360        | 269       | 315       |  | 01/17/96                                | 887        | 873       | 878       |  |
| 01/18/96                                     | 498        | 479       | 491       |  | 01/18/96                                | 299        | 265       | 278       |  | 01/18/96                                | 879        | 873       | 873       |  |
| 01/19/96                                     | 497        | 478       | 489       |  | 01/19/96                                | 310        | 271       | 298       |  | 01/19/96                                | 887        | 873       | 876       |  |
| 01/20/96                                     | 495        | 478       | 487       |  | 01/20/96                                | 280        | 257       | 268       |  | 01/20/96                                | 879        | 862       | 866       |  |
| 01/21/96                                     | 504        | 487       | 494       |  | 01/21/96                                | 329        | 280       | 312       |  | 01/21/96                                | 894        | 866       | 873       |  |
| 01/22/96                                     | 503        | 485       | 494       |  | 01/22/96                                | 325        | 265       | 297       |  | 01/22/96                                | 894        | 886       | 887       |  |
| 01/23/96                                     | 493        | 479       | 485       |  | 01/23/96                                | 273        | 255       | 264       |  | 01/23/96                                | 894        | 886       | 887       |  |
| 01/24/96                                     | 495        | 480       | 487       |  | 01/24/96                                | 316        | 273       | 296       |  | 01/24/96                                | 891        | 886       | 886       |  |
| 01/25/96                                     | 508        | 488       | 499       |  | 01/25/96                                | 328        | 284       | 319       |  | 01/25/96                                | 891        | 886       | 886       |  |
| 01/26/96                                     | 498        | 485       | 492       |  | 01/26/96                                | 284        | 269       | 274       |  | 01/26/96                                | 894        | 886       | 887       |  |
| 01/27/96                                     | 510        | 490       | 500       |  | 01/27/96                                | 322        | 273       | 301       |  | 01/27/96                                | 894        | 887       | 889       |  |
| 01/28/96                                     | 503        | 489       | 497       |  | 01/28/96                                | 321        | 290       | 300       |  | 01/28/96                                | 923        | 889       | 900       |  |
| 01/29/96                                     | 509        | 495       | 499       |  | 01/29/96                                | 310        | 291       | 298       |  | 01/29/96                                | 930        | 920       | 922       |  |
| 01/30/96                                     | 508        | 495       | 502       |  | 01/30/96                                | 313        | 298       | 305       |  | 01/30/96                                | 929        | 923       | 923       |  |
| 01/31/96                                     | 508        | 498       | 503       |  | 01/31/96                                | 334        | 311       | 320       |  | 01/31/96                                | 935        | 923       | 926       |  |
| 02/01/96                                     | 510        | 500       | 505       |  | 02/01/96                                | 329        | 303       | 317       |  | 02/01/96                                | 973        | 964       | 965       |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 02/02/96                                     | 507        | 488       | 496       |  | 02/02/96                                | 303        | 260       | 287       |  | 02/02/96                                | 976        | 967       | 968       |  |
| 02/03/96                                     | 497        | 484       | 491       |  | 02/03/96                                | 266        | 248       | 258       |  | 02/03/96                                | 976        | 967       | 968       |  |
| 02/04/96                                     | 503        | 489       | 496       |  | 02/04/96                                | 282        | 256       | 267       |  | 02/04/96                                | 973        | 967       | 967       |  |
| 02/05/96                                     | 506        | 492       | 500       |  | 02/05/96                                | 286        | 269       | 275       |  | 02/05/96                                | 976        | 967       | 968       |  |
| 02/06/96                                     | 509        | 495       | 500       |  | 02/06/96                                | 295        | 274       | 282       |  | 02/06/96                                | 976        | 967       | 968       |  |
| 02/07/96                                     | 513        | 501       | 508       |  | 02/07/96                                | 318        | 287       | 300       |  | 02/07/96                                | 974        | 968       | 968       |  |
| 02/08/96                                     | 520        | 505       | 512       |  | 02/08/96                                | 328        | 299       | 311       |  | 02/08/96                                | 974        | 968       | 968       |  |
| 02/09/96                                     | 519        | 507       | 513       |  | 02/09/96                                | 321        | 307       | 316       |  | 02/09/96                                | 973        | 967       | 967       |  |
| 02/10/96                                     | 514        | 502       | 507       |  | 02/10/96                                | 308        | 283       | 296       |  | 02/10/96                                | 973        | 967       | 967       |  |
| 02/11/96                                     | 515        | 500       | 506       |  | 02/11/96                                | 301        | 281       | 287       |  | 02/11/96                                | 973        | 967       | 967       |  |
| 02/12/96                                     | 514        | 501       | 507       |  | 02/12/96                                | 305        | 279       | 292       |  | 02/12/96                                | 973        | 967       | 967       |  |
| 02/13/96                                     | 516        | 501       | 507       |  | 02/13/96                                | 305        | 277       | 288       |  | 02/13/96                                | 973        | 967       | 967       |  |
| 02/14/96                                     | 515        | 503       | 508       |  | 02/14/96                                | 297        | 289       | 291       |  | 02/14/96                                | 973        | 964       | 965       |  |
| 02/15/96                                     |            |           |           |  | 02/15/96                                |            |           |           |  | 02/15/96                                | 973        | 964       | 965       |  |
| 02/16/96                                     |            |           |           |  | 02/16/96                                |            |           |           |  | 02/16/96                                | 973        | 956       | 961       |  |
| 02/17/96                                     |            |           |           |  | 02/17/96                                |            |           |           |  | 02/17/96                                | 973        | 956       | 962       |  |
| 02/18/96                                     |            |           |           |  | 02/18/96                                |            |           |           |  | 02/18/96                                | 989        | 964       | 972       |  |
| 02/19/96                                     |            |           |           |  | 02/19/96                                |            |           |           |  | 02/19/96                                | 970        | 951       | 958       |  |
| 02/20/96                                     |            |           |           |  | 02/20/96                                |            |           |           |  | 02/20/96                                | 957        | 939       | 945       |  |
| 02/21/96                                     | 510        | 501       | 505       |  | 02/21/96                                | 309        | 294       | 319       |  | 02/21/96                                | 946        | 936       | 939       |  |
| 02/22/96                                     | 514        | 491       | 505       |  | 02/22/96                                | 313        | 250       | 288       |  | 02/22/96                                | 941        | 936       | 936       |  |
| 02/23/96                                     | 519        | 492       | 505       |  | 02/23/96                                | 307        | 248       | 275       |  | 02/23/96                                | 941        | 929       | 933       |  |
| 02/24/96                                     | 532        | 512       | 521       |  | 02/24/96                                | 361        | 306       | 336       |  | 02/24/96                                | 937        | 928       | 929       |  |
| 02/25/96                                     | 529        | 512       | 520       |  | 02/25/96                                | 347        | 324       | 334       |  | 02/25/96                                | 937        | 928       | 929       |  |
| 02/26/96                                     | 520        | 502       | 510       |  | 02/26/96                                | 330        | 278       | 304       |  | 02/26/96                                | 941        | 928       | 931       |  |
| 02/27/96                                     | 514        | 502       | 507       |  | 02/27/96                                | 291        | 277       | 283       |  | 02/27/96                                | 943        | 934       | 936       |  |
| 02/28/96                                     | 514        | 500       | 506       |  | 02/28/96                                | 288        | 268       | 279       |  | 02/28/96                                | 949        | 936       | 940       |  |
| 02/29/96                                     | 509        | 497       | 503       |  | 02/29/96                                | 274        | 260       | 268       |  | 02/29/96                                | 934        | 920       | 925       |  |
| 03/01/96                                     | 514        | 498       | 494       |  | 03/01/96                                | 292        | 260       | 274       |  | 03/01/96                                | 929        | 920       | 922       |  |
| 03/02/96                                     | 515        | 504       | 510       |  | 03/02/96                                | 326        | 288       | 308       |  | 03/02/96                                | 937        | 922       | 928       |  |
| 03/03/96                                     | 526        | 512       | 518       |  | 03/03/96                                | 339        | 318       | 328       |  | 03/03/96                                | 941        | 928       | 933       |  |
| 03/04/96                                     | 526        | 510       | 517       |  | 03/04/96                                | 342        | 324       | 337       |  | 03/04/96                                | 945        | 936       | 937       |  |
| 03/05/96                                     | 529        | 512       | 520       |  | 03/05/96                                | 355        | 315       | 330       |  | 03/05/96                                | 945        | 936       | 937       |  |
| 03/06/96                                     | 508        | 489       | 499       |  | 03/06/96                                | 315        | 277       | 292       |  | 03/06/96                                | 945        | 928       | 934       |  |
| 03/07/96                                     | 515        | 497       | 505       |  | 03/07/96                                | 325        | 277       | 301       |  | 03/07/96                                | 934        | 923       | 925       |  |
| 03/08/96                                     | 521        | 505       | 513       |  | 03/08/96                                | 346        | 316       | 329       |  | 03/08/96                                | 937        | 920       | 926       |  |
| 03/09/96                                     | 518        | 507       | 512       |  | 03/09/96                                | 342        | 327       | 335       |  | 03/09/96                                | 941        | 931       | 934       |  |
| 03/10/96                                     | 521        | 508       | 514       |  | 03/10/96                                | 358        | 334       | 343       |  | 03/10/96                                | 938        | 920       | 926       |  |
| 03/11/96                                     | 520        | 509       | 515       |  | 03/11/96                                | 366        | 334       | 351       |  | 03/11/96                                | 934        | 914       | 920       |  |
| 03/12/96                                     | 526        | 512       | 520       |  | 03/12/96                                | 397        | 364       | 381       |  | 03/12/96                                | 918        | 905       | 908       |  |
| 03/13/96                                     | 504        | 494       | 499       |  | 03/13/96                                | 397        | 337       | 377       |  | 03/13/96                                | 918        | 905       | 908       |  |
| 03/14/96                                     | 504        | 494       | 499       |  | 03/14/96                                | 337        | 308       | 325       |  | 03/14/96                                | 926        | 912       | 915       |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 03/15/96                                     | 520        | 495       | 506       |  | 03/15/96                                | 349        | 308       | 327       |  | 03/15/96                                | 941        | 925       | 929       |  |
| 03/15/96                                     | 524        | 507       | 514       |  | 03/16/96                                | 362        | 336       | 347       |  | 03/16/96                                | 941        | 929       | 934       |  |
| 03/17/96                                     | 526        | 507       | 516       |  | 03/17/96                                | 381        | 337       | 357       |  | 03/17/96                                | 943        | 931       | 936       |  |
| 03/18/96                                     | 516        | 501       | 509       |  | 03/18/96                                | 368        | 347       | 358       |  | 03/18/96                                | 943        | 931       | 934       |  |
| 03/19/96                                     | 514        | 500       | 507       |  | 03/19/96                                | 374        | 355       | 362       |  | 03/19/96                                | 957        | 920       | 936       |  |
| 03/20/96                                     | 519        | 499       | 509       |  | 03/20/96                                | 392        | 362       | 371       |  | 03/20/96                                | 946        | 920       | 931       |  |
| 03/21/96                                     | 530        | 514       | 520       |  | 03/21/96                                | 406        | 373       | 386       |  | 03/21/96                                | 946        | 937       | 939       |  |
| 03/22/96                                     | 532        | 513       | 523       |  | 03/22/96                                | 409        | 392       | 404       |  | 03/22/96                                | 949        | 928       | 936       |  |
| 03/23/96                                     | 522        | 500       | 510       |  | 03/23/96                                | 407        | 342       | 377       |  | 03/23/96                                | 941        | 926       | 928       |  |
| 03/24/96                                     | 520        | 499       | 510       |  | 03/24/96                                | 371        | 338       | 350       |  | 03/24/96                                | 932        | 904       | 915       |  |
| 03/25/96                                     | 530        | 489       | 514       |  | 03/25/96                                | 405        | 328       | 370       |  | 03/25/96                                | 947        | 885       | 925       |  |
| 03/26/96                                     | 516        | 489       | 505       |  | 03/26/96                                | 355        | 325       | 338       |  | 03/26/96                                | 931        | 885       | 908       |  |
| 03/27/96                                     | 529        | 504       | 516       |  | 03/27/96                                | 394        | 352       | 372       |  | 03/27/96                                | 943        | 920       | 931       |  |
| 03/28/96                                     | 534        | 501       | 522       |  | 03/28/96                                | 420        | 353       | 393       |  | 03/28/96                                | 965        | 923       | 945       |  |
| 03/29/96                                     | 517        | 507       | 512       |  | 03/29/96                                | 353        | 329       | 337       |  | 03/29/96                                | 932        | 919       | 926       |  |
| 03/30/96                                     | 543        | 507       | 516       |  | 03/30/96                                | 364        | 335       | 346       |  | 03/30/96                                | 940        | 925       | 931       |  |
| 03/31/96                                     | 546        | 507       | 513       |  | 03/31/96                                | 381        | 353       | 363       |  | 03/31/96                                | 948        | 931       | 937       |  |
| 04/01/96                                     | 532        | 506       | 510       |  | 04/01/96                                | 392        | 368       | 378       |  | 04/01/96                                | 958        | 937       | 943       |  |
| 04/02/96                                     | 517        | 501       | 510       |  | 04/02/96                                | 383        | 351       | 368       |  | 04/02/96                                | 958        | 939       | 949       |  |
| 04/03/96                                     | 532        | 496       | 516       |  | 04/03/96                                | 368        | 342       | 353       |  | 04/03/96                                | 951        | 940       | 947       |  |
| 04/04/96                                     | 514        | 489       | 502       |  | 04/04/96                                | 344        | 321       | 333       |  | 04/04/96                                | 944        | 916       | 926       |  |
| 04/05/96                                     | 515        | 495       | 505       |  | 04/05/96                                | 351        | 328       | 335       |  | 04/05/96                                | 928        | 906       | 920       |  |
| 04/06/96                                     | 521        | 501       | 510       |  | 04/06/96                                | 394        | 335       | 361       |  | 04/06/96                                | 949        | 921       | 935       |  |
| 04/07/96                                     | 523        | 507       | 516       |  | 04/07/96                                | 397        | 373       | 381       |  | 04/07/96                                | 966        | 942       | 952       |  |
| 04/08/96                                     | 526        | 507       | 513       |  | 04/08/96                                | 375        | 355       | 367       |  | 04/08/96                                | 961        | 948       | 957       |  |
| 04/09/96                                     | 526        | 507       | 516       |  | 04/09/96                                | 390        | 352       | 368       |  | 04/09/96                                | 961        | 948       | 954       |  |
| 04/10/96                                     | 534        | 502       | 523       |  | 04/10/96                                | 404        | 376       | 386       |  | 04/10/96                                | 969        | 947       | 955       |  |
| 04/11/96                                     | 530        | 500       | 516       |  | 04/11/96                                | 377        | 339       | 359       |  | 04/11/96                                | 951        | 912       | 930       |  |
| 04/12/96                                     | 529        | 498       | 513       |  | 04/12/96                                | 404        | 356       | 377       |  | 04/12/96                                | 957        | 931       | 940       |  |
| 04/13/96                                     | 518        | 500       | 507       |  | 04/13/96                                | 356        | 339       | 346       |  | 04/13/96                                | 931        | 915       | 922       |  |
| 04/14/96                                     | 510        | 495       | 505       |  | 04/14/96                                | 352        | 330       | 340       |  | 04/14/96                                | 921        | 902       | 915       |  |
| 04/15/96                                     | 525        | 501       | 512       |  | 04/15/96                                | 401        | 345       | 369       |  | 04/15/96                                | 942        | 910       | 925       |  |
| 04/16/96                                     | 526        | 507       | 516       |  | 04/16/96                                | 400        | 373       | 390       |  | 04/16/96                                | 938        | 920       | 931       |  |
| 04/17/96                                     | 532        | 507       | 525       |  | 04/17/96                                | 376        | 355       | 372       |  | 04/17/96                                | 935        | 915       | 922       |  |
| 04/18/96                                     | 523        | 495       | 510       |  | 04/18/96                                | 358        | 324       | 348       |  | 04/18/96                                | 922        | 902       | 916       |  |
| 04/19/96                                     | 523        | 495       | 507       |  | 04/19/96                                | 378        | 321       | 344       |  | 04/19/96                                | 925        | 902       | 911       |  |
| 04/20/96                                     | 521        | 502       | 513       |  | 04/20/96                                | 383        | 369       | 375       |  | 04/20/96                                | 923        | 908       | 917       |  |
| 04/21/96                                     | 520        | 501       | 510       |  | 04/21/96                                | 381        | 344       | 369       |  | 04/21/96                                | 926        | 912       | 919       |  |
| 04/22/96                                     | 514        | 500       | 510       |  | 04/22/96                                | 352        | 333       | 341       |  | 04/22/96                                | 922        | 907       | 915       |  |
| 04/23/96                                     | 521        | 501       | 510       |  | 04/23/96                                | 372        | 340       | 351       |  | 04/23/96                                | 925        | 906       | 915       |  |
| 04/24/96                                     | 526        | 498       | 516       |  | 04/24/96                                | 394        | 359       | 368       |  | 04/24/96                                | 936        | 919       | 921       |  |
| 04/25/96                                     | 520        | 498       | 513       |  | 04/25/96                                | 370        | 347       | 358       |  | 04/25/96                                | 950        | 924       | 933       |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 04/26/96                                     | 530        | 501       | 516       |  | 04/26/96                                | 385        | 347       | 369       |  | 04/26/96                                | 956        | 930       | 939       |  |
| 04/27/96                                     | 526        | 507       | 513       |  | 04/27/96                                | 394        | 370       | 382       |  | 04/27/96                                | 955        | 932       | 944       |  |
| 04/28/96                                     | 514        | 495       | 505       |  | 04/28/96                                | 370        | 323       | 341       |  | 04/28/96                                | 936        | 891       | 909       |  |
| 04/29/96                                     | 526        | 496       | 507       |  | 04/29/96                                | 366        | 320       | 339       |  | 04/29/96                                | 927        | 901       | 910       |  |
| 04/30/96                                     | 526        | 507       | 516       |  | 04/30/96                                | 396        | 359       | 374       |  | 04/30/96                                | 937        | 913       | 924       |  |
| 05/01/96                                     | 531        | 498       | 510       |  | 05/01/96                                | 379        | 371       | 375       |  | 05/01/96                                | 934        | 926       | 928       |  |
| 05/02/96                                     | 526        | 496       | 509       |  | 05/02/96                                | 387        | 377       | 396       |  | 05/02/96                                | 945        | 942       | 952       |  |
| 05/03/96                                     | 529        | 507       | 513       |  | 05/03/96                                | 393        | 365       | 378       |  | 05/03/96                                | 959        | 940       | 945       |  |
| 05/04/96                                     | 520        | 502       | 510       |  | 05/04/96                                | 371        | 350       | 360       |  | 05/04/96                                | 946        | 926       | 937       |  |
| 05/05/96                                     | 523        | 497       | 510       |  | 05/05/96                                | 378        | 348       | 358       |  | 05/05/96                                | 945        | 926       | 933       |  |
| 05/06/96                                     | 526        | 507       | 516       |  | 05/06/96                                | 389        | 360       | 370       |  | 05/06/96                                | 953        | 928       | 937       |  |
| 05/07/96                                     | 525        | 507       | 513       |  | 05/07/96                                | 381        | 363       | 371       |  | 05/07/96                                | 946        | 931       | 939       |  |
| 05/08/96                                     | 520        | 507       | 513       |  | 05/08/96                                | 363        | 359       | 360       |  | 05/08/96                                | 937        | 926       | 931       |  |
| 05/09/96                                     | 516        | 494       | 505       |  | 05/09/96                                | 284        | 262       | 280       |  | 05/09/96                                | 931        | 926       | 929       |  |
| 05/10/96                                     | 519        | 500       | 505       |  | 05/10/96                                | 285        | 262       | 280       |  | 05/10/96                                | 929        | 924       | 926       |  |
| 05/11/96                                     | 517        | 501       | 509       |  | 05/11/96                                | 281        | 272       | 275       |  | 05/11/96                                | 931        | 926       | 928       |  |
| 05/12/96                                     | 519        | 496       | 507       |  | 05/12/96                                | 287        | 275       | 281       |  | 05/12/96                                | 944        | 930       | 936       |  |
| 05/13/96                                     | 520        | 501       | 510       |  | 05/13/96                                | 302        | 286       | 292       |  | 05/13/96                                | 947        | 940       | 943       |  |
| 05/14/96                                     | 526        | 507       | 516       |  | 05/14/96                                | 303        | 293       | 296       |  | 05/14/96                                | 944        | 941       | 942       |  |
| 05/15/96                                     | 526        | 509       | 516       |  | 05/15/96                                | 295        | 290       | 293       |  | 05/15/96                                | 942        | 935       | 939       |  |
| 05/16/96                                     | 520        | 507       | 513       |  | 05/16/96                                | 293        | 287       | 290       |  | 05/16/96                                | 936        | 929       | 932       |  |
| 05/17/96                                     | 517        | 501       | 510       |  | 05/17/96                                | 292        | 283       | 287       |  | 05/17/96                                | 934        | 929       | 931       |  |
| 05/18/96                                     | 520        | 501       | 511       |  | 05/18/96                                | 292        | 282       | 285       |  | 05/18/96                                | 935        | 928       | 931       |  |
| 05/19/96                                     | 517        | 501       | 510       |  | 05/19/96                                | 296        | 285       | 290       |  | 05/19/96                                | 937        | 929       | 932       |  |
| 05/20/96                                     | 516        | 499       | 507       |  | 05/20/96                                | 295        | 286       | 290       |  | 05/20/96                                | 936        | 931       | 933       |  |
| 05/21/96                                     | 515        | 503       | 509       |  | 05/21/96                                | 290        | 283       | 286       |  | 05/21/96                                | 936        | 933       | 934       |  |
| 05/22/96                                     | 523        | 496       | 509       |  | 05/22/96                                | 293        | 287       | 290       |  | 05/22/96                                | 942        | 928       | 935       |  |
| 05/23/96                                     | 525        | 497       | 511       |  | 05/23/96                                | 300        | 286       | 292       |  | 05/23/96                                | 941        | 923       | 929       |  |
| 05/24/96                                     | 519        | 501       | 510       |  | 05/24/96                                | 299        | 282       | 287       |  | 05/24/96                                | 932        | 923       | 926       |  |
| 05/25/96                                     | 518        | 501       | 509       |  | 05/25/96                                | 295        | 285       | 291       |  | 05/25/96                                | 930        | 922       | 926       |  |
| 05/26/96                                     | 517        | 500       | 509       |  | 05/26/96                                | 289        | 280       | 285       |  | 05/26/96                                | 936        | 925       | 929       |  |
| 05/27/96                                     | 520        | 489       | 505       |  | 05/27/96                                | 292        | 280       | 286       |  | 05/27/96                                | 946        | 928       | 936       |  |
| 05/28/96                                     | 508        | 488       | 498       |  | 05/28/96                                | 306        | 286       | 295       |  | 05/28/96                                | 937        | 925       | 930       |  |
| 05/29/96                                     | 518        | 497       | 507       |  | 05/29/96                                | 293        | 280       | 286       |  | 05/29/96                                | 943        | 935       | 938       |  |
| 05/30/96                                     | 514        | 501       | 507       |  | 05/30/96                                | 298        | 290       | 293       |  | 05/30/96                                | 942        | 937       | 938       |  |
| 05/31/96                                     | 511        | 499       | 505       |  | 05/31/96                                | 292        | 283       | 289       |  | 05/31/96                                | 938        | 934       | 936       |  |
| 06/01/96                                     | 517        | 504       | 510       |  | 06/01/96                                | 287        | 280       | 283       |  | 06/01/96                                | 936        | 933       | 935       |  |
| 06/02/96                                     | 518        | 492       | 503       |  | 06/02/96                                | 282        | 276       | 279       |  | 06/02/96                                | 941        | 933       | 936       |  |
| 06/03/96                                     | 514        | 495       | 505       |  | 06/03/96                                | 286        | 276       | 280       |  | 06/03/96                                | 950        | 939       | 943       |  |
| 06/04/96                                     | 513        | 500       | 506       |  | 06/04/96                                | 296        | 282       | 288       |  | 06/04/96                                | 956        | 947       | 951       |  |
| 06/05/96                                     | 520        | 502       | 508       |  | 06/05/96                                | 300        | 290       | 295       |  | 06/05/96                                | 954        | 942       | 947       |  |
| 06/06/96                                     | 520        | 500       | 507       |  | 06/06/96                                | 298        | 290       | 294       |  | 06/06/96                                | 945        | 939       | 942       |  |



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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 06/07/96                                     | 519        | 501       | 510       |  | 06/07/96                                | 294        | 286       | 290       |  | 06/07/96                                | 942        | 936       | 939       |  |
| 06/08/96                                     | 519        | 495       | 505       |  | 06/08/96                                | 292        | 283       | 288       |  | 06/08/96                                | 940        | 935       | 938       |  |
| 06/09/96                                     | 514        | 501       | 507       |  | 06/09/96                                | 290        | 285       | 288       |  | 06/09/96                                | 942        | 936       | 938       |  |
| 06/10/96                                     | 514        | 500       | 507       |  | 06/10/96                                | 296        | 287       | 291       |  | 06/10/96                                | 947        | 935       | 939       |  |
| 06/11/96                                     | 516        | 500       | 508       |  | 06/11/96                                | 300        | 287       | 292       |  | 06/11/96                                | 946        | 938       | 941       |  |
| 06/12/96                                     | 520        | 503       | 509       |  | 06/12/96                                | 298        | 292       | 294       |  | 06/12/96                                | 943        | 937       | 940       |  |
| 06/13/96                                     |            |           |           |  | 06/13/96                                | 294        | 288       | 291       |  | 06/13/96                                | 940        | 935       | 937       |  |
| 06/14/96                                     |            |           |           |  | 06/14/96                                | 292        | 285       | 287       |  | 06/14/96                                | 941        | 935       | 937       |  |
| 06/15/96                                     |            |           |           |  | 06/15/96                                | 293        | 285       | 288       |  | 06/15/96                                | 942        | 935       | 938       |  |
| 06/16/96                                     |            |           |           |  | 06/16/96                                | 294        | 288       | 290       |  | 06/16/96                                | 939        | 934       | 936       |  |
| 06/17/96                                     |            |           |           |  | 06/17/96                                | 293        | 285       | 289       |  | 06/17/96                                | 939        | 930       | 934       |  |
| 06/18/96                                     |            |           |           |  | 06/18/96                                | 292        | 282       | 286       |  | 06/18/96                                | 940        | 933       | 935       |  |
| 06/19/96                                     |            |           |           |  | 06/19/96                                | 295        | 285       | 288       |  | 06/19/96                                | 940        | 932       | 936       |  |
| 06/20/96                                     |            |           |           |  | 06/20/96                                | 294        | 287       | 289       |  | 06/20/96                                | 941        | 932       | 935       |  |
| 06/21/96                                     |            |           |           |  | 06/21/96                                | 298        | 285       | 290       |  | 06/21/96                                | 945        | 937       | 940       |  |
| 06/22/96                                     |            |           |           |  | 06/22/96                                | 300        | 288       | 294       |  | 06/22/96                                | 938        | 929       | 934       |  |
| 06/23/96                                     |            |           |           |  | 06/23/96                                | 288        | 282       | 285       |  | 06/23/96                                | 940        | 933       | 935       |  |
| 06/24/96                                     |            |           |           |  | 06/24/96                                | 292        | 281       | 286       |  | 06/24/96                                | 941        | 933       | 936       |  |
| 06/25/96                                     | 506        | 495       | 501       |  | 06/25/96                                | 295        | 286       | 289       |  | 06/25/96                                | 935        | 933       | 934       |  |
| 06/26/96                                     | 504        | 489       | 497       |  | 06/26/96                                | 290        | 286       | 287       |  | 06/26/96                                | 933        | 922       | 926       |  |
| 06/27/96                                     | 504        | 484       | 494       |  | 06/27/96                                | 289        | 281       | 286       |  | 06/27/96                                | 923        | 917       | 920       |  |
| 06/28/96                                     | 503        | 489       | 496       |  | 06/28/96                                | 286        | 276       | 281       |  | 06/28/96                                | 920        | 916       | 918       |  |
| 06/29/96                                     | 507        | 489       | 499       |  | 06/29/96                                | 280        | 274       | 276       |  | 06/29/96                                | 927        | 917       | 921       |  |
| 07/01/96                                     | 508        | 491       | 501       |  | 06/30/96                                | 289        | 275       | 281       |  | 06/30/96                                | 932        | 925       | 927       |  |
| 07/02/96                                     | 508        | 491       | 500       |  | 07/01/96                                | 290        | 283       | 285       |  | 07/01/96                                | 939        | 927       | 931       |  |
| 07/03/96                                     | 508        | 487       | 499       |  | 07/02/96                                | 293        | 280       | 286       |  | 07/02/96                                | 945        | 935       | 938       |  |
| 07/04/96                                     | 512        | 495       | 504       |  | 07/03/96                                | 298        | 288       | 291       |  | 07/03/96                                | 941        | 938       | 940       |  |
| 07/05/96                                     | 507        | 492       | 500       |  | 07/04/96                                | 289        | 280       | 289       |  | 07/04/96                                | 948        | 936       | 940       |  |
| 07/06/96                                     | 504        | 491       | 499       |  | 07/05/96                                | 296        | 286       | 290       |  | 07/05/96                                | 945        | 939       | 941       |  |
| 07/07/96                                     | 508        | 492       | 502       |  | 07/06/96                                | 293        | 285       | 288       |  | 07/06/96                                | 946        | 937       | 941       |  |
| 07/08/96                                     | 508        | 494       | 502       |  | 07/07/96                                | 289        | 281       | 285       |  | 07/07/96                                | 948        | 941       | 944       |  |
| 07/09/96                                     | 503        | 489       | 496       |  | 07/08/96                                | 296        | 283       | 288       |  | 07/08/96                                | 949        | 943       | 945       |  |
| 07/10/96                                     | 503        | 486       | 494       |  | 07/09/96                                | 295        | 288       | 291       |  | 07/09/96                                | 945        | 941       | 943       |  |
| 07/11/96                                     | 506        | 488       | 495       |  | 07/10/96                                | 288        | 275       | 284       |  | 07/10/96                                | 942        | 936       | 939       |  |
| 07/12/96                                     | 503        | 488       | 496       |  | 07/11/96                                | 287        | 270       | 279       |  | 07/11/96                                | 943        | 933       | 938       |  |
| 07/13/96                                     | 506        | 489       | 498       |  | 07/12/96                                | 288        | 275       | 281       |  | 07/12/96                                | 941        | 932       | 936       |  |
| 07/14/96                                     | 503        | 491       | 497       |  | 07/13/96                                | 292        | 280       | 285       |  | 07/13/96                                | 942        | 938       | 940       |  |
| 07/15/96                                     | 507        | 489       | 499       |  | 07/14/96                                | 293        | 285       | 287       |  | 07/14/96                                | 947        | 939       | 943       |  |
| 07/16/96                                     | 503        | 481       | 492       |  | 07/15/96                                | 290        | 285       | 288       |  | 07/15/96                                | 951        | 942       | 945       |  |
| 07/17/96                                     | 503        | 487       | 493       |  | 07/16/96                                | 295        | 283       | 288       |  | 07/16/96                                | 947        | 944       | 945       |  |
| 07/18/96                                     | 503        | 484       | 494       |  | 07/17/96                                | 296        | 287       | 290       |  | 07/17/96                                | 947        | 941       | 943       |  |
|                                              |            |           |           |  | 07/18/96                                | 290        | 279       | 285       |  | 07/18/96                                | 941        | 936       | 939       |  |

| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 07/19/96                                     | 502        | 485       | 494       |  | 07/19/96                                | 286        | 277       | 280       |  | 07/19/96                                | 944        | 936       | 939       |  |
| 07/20/96                                     | 503        | 487       | 493       |  | 07/20/96                                | 287        | 277       | 281       |  | 07/20/96                                | 946        | 939       | 942       |  |
| 07/21/96                                     | 503        | 489       | 493       |  | 07/21/96                                | 290        | 282       | 285       |  | 07/21/96                                | 945        | 941       | 942       |  |
| 07/22/96                                     | 498        | 484       | 490       |  | 07/22/96                                | 288        | 280       | 283       |  | 07/22/96                                | 947        | 940       | 943       |  |
| 07/23/96                                     | 503        | 484       | 494       |  | 07/23/96                                | 286        | 279       | 281       |  | 07/23/96                                | 952        | 943       | 946       |  |
| 07/24/96                                     | 504        | 484       | 494       |  | 07/24/96                                | 293        | 282       | 286       |  | 07/24/96                                | 956        | 944       | 949       |  |
| 07/25/96                                     | 506        | 489       | 498       |  | 07/25/96                                | 295        | 285       | 289       |  | 07/25/96                                | 955        | 946       | 949       |  |
| 07/26/96                                     | 503        | 484       | 496       |  | 07/26/96                                | 294        | 285       | 289       |  | 07/26/96                                | 949        | 943       | 946       |  |
| 07/27/96                                     | 497        | 478       | 487       |  | 07/27/96                                | 288        | 280       | 284       |  | 07/27/96                                | 947        | 938       | 941       |  |
| 07/28/96                                     | 497        | 481       | 491       |  | 07/28/96                                | 283        | 272       | 278       |  | 07/28/96                                | 943        | 937       | 939       |  |
| 07/29/96                                     | 505        | 481       | 490       |  | 07/29/96                                | 287        | 275       | 280       |  | 07/29/96                                | 946        | 939       | 941       |  |
| 07/30/96                                     | 503        | 484       | 494       |  | 07/30/96                                | 288        | 276       | 281       |  | 07/30/96                                | 950        | 940       | 944       |  |
| 07/31/96                                     | 504        | 483       | 493       |  | 07/31/96                                | 295        | 282       | 287       |  | 07/31/96                                | 953        | 945       | 949       |  |
| 08/01/96                                     | 507        | 489       | 499       |  | 08/01/96                                | 295        | 286       | 289       |  | 08/01/96                                | 954        | 948       | 950       |  |
| 08/02/96                                     | 507        | 489       | 499       |  | 08/02/96                                | 296        | 277       | 289       |  | 08/02/96                                | 955        | 949       | 951       |  |
| 08/03/96                                     | 508        | 490       | 499       |  | 08/03/96                                | 293        | 285       | 288       |  | 08/03/96                                | 953        | 949       | 951       |  |
| 08/04/96                                     | 509        | 490       | 499       |  | 08/04/96                                | 295        | 287       | 290       |  | 08/04/96                                | 950        | 938       | 941       |  |
| 08/05/96                                     | 501        | 483       | 492       |  | 08/05/96                                | 290        | 279       | 283       |  | 08/05/96                                | 943        | 937       | 940       |  |
| 08/06/96                                     | 507        | 487       | 495       |  | 08/06/96                                | 290        | 277       | 283       |  | 08/06/96                                | 942        | 936       | 939       |  |
| 08/07/96                                     | 498        | 484       | 491       |  | 08/07/96                                | 287        | 275       | 280       |  | 08/07/96                                | 940        | 936       | 938       |  |
| 08/08/96                                     | 500        | 484       | 492       |  | 08/08/96                                | 281        | 273       | 277       |  | 08/08/96                                | 942        | 937       | 939       |  |
| 08/09/96                                     | 503        | 484       | 493       |  | 08/09/96                                | 283        | 273       | 277       |  | 08/09/96                                | 945        | 939       | 942       |  |
| 08/10/96                                     | 503        | 487       | 495       |  | 08/10/96                                | 288        | 274       | 281       |  | 08/10/96                                | 946        | 942       | 944       |  |
| 08/11/96                                     | 503        | 485       | 493       |  | 08/11/96                                | 290        | 281       | 284       |  | 08/11/96                                | 946        | 942       | 944       |  |
| 08/12/96                                     | 503        | 483       | 492       |  | 08/12/96                                | 289        | 279       | 282       |  | 08/12/96                                | 946        | 933       | 942       |  |
| 08/13/96                                     | 503        | 484       | 493       |  | 08/13/96                                | 285        | 274       | 278       |  | 08/13/96                                | 944        | 934       | 938       |  |
| 08/14/96                                     | 503        | 484       | 493       |  | 08/14/96                                | 286        | 274       | 278       |  | 08/14/96                                | 946        | 940       | 943       |  |
| 08/15/96                                     | 503        | 487       | 495       |  | 08/15/96                                | 288        | 273       | 280       |  | 08/15/96                                | 946        | 940       | 943       |  |
| 08/16/96                                     | 503        | 489       | 496       |  | 08/16/96                                | 289        | 280       | 283       |  | 08/16/96                                | 947        | 944       | 945       |  |
| 08/17/96                                     | 506        | 488       | 497       |  | 08/17/96                                | 289        | 282       | 285       |  | 08/17/96                                | 949        | 944       | 947       |  |
| 08/18/96                                     | 506        | 489       | 498       |  | 08/18/96                                | 294        | 282       | 287       |  | 08/18/96                                | 948        | 945       | 947       |  |
| 08/19/96                                     | 501        | 483       | 492       |  | 08/19/96                                | 292        | 283       | 288       |  | 08/19/96                                | 945        | 938       | 941       |  |
| 08/20/96                                     | 503        | 484       | 493       |  | 08/20/96                                | 285        | 275       | 279       |  | 08/20/96                                | 942        | 937       | 940       |  |
| 08/21/96                                     | 503        | 481       | 492       |  | 08/21/96                                | 288        | 276       | 280       |  | 08/21/96                                | 946        | 938       | 942       |  |
| 08/22/96                                     | 503        | 487       | 494       |  | 08/22/96                                | 288        | 275       | 282       |  | 08/22/96                                | 943        | 939       | 942       |  |
| 08/23/96                                     | 501        | 484       | 491       |  | 08/23/96                                | 288        | 277       | 282       |  | 08/23/96                                | 943        | 939       | 941       |  |
| 08/24/96                                     | 504        | 485       | 494       |  | 08/24/96                                | 288        | 275       | 279       |  | 08/24/96                                | 947        | 937       | 942       |  |
| 08/25/96                                     | 508        | 489       | 499       |  | 08/25/96                                | 292        | 276       | 282       |  | 08/25/96                                | 953        | 944       | 947       |  |
| 08/26/96                                     | 508        | 491       | 499       |  | 08/26/96                                | 299        | 285       | 289       |  | 08/26/96                                | 950        | 948       | 949       |  |
| 08/27/96                                     | 503        | 488       | 494       |  | 08/27/96                                | 299        | 286       | 291       |  | 08/27/96                                | 948        | 942       | 945       |  |
| 08/28/96                                     | 497        | 484       | 491       |  | 08/28/96                                | 290        | 279       | 284       |  | 08/28/96                                | 942        | 935       | 937       |  |
| 08/29/96                                     | 503        | 484       | 493       |  | 08/29/96                                | 282        | 270       | 276       |  | 08/29/96                                | 942        | 935       | 939       |  |

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| Devils Kitchen Steam Flow 10/95 through 9/96 |            |           |           |  | Well 4H-4 Steam Flow 10/95 through 9/96 |            |           |           |  | Schober's Steam Flow 10/95 through 9/96 |            |           |           |  |
|----------------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|-----------------------------------------|------------|-----------|-----------|--|
| DATE                                         | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  | DATE                                    | High, lb/h | Low, lb/h | Avg, lb/h |  |
| 08/30/96                                     | 506        | 488       | 494       |  | 08/30/96                                | 287        | 275       | 279       |  | 08/30/96                                | 947        | 939       | 943       |  |
| 08/31/96                                     | 508        | 489       | 499       |  | 08/31/96                                | 294        | 280       | 286       |  | 08/31/96                                | 951        | 944       | 947       |  |
| 09/01/96                                     | 507        | 489       | 498       |  | 09/01/96                                | 299        | 287       | 291       |  | 09/01/96                                | 950        | 947       | 948       |  |
| 09/02/96                                     | 503        | 487       | 495       |  | 09/02/96                                | 296        | 289       | 292       |  | 09/02/96                                | 951        | 944       | 946       |  |
| 09/03/96                                     | 503        | 488       | 496       |  | 09/03/96                                | 295        | 282       | 286       |  | 09/03/96                                | 945        | 940       | 942       |  |
| 09/04/96                                     | 506        | 489       | 498       |  | 09/04/96                                | 289        | 280       | 284       |  | 09/04/96                                | 944        | 938       | 941       |  |
| 09/05/96                                     | 508        | 489       | 499       |  | 09/05/96                                | 293        | 276       | 286       |  | 09/05/96                                | 942        | 939       | 941       |  |
| 09/06/96                                     | 497        | 484       | 490       |  | 09/06/96                                | 295        | 285       | 288       |  | 09/06/96                                | 941        | 934       | 937       |  |
| 09/07/96                                     | 501        | 483       | 491       |  | 09/07/96                                | 285        | 276       | 280       |  | 09/07/96                                | 937        | 933       | 935       |  |
| 09/08/96                                     | 503        | 484       | 493       |  | 09/08/96                                | 285        | 273       | 279       |  | 09/08/96                                | 940        | 935       | 937       |  |
| 09/09/96                                     | 504        | 485       | 498       |  | 09/09/96                                | 289        | 276       | 282       |  | 09/09/96                                | 941        | 937       | 939       |  |
| 09/10/96                                     | 503        | 487       | 495       |  | 09/10/96                                | 289        | 281       | 284       |  | 09/10/96                                | 938        | 933       | 936       |  |
| 09/11/96                                     | 508        | 478       | 493       |  | 09/11/96                                | 288        | 276       | 281       |  | 09/11/96                                | 942        | 936       | 938       |  |
| 09/12/96                                     | 511        | 491       | 499       |  | 09/12/96                                | 295        | 274       | 286       |  | 09/12/96                                | 941        | 936       | 939       |  |
| 09/13/96                                     | 514        | 495       | 504       |  | 09/13/96                                | 298        | 285       | 290       |  | 09/13/96                                | 943        | 937       | 940       |  |
| 09/14/96                                     | 503        | 488       | 494       |  | 09/14/96                                | 299        | 292       | 293       |  | 09/14/96                                | 940        | 937       | 938       |  |
| 09/15/96                                     | 510        | 489       | 501       |  | 09/15/96                                | 290        | 281       | 288       |  | 09/15/96                                | 944        | 936       | 939       |  |
| 09/16/96                                     | 501        | 488       | 495       |  | 09/16/96                                | 299        | 281       | 287       |  | 09/16/96                                | 939        | 933       | 936       |  |
| 09/17/96                                     | 503        | 481       | 492       |  | 09/17/96                                | 289        | 272       | 283       |  | 09/17/96                                | 936        | 927       | 932       |  |
| 09/18/96                                     | 497        | 484       | 490       |  | 09/18/96                                | 285        | 269       | 276       |  | 09/18/96                                | 935        | 926       | 930       |  |
| 09/19/96                                     | 506        | 484       | 498       |  | 09/19/96                                | 283        | 268       | 277       |  | 09/19/96                                | 936        | 929       | 932       |  |
| 09/20/96                                     | 503        | 489       | 496       |  | 09/20/96                                | 292        | 272       | 280       |  | 09/20/96                                | 937        | 934       | 935       |  |
| 09/21/96                                     | 508        | 489       | 499       |  | 09/21/96                                | 292        | 282       | 286       |  | 09/21/96                                | 943        | 935       | 939       |  |
| 09/22/96                                     | 506        | 491       | 498       |  | 09/22/96                                | 299        | 287       | 291       |  | 09/22/96                                | 944        | 940       | 941       |  |
| 09/23/96                                     | 503        | 485       | 494       |  | 09/23/96                                | 295        | 288       | 292       |  | 09/23/96                                | 941        | 938       | 940       |  |
| 09/24/96                                     | 504        | 489       | 497       |  | 09/24/96                                | 289        | 281       | 285       |  | 09/24/96                                | 943        | 938       | 940       |  |
| 09/25/96                                     | 508        | 489       | 499       |  | 09/25/96                                | 292        | 282       | 285       |  | 09/25/96                                | 948        | 939       | 943       |  |
| 09/26/96                                     | 503        | 484       | 493       |  | 09/26/96                                | 298        | 285       | 289       |  | 09/26/96                                | 946        | 942       | 944       |  |
| 09/27/96                                     | 507        | 489       | 498       |  | 09/27/96                                | 293        | 279       | 289       |  | 09/27/96                                | 942        | 934       | 938       |  |
| 09/28/96                                     | 497        | 479       | 491       |  | 09/28/96                                | 282        | 273       | 276       |  | 09/28/96                                | 941        | 937       | 938       |  |
| 09/29/96                                     | 503        | 484       | 493       |  | 09/29/96                                | 287        | 273       | 279       |  | 09/29/96                                | 946        | 940       | 942       |  |
| 09/30/96                                     | 508        | 489       | 499       |  | 09/30/96                                | 296        | 283       | 290       |  | 09/30/96                                | 950        | 944       | 946       |  |