

## **APPENDIX B**

# **Slug Testing Uplands Work Plan Rayonier Pulp Mill Facility**

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## **REMEDIAL INVESTIGATION FOR THE UPLANDS ENVIRONMENT OF THE FORMER RAYONIER MILL SITE**

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Public Review Draft



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## **Slug Testing Uplands Work Plan Rayonier Pulp Mill Facility**

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**From:** Nick Varnum  
**Date:** June 2, 2003  
**Project No.:** C033.0201

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This memorandum provides a review of the existing data regarding slug testing for the mill site. The Uplands RI/FS Management Plans<sup>1</sup> include a slug testing task (Volume II, Section 5.5.5) that describes conducting slug tests on all wells not tested in 2001<sup>2</sup> when slug testing was performed on eight wells on the mill site.

The following sections summarize the 2001 slug testing and provide recommendations for the Uplands RI/FS groundwater investigation.

### **2001 Slug Testing**

The slug testing was conducted on wells PZ-2, PZ-4, PZ-10, PZ-12, MW-20, MW-51, MW-53, and MW-56 (see attached figure). The wells were selected to provide information from different portions of the property and different soil types in the screened zones of the wells.

The soil in screened intervals of the eight wells consists of fill material composed primarily of silty sands and gravels.

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<sup>1</sup> Integral Consulting, Inc., and Foster Wheeler Environmental Corporation. 2003. *Management Plans for the Remedial Investigation – Feasibility Study of the Uplands Environment, Former Rayonier Mill, Port Angeles, Washington*. Prepared for Rayonier, Jacksonville, FL. April 2003.

<sup>2</sup> Landau Associates. 2001. *Well Installation and Abandonment, Rayonier Inc. Port Angeles Mill Site*. Prepared for Rayonier Inc. May 11.

A rising head test was performed in each well and the well recovery was measured using a pressure transducer. The Bower and Rice Method was used to evaluate the slug test data, the results are shown below.

Well	Conductivity (cm/sec)
MW-20	8.90E-03
MW-51	1.40E-04
MW-53	4.38E-03
MW-56	1.67E-03
PZ-2	3.28E-03
PZ-4	1.20E-04
PZ-10	2.80E-03
PZ-12	1.42E-03
Mean	0.0028
SD	0.0029

Hydraulic conductivity values ranged from  $1.4 \times 10^{-4}$  cm/sec to  $8.9 \times 10^{-3}$  cm/sec, which are consistent with silty sands and gravels.

## Discussion

The range in hydraulic conductivity estimated for the eight wells is generally within one order-of-magnitude, which is small given the nature of the test method. Two wells had hydraulic conductivities that were more than an order-of-magnitude smaller than the mean, MW-51 and PZ-4. The logs of these wells do not indicate aquifer materials significantly different from other wells tested. Therefore, the reason for the low hydraulic conductivities at these two wells is unclear.

The well logs of the wells that are scheduled for slug tests in the Uplands RI/FS Management Plans were reviewed to evaluate aquifer materials within the screened intervals. The aquifer materials in these wells is generally similar to those found in the eight wells tested in 2001 with two exceptions; PZ-11 was screened across native silt and portions of MW-55 had wood debris. PZ-11 is located near the southern site boundary, near the bluff, and is not screened in the unconfined fill aquifer. MW-55 is located near the northern end of the site, west of the dock. Being near the site boundaries, neither of these wells will provide significant information on average conditions in the fill aquifer.

## **Recommendations**

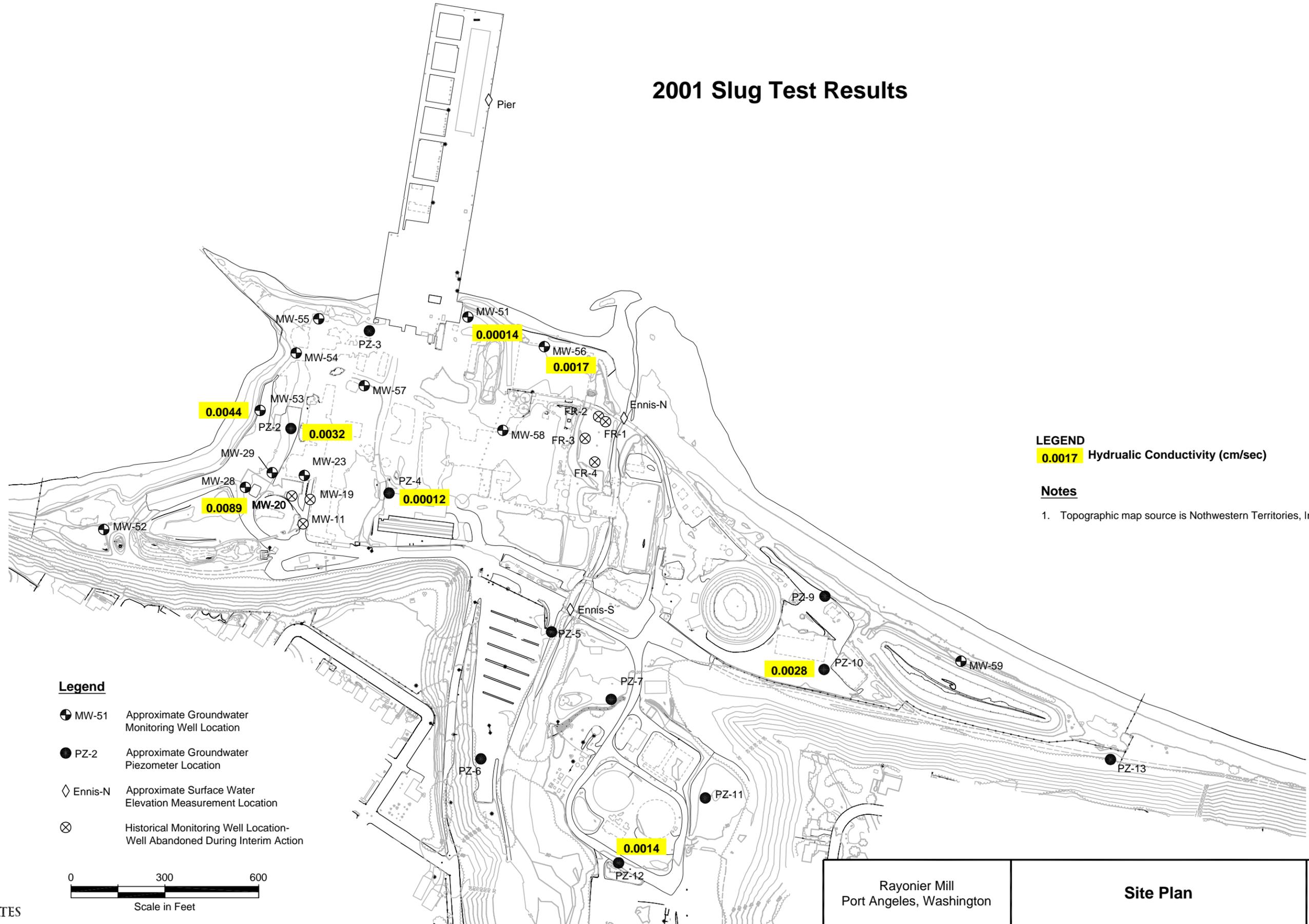
The purpose of the slug testing is to determine the approximate hydraulic conductivity of the unconfined fill aquifer beneath the site. This information can be used for fate and transport evaluations of chemical groundwater migration in the event that significant chemical concentrations are detected during the groundwater sampling event. Based on groundwater sampling data collected to date, it is not likely that significant chemical concentrations will be detected in the site wells.

The range of values obtained from the 2001 testing indicates that there is not a large range in hydraulic conductivity in the unconfined fill aquifer and that the range is consistent with the material tested.

Given the nature of slug testing and the similarity of the screened aquifer materials in the site wells, the existing data appears to be adequate for the purposes stated. Integral recommends that the 2001 data be used to evaluate the hydraulic conductivity of the fill aquifer.

Attachments: Figure 1. 2001 Slug Test Results

# 2001 Slug Test Results



**LEGEND**

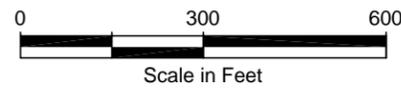
**0.0017** Hydraulic Conductivity (cm/sec)

**Notes**

1. Topographic map source is Northwestern Territories, Inc.

**Legend**

- ⊕ MW-51 Approximate Groundwater Monitoring Well Location
- PZ-2 Approximate Groundwater Piezometer Location
- ◇ Ennis-N Approximate Surface Water Elevation Measurement Location
- ⊗ Historical Monitoring Well Location- Well Abandoned During Interim Action



Rayonier Mill Port Angeles, Washington	Site Plan
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