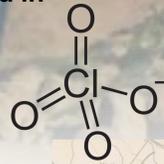


**PERCHLORATE OVERVIEW**

Perchlorate is an anion. It occurs naturally, and has been used by mankind as an oxidant for solid rocket propulsion and in road flares and fireworks. Perchlorate is also found in some fertilizers. In California, a public health goal for drinking water of 6 micrograms per liter (ppb) has been established.



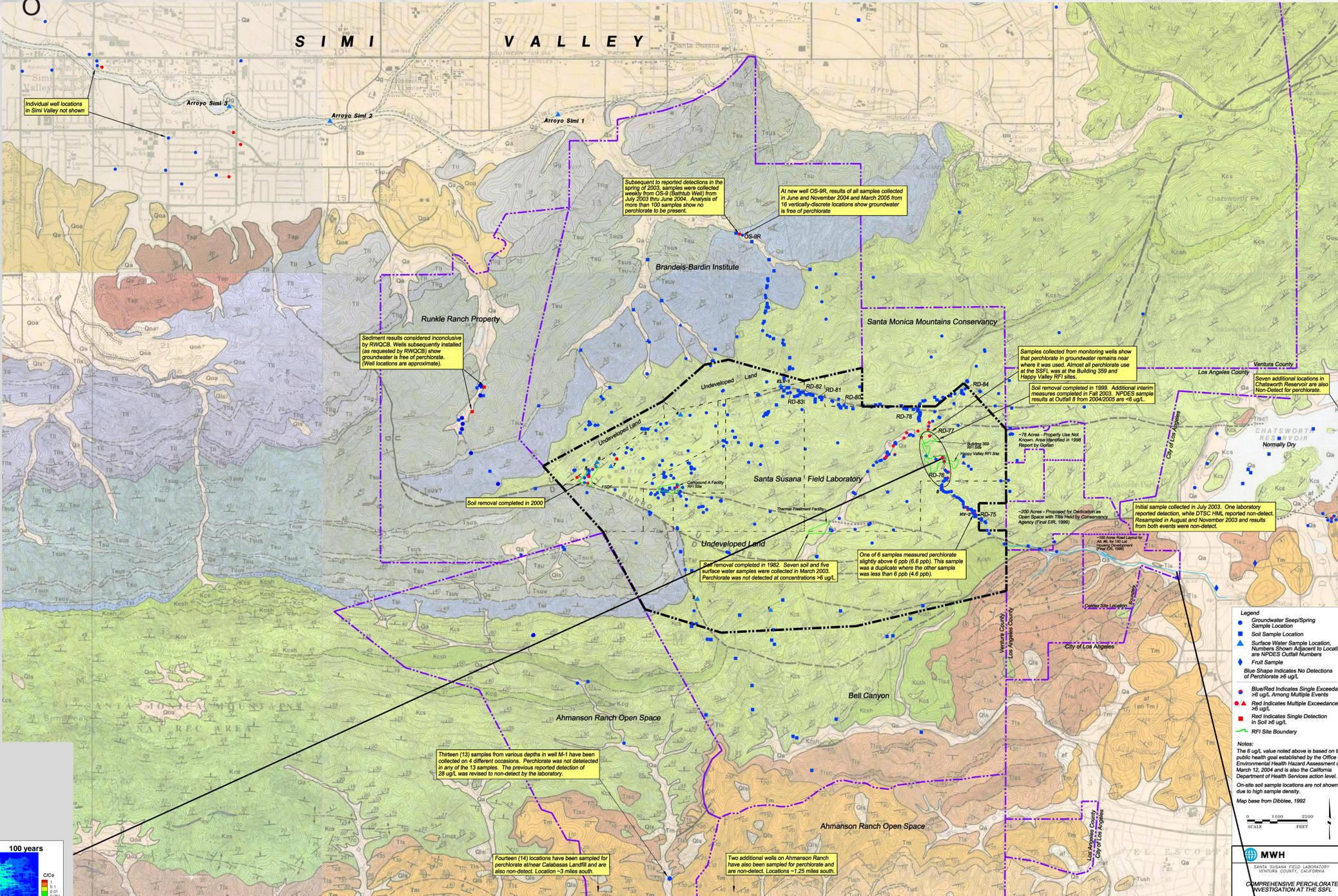
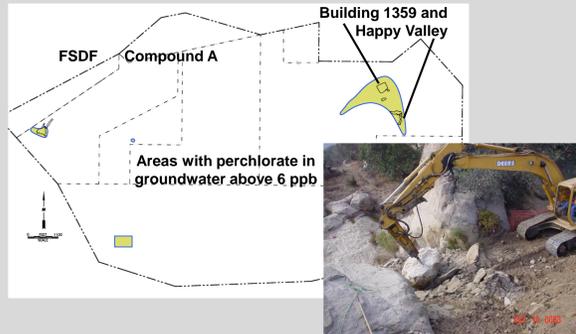
# Sampling for Perchlorate At and Around SSFL

## Extensive Data Shows Site Releases Remain Close to Where They Entered the Ground

**NATURE, EXTENT AND REMEDIATION AT SSFL**

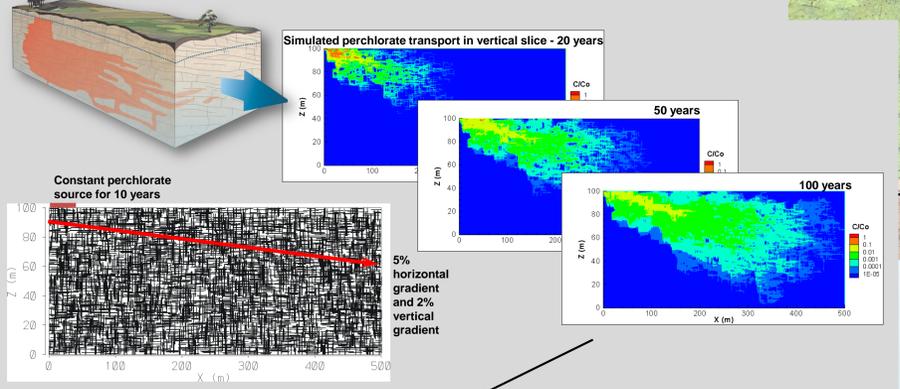
Perchlorate was used at SSFL in small amounts because it was not used as the oxidant in the rocket engines that were tested there. Many soil, soil leachate, groundwater, surface water, and seep samples have been collected and analyzed for perchlorate to define its nature and extent.

Perchlorate in soil and rock at SSFL has been remediated by excavation and off-site disposal (~8,000 cubic yards (cy)) and *in situ* by bioremediation (~9,000 cy)

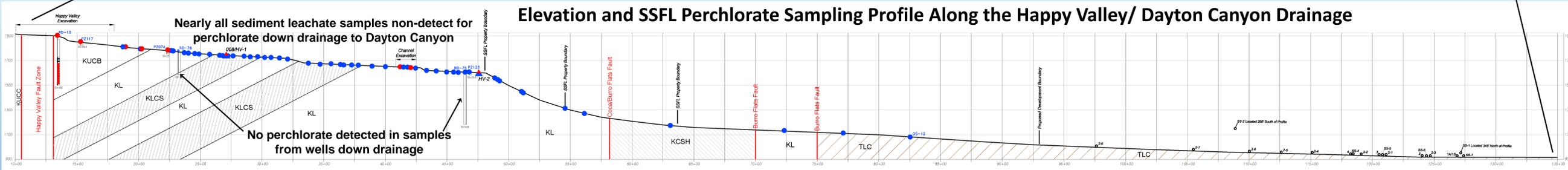


**RETARDATION OF PERCHLORATE IN SSFL GROUNDWATER**

Unlike granular aquifers, perchlorate transport in the fractured sedimentary rock of the Chatsworth Formation that underlies SSFL moves much slower than groundwater due to matrix diffusion. Site data and transport modeling show it to be within a thousand feet or so of where it entered the ground



**Elevation and SSFL Perchlorate Sampling Profile Along the Happy Valley/ Dayton Canyon Drainage**



**Legend**  
 ● Groundwater Seep/Spring Sample Location  
 ● Soil Sample Location  
 ▲ Surface Water Sample Location, Numbers Shown Adjacent to Locations are NPDES Outfall Numbers  
 ● Fruit Sample  
 ● Blue Shape Indicates No Detections of Perchlorate >6 ug/L  
 ● Blue/Red Indicates Single Exceedance >6 ug/L Among Multiple Events  
 ● Red Indicates Multiple Exceedances >6 ug/L  
 ● Red Indicates Single Detection in Soil >6 ug/L  
 ● Green Line RFI Site Boundary

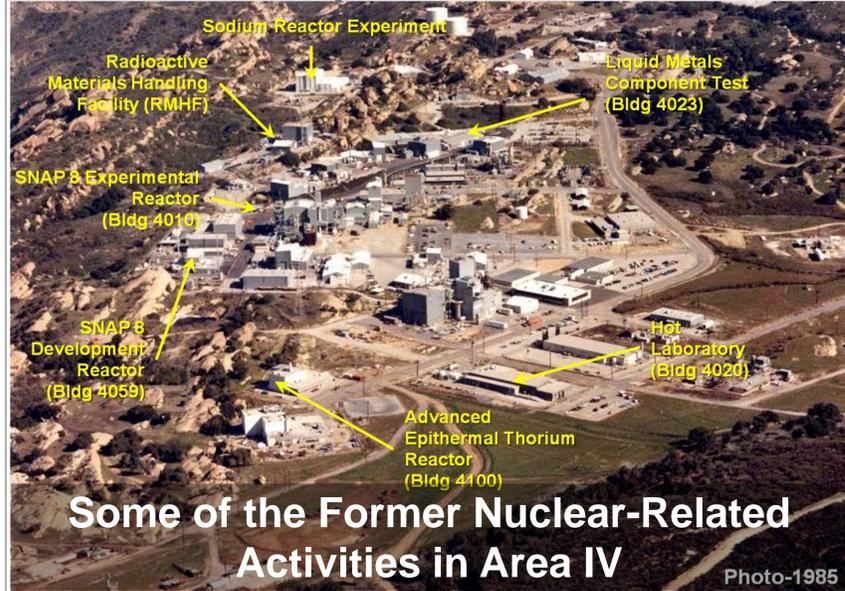
**Notes:**  
 The 6 ug/L value noted above is based on the public health goal established by the Office of Environmental Health Hazard Assessment on March 12, 2004 and is also the California Department of Health Services action level. On-site soil sample locations are not shown due to high sample density.  
 Map base from Dibblee, 1992

**MWH**  
 SANTA SUSANA FIELD LABORATORY  
 VENTURA COUNTY, CALIFORNIA  
 COMPREHENSIVE PERCHLORATE INVESTIGATION AT THE SSFL

# Site Related Tritium in Groundwater

**SSFL tritium contamination from nuclear operations shows a small plume consistent with lower permeability and strong matrix diffusion**

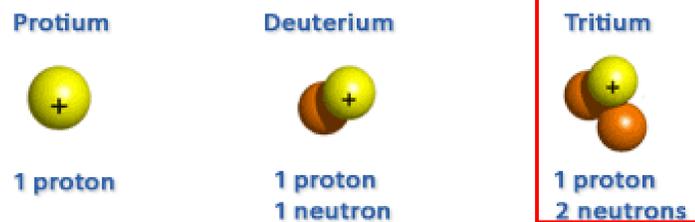
## Nuclear related operations from 1956 - 1983



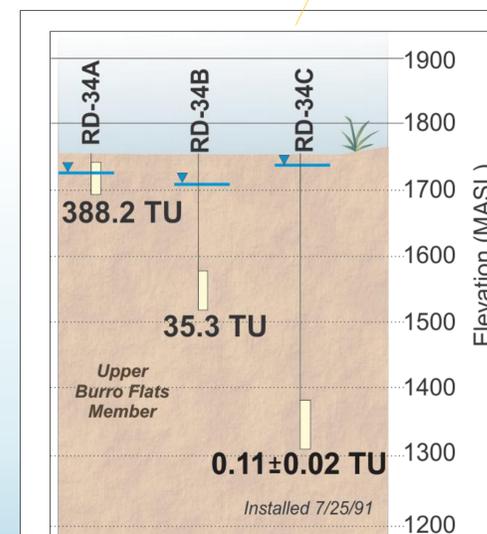
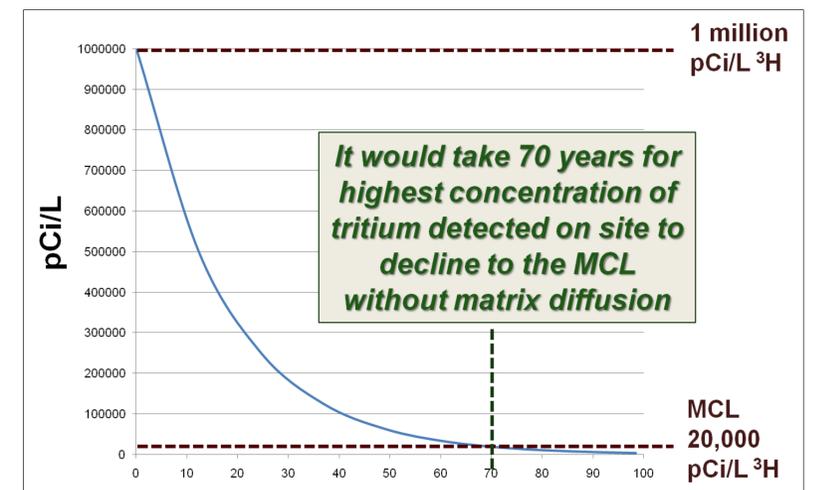
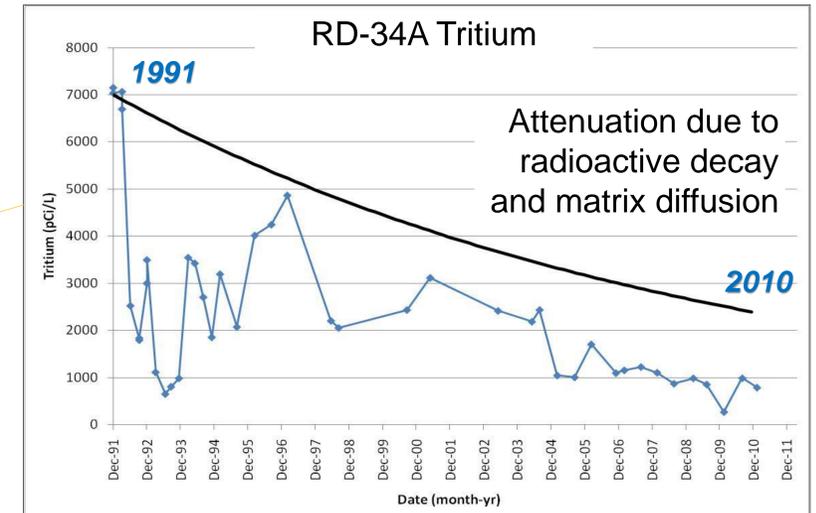
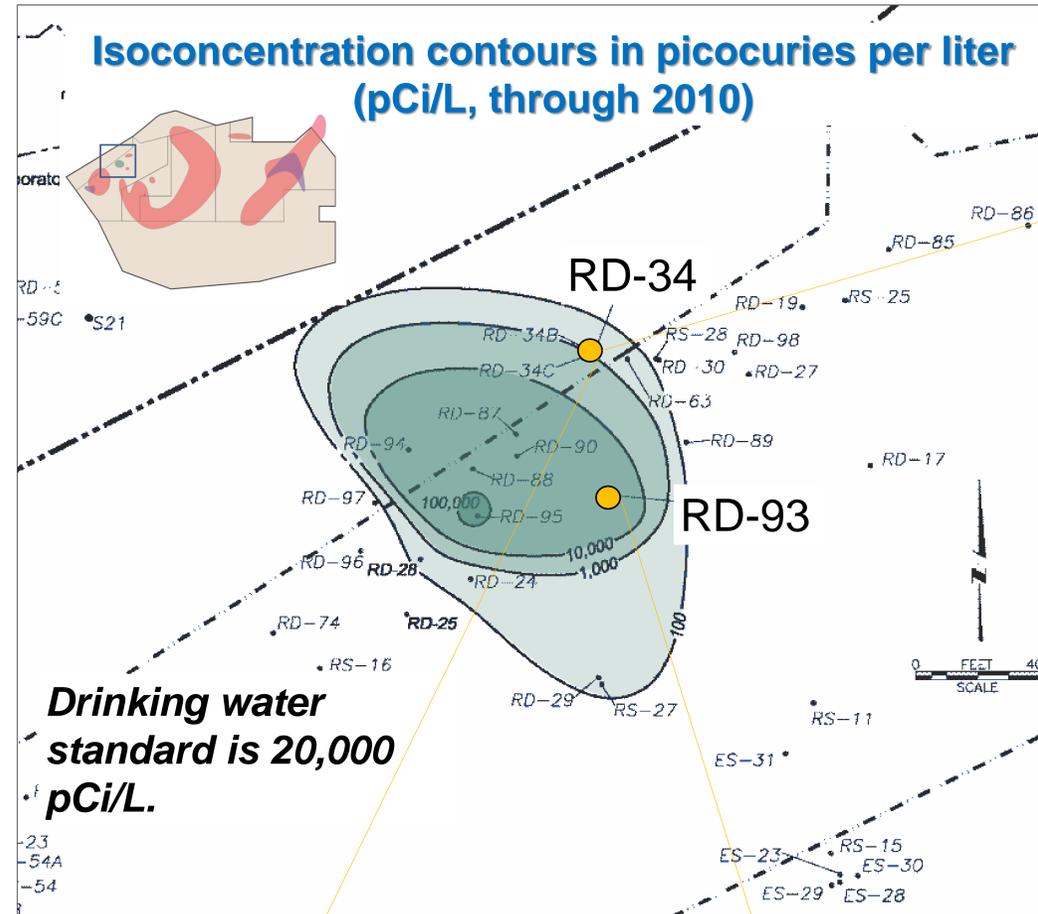
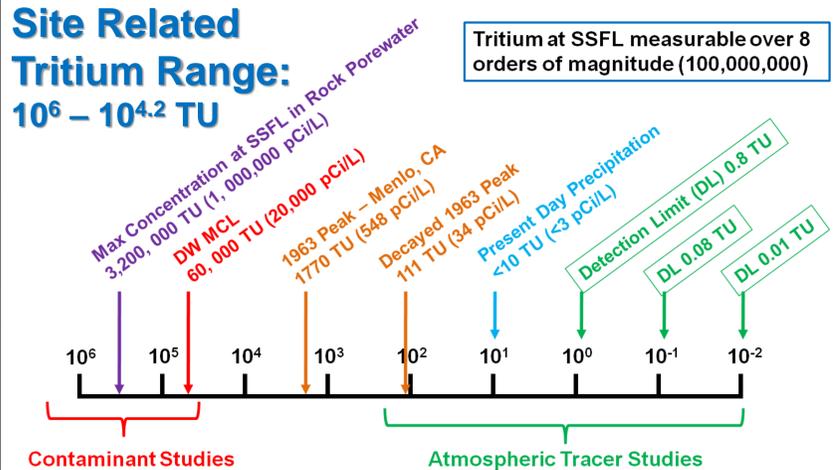
## What is Tritium ?

Radioactive decay isotope of hydrogen with decay half life of 12 years

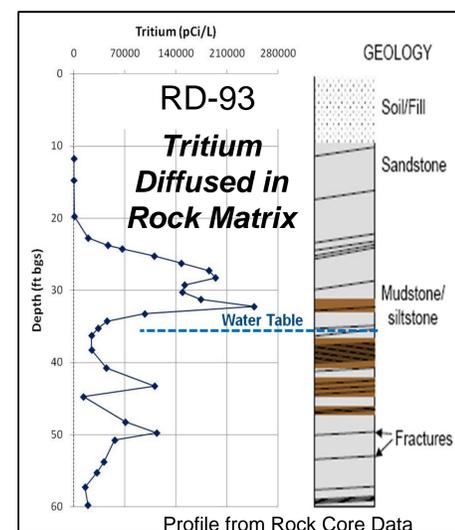
### Three Nuclides of the Hydrogen Isotopes:



## Site Related Tritium Range: $10^6 - 10^{4.2}$ TU



Example of Tritium decrease with depth measured in groundwater samples.



The highest site related tritium concentrations were found in rock core samples

## Tritium Plume Front Retardation

As tritium molecules move along fractures diffusion continually causes some of the molecules to be transferred into the rock matrix

Plug Flow Position for Water

