

V063

14-105-24E

Uintah County, UT

X-4 CORE LOG

WHITE RIVER SHALE PROJECT

HOLE: X-4

| Depth | ±M | FRX | PP | 0 | Gal/ 50 Ton | Lith | Rock Description |
|-------|------|-----|-----------|---|----------------|------|------------------------------------|
| 707 | +130 | | .25 | | 10.1 | | Oil Shale - low grade, light brown |
| 708 | | | .45.58 | | 10.4 | | |
| 709 | | | | | 11.4 | | |
| 710 | | | | | 13.2 | | |
| 711 | | | | | 36.7 | | |
| 712 | | | .22 | | 16.1 | | |
| 713 | | | .71 | | 9.4 | | |
| 714 | | | | | 7.2 | | |
| 715 | | | .68 | | 1.2 | | Marlstone - light gray, hard |
| 716 | | | .46 | | 5.0 | | Oil Shale - medium grade, |
| 717 | +120 | | .44 | | 13.9 | | medium brown |
| 718 | | | | | 24.8 | | |
| 719 | | | .18.55 | | 10.4 | | |
| 720 | | | | | 9.7 | | |
| 721 | | | | | | | |
| 722 | | | | | | | |
| 723 | | | | | | | |
| 724 | | | | | | | |
| 725 | | | | | | | |
| 726 | | | | | | | |
| 727 | +110 | | | | | | |
| 728 | | | | | | | |
| 729 | | | | | | | |
| 730 | | | | | | | |
| 731 | | | | | | | |
| 732 | | | | | | | |
| 733 | | | | | | | Lost Core Interval |
| 734 | | | | | | | |
| 735 | | | | | | | |
| 736 | | | | | | | |
| 737 | +100 | | | | | | |
| 738 | | | | | | | |
| 739 | | | | | | | |
| 740 | | | | | | | |
| 741 | | | | | | | |
| 742 | | | | | | | |
| 743 | | | | | | | |
| 744 | | | | | | | |
| 745 | | | | | | | |
| 746 | | | | | | | |
| 747 | +90 | | .30.60.90 | | 7.8 | | Oil Shale - low to medium grade, |
| 748 | | | .30.75 | | 14.0 | | light brown |
| 749 | | | .10.45.80 | | 19.6 | | |
| 750 | | | .15.45.70 | | 12.5 | | |
| 751 | | | .10.50.90 | | 8.8 | | |
| 752 | | | .15.35.60 | | 8.9 | | |
| 753 | | | .18.47.75 | | 8.4 | | |
| 754 | | | .10.44.74 | | 10.7 | | |
| 755 | | | .25.72 | | 14.2 | | |
| 756 | | | .10.60 | | 11.5 | | |

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| Depth | ±MM | FRX | PP | 0 | Gal/ 50 Ton Ltrh | Rock Description |
|-------|-----|-----|-----------|---|---------------------|------------------------------------|
| 757 | +80 | | .09.61 | | 10.5 | Oil Shale - low to medium grade, |
| 758 | | | .08.31.57 | | 10.4 | buff to dark brown, |
| 759 | | | .21 | | 10.0 | thinly laminated |
| 760 | | | .21.58.88 | | 12.1 | |
| 761 | | | .25.76 | | 11.6 | |
| 762 | | | .32.55.82 | | 11.4 | |
| 763 | | | .17.53.76 | | 10.7 | |
| 764 | | | .12.34.79 | | 10.6 | |
| 765 | | | .38.69 | | 11.5 | |
| 766 | | | .32.75 | | 13.7 | |
| 767 | +70 | | .14.43.88 | | 9.9 | |
| 768 | | | .21.68 | | 11.1 | |
| 769 | | | .20.70 | | 16.5 | |
| 770 | | | .51 | | 12.0 | |
| 771 | | | .20.50 | | 9.5 | |
| 772 | | | .35.61 | | 5.2 | |
| 773 | | | .20.50.65 | | 9.2 | |
| 774 | | | .15.34.64 | | 13.7 | 774.67-776.37 Upper Wavy Bed |
| 775 | | | .37.50.70 | | 7.6 | Sandstone layer with interbedded |
| 776 | | | .05.30.50 | | 15.4 | shale, highly contorted |
| 777 | +60 | | .23.88 | | 13.9 | Oil Shale - medium grade, |
| 778 | | | .31 | | 9.1 | medium to dark brown |
| 779 | | | .50 | | 6.5 | |
| 780 | | | .40 | | 8.7 | |
| 781 | | | .05.65 | | 8.0 | |
| 782 | | | .67 | | 4.6 | |
| 783 | | | | | 14.4 | |
| 784 | | | | | 15.3 | |
| 785 | | | | | 12.1 | |
| 786 | | | .38.60.94 | | 8.5 | |
| 787 | +50 | | .27.50.95 | | 10.2 | |
| 788 | | | | | 16.5 | |
| 789 | | | | | 39.4 | Oil Shale - high grade, black |
| 790 | | | .91 | | 17.0 | Oil Shale - medium grade, |
| 791 | | | .28 | | 12.0 | medium to dark brown |
| 792 | | | | | 12.7 | |
| 793 | | | .46 | | 13.6 | |
| 794 | | | | | 14.9 | |
| 795 | | | .50 | | 14.7 | |
| 796 | | | | | 32.9 | 796.40-.60 Sandstone layer, |
| 797 | +40 | | .31 | | 19.4 | oil saturated |
| 798 | | | | | 14.0 | |
| 799 | | | .34.76 | | 16.1 | |
| 800 | | | .61 | | 34.4 | Oil Shale - high grade, |
| 801 | | | | | 15.1 | dark brown |
| 802 | | | .08.72 | | 7.2 | Oil Shale - low grade, |
| 803 | | | .75 | | 5.7 | buff to light brown |
| 804 | | | .38.85 | | 6.1 | |
| 805 | | | .47.66 | | 3.0 | 805-807 Vugs filled with nahcolite |
| 806 | | | .25.36.78 | | 7.7 | |

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| Depth | ±MM | FRX | PP | 0 | Gal/ 50 Ton | Lith | Rock Description |
|-------|-----|-----|-----------|---|----------------|-------|-------------------------------------|
| 807 | +30 | | .30.48.68 | | 5.6 | | |
| 808 | | | .55.90 | | 4.6 | | |
| 809 | | | .09.32.98 | | 2.8 | T T T | Marlstone - gray, hard |
| 810 | | 90° | .37.97 | | 1.0 | T T T | |
| 811 | | | .60 | | 1.5 | T T T | |
| 812 | | | .60.89 | | 3.5 | | Bottom 'A' Groove |
| 813 | | | | | 10.6 | | |
| 814 | | | .98 | | 15.3 | | Oil Shale - medium to high grade, |
| 815 | | | .90 | | 14.2 | | brown to black, thinly laminated |
| 816 | | | .80 | | 35.5 | | |
| 817 | +20 | | | | 16.3 | | |
| 818 | | | .21 | | 14.4 | | |
| 819 | | | .10.19 | | 12.9 | | |
| 820 | | | .12 | | 28.5 | | |
| 821 | | | .50 | | 28.9 | + | 821.50-.70 Sandstone layers, |
| 822 | | | .45 | | 21.1 | + | 822.00-.45 oil saturated |
| 823 | | | .31.68 | | 17.9 | | |
| 824 | | | | | 25.0 | | Oil Shale - high grade, dark brown |
| 825 | | | .50 | | 43.4 | | |
| 826 | | | .45 | | 42.2 | | |
| 827 | +10 | | .40 | | 29.6 | | |
| 828 | | | | | 21.9 | | Oil Shale - low grade, |
| 829 | | | | | 20.2 | | light to medium brown |
| 830 | | | .84 | | 14.5 | | |
| 831 | | | .75 | | 10.3 | | |
| 832 | | | | | 23.9 | | |
| 833 | | | .83 | | 16.9 | | |
| 834 | | | .67 | | 11.5 | | |
| 835 | | | .64 | | 13.1 | | |
| 836 | | | .65 | | 12.2 | | |
| 837 | 0 | | .57 | | 10.9 | + | 836.50-837.10 Mahogany Marker |
| 838 | | | .24 | | 9.1 | | Sandstone layer, oil saturated |
| 839 | | | .41 | | 11.1 | | |
| 840 | | | | | 13.0 | | |
| 841 | | | .27 | | 33.9 | | Oil Shale - medium to high grade, |
| 842 | | | | | 37.8 | | medium brown with dark bands, |
| 843 | | | | | 20.9 | | |
| 844 | | | | | 22.6 | | |
| 845 | | | .09 | | 16.7 | | |
| 846 | | | | | 30.5 | | Oil Shale - high grade, |
| 847 | -10 | | .54 | | 32.3 | | dark brown to black |
| 848 | | | | | 30.4 | | |
| 849 | | | .67 | | 49.4 | | 'Mahogany Zone' |
| 850 | | | .11 | | 45.4 | | Oil Shale - medium grade, |
| 851 | | | .30.38.75 | | 66.8 | | dark brown |
| 852 | | | .68 | | 26.7 | | 852.70-853.65 Nahcolite massive, |
| 853 | | | .52 | | 19.1 | *** | high grade; 853.65-854.65 nahcolite |
| 854 | | | .25.40.95 | | 38.6 | *** | with thin, irregular seams of gray |
| 855 | | | | | 28.2 | | shale |
| 856 | | | .83 | | 20.7 | | |

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HOLE:

X-4

| Depth | ±MM | FRX | PP | 0 | Gal/ 50 Ton | Lith | Rock Description |
|----------|-----|-----|-----------|---|----------------|------|------------------------------------|
| 857 | -20 | | | | 24.3 | | |
| 858 | | | | | 38.3 | | Oil Shale - medium to high grade, |
| 859 | | | | | 22.1 | | brown to black, thinly laminated |
| 860 | | | | | 17.6 | | |
| 861 | | | | | 16.5 | | |
| 862 | | | .50 | | 15.8 | | |
| 863 | | | .18 | | 17.8 | | |
| 864 | | 90° | .25 | | 18.3 | | |
| 865 | | | .30 | | 18.5 | | |
| 866 | | 90° | .35 | | 17.2 | | |
| 867 | -30 | | .55.90 | | 46.2 | | Oil Shale - high grade, black |
| 868 | | | .15.75 | | 53.9 | | |
| 869 | | | .84 | | 20.5 | | |
| 870 | | | | | 22.0 | | |
| 51 → 871 | | | .24 | | 38.0 | | |
| 872 | | | | | 17.1 | | Oil Shale - low grade, light brown |
| 873 | | | .08 | | 18.3 | | |
| 874 | | | .45 | | 14.4 | | |
| 875 | | | | | 18.4 | | |
| 876 | | | .04 | | 19.1 | | |
| 877 | -40 | | | | 19.6 | | |
| 878 | | | .66 | | 10.6 | | |
| 879 | | | .46 | | 10.7 | | |
| 880 | | | | | 11.7 | | |
| 881 | | | .08 | | 15.7 | | |
| 882 | | | .00 | | 29.5 | | Oil Shale - high grade, |
| 883 | | | | | 34.5 | | dark brown to black |
| 884 | | | | | 28.9 | | |
| 885 | | | | | 23.3 | | |
| 886 | | | .50 | | 25.1 | | |
| 887 | -50 | | | | 29.9 | | |
| 69 → 888 | | | .96 | | 32.7 | | |
| 889 | | | .38 | | 20.5 | | Oil Shale - low grade, light brown |
| 890 | | | .15 | | 18.9 | | with dark brown bands |
| 891 | | | .10.83 | | 12.9 | | |
| 892 | | | .07.59 | | 9.4 | | |
| 893 | | | .27 | | 14.8 | | |
| 894 | | | .12.37 | | 24.3 | | |
| 895 | | | .17.83 | | 12.6 | | |
| 896 | | 90° | | | 11.1 | | |
| 897 | -60 | | .33.95 | | 8.9 | | Oil Shale - low grade, |
| 898 | | | .15.33.55 | | 4.5 | | light brown |
| 899 | | | .71 | | 5.9 | | |
| 900 | | | .63 | | 15.6 | | |
| 901 | | | .52 | | 11.3 | | |
| 902 | | | .07.44.84 | | 5.0 | | 902.00-.44 Sandstone layer, |
| 903 | | | .65 | | 18.4 | | oil saturated |
| 904 | | | .13 | | 21.7 | | Oil Shale - medium grade, brown |
| 905 | | | .13.71 | | 14.7 | | |
| 906 | | | .16 | | 12.8 | | |

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HOLE: X-4

| Depth | ±MM | FRX | PP | 0 | Gal/ 50 Ton | Lith | Rock Description |
|-------|------|-----|-----------|---|----------------|------|------------------------------|
| 907 | -70 | | .05,25.80 | | 13.0 | | |
| 908 | | | .34 | | 7.6 | | |
| 909 | | | .38 | | 36.7 | | Oil Shale - high grade, |
| 910 | | | .09.79 | | 29.0 | | dark brown to black |
| 911 | | | .38.59.68 | | 6.6 | | |
| 912 | | | .21.58.92 | | 2.5 | TLT | Marlstone - gray, hard |
| 913 | | | .46.66.72 | | 3.4 | | |
| 914 | | | .36.73.90 | | 3.9 | | |
| 915 | | | .65 | | 16.2 | | |
| 916 | | | .18.75 | | 26.8 | | Oil Shale - high grade, |
| 917 | -80 | | .05.48.83 | | 13.7 | | dark brown |
| 918 | | | .15 | | 14.8 | | |
| 919 | | | .09.55 | | 11.6 | | 919.55-.60 Sandstone layer, |
| 920 | | | .02.62 | | 6.9 | | oil saturated |
| 921 | | | .17.92 | | 4.8 | | |
| 922 | | | .40 | | 3.9 | | Oil Shale - low grade, |
| 923 | | | .13.70 | | 6.9 | | buff to brown, |
| 924 | | | .52 | | 5.2 | | thinly laminated |
| 925 | | | .57 | | 5.7 | | |
| 926 | | | .31.87 | | 5.4 | | |
| 927 | -90 | | | | 6.1 | | |
| 928 | | | | | 6.6 | | |
| 929 | | | .36 | | 9.2 | | |
| 930 | | | .32 | | 7.2 | | |
| 931 | | | | | 3.3 | | |
| 932 | | | | | 3.8 | | |
| 933 | | | | | 4.5 | | |
| 934 | | | | | 7.0 | | 934.10-.25 Sandstone layers |
| 935 | | | | | 3.6 | | 934.50-.70 oil saturated |
| 936 | | | .45 | | 5.1 | | Oil Shale - low grade, |
| 937 | -100 | | | | 5.2 | | light brown |
| 938 | | | | | 3.3 | | |
| 939 | | | .70 | | 3.6 | | |
| 940 | | | .44 | | 5.9 | | 940.65-.80 Sandstone layer, |
| 941 | | | .40 | | 4.2 | | oil saturated |
| 942 | | | .92 | | 2.9 | TLT | Oil Shale - low grade, |
| 943 | | | .92 | | 3.1 | | light brown |
| 944 | | | | | 2.7 | TLT | Marlstone - light gray, hard |
| 945 | | | .13.27.38 | | 4.6 | | Oil Shale - low grade, |
| 946 | | | .80 | | 4.9 | | light brown |
| 947 | -110 | | | | 2.2 | TLT | Marlstone - light gray, hard |
| 948 | | | | | 1.0 | TLT | |
| 949 | | | | | 0.8 | TLT | |
| 950 | | | .48 | | 1.9 | TLT | |
| 951 | | | .63 | | 1.1 | TLT | |
| 952 | | | .90 | | 2.0 | TLT | |
| 953 | | 90° | | | 2.0 | TLT | |
| 954 | | | .22 | | 1.5 | TLT | |
| 955 | | | | | 1.9 | TLT | |
| 956 | | | | | 1.6 | TLT | |