

PROGRESS REPORT FOR THE DEVELOPMENT OF CLEANUP LEVELS  
FOR CONTAMINANTS IN SOILS AT THE SOLAR EVAPORATION PONDS  
SEPTEMBER 5, 1989

The objective of the assessment is to establish cleanup levels of possible contaminants in soils in and around the Solar Evaporation Ponds that are protective of human health and the environment. Previous studies of the Solar Ponds indicated fifty-three chemicals including volatile, semi-volatile, and inorganic materials in samples collected in the vicinity of the ponds. Based on a toxicity assessment which evaluates the carcinogenic and non-carcinogenic potential of each contaminant, Target Cleanup Levels (TCLs) are developed for the chemicals.

As of September 5, 1989, a preliminary evaluation has been performed to determine possible cleanup levels based on carcinogenic risk. This evaluation for the Solar Evaporation Ponds was executed using a maximum plausible case scenario (i.e., a future use of the Pond area as Residential property).

Included in this progress report are the methods used to determine the TCL's, and results of the preliminary findings.

**METHODS:**

The Screening Target Cleanup Model (STCM) was based upon preliminary risk criteria selected by Rockwell International, and WESTON. To define the Target Cleanup Levels (TCLs) at a risk level of  $10^{-6}$ , each of the carcinogenic chemicals was initially allotted the risk of  $10^{-8}$ . This allowable risk for each contaminant assumed a 100 fold safety margin associated with the additivity of individual compounds.

Definition of the preliminary model consisted of five exposure pathways which included dermal contact, dust inhalation, vapor inhalation, soil ingestion (adult), and vegetable

consumption. Algorithms were derived for each pathway to calculate the concentrations of contaminants in the soil which will pose a  $10^{-8}$  cancer risk for each pathway alone. To account for the additivity of pathways, the TCL for each of the contaminants was then calculated using the following equation (Rosenblatt et al., 1982)

$$\text{TCL} = 1 / \left( \frac{1}{\text{TCL PATHWAY 1}} + \frac{1}{\text{TCL PATHWAY 2}} + \frac{1}{\text{TCL PATHWAY 3}} + \frac{1}{\text{TCL PATHWAY N}} \right)$$

This equation protects the potential receptor from combined exposure to numerous pathways at a risk level of  $10^{-8}$ .

#### RESULTS:

At this time, the STCM has been performed, but is being refined. A list of the assessed carcinogens is attached (TABLE 1) along with preliminary TCLs based on a  $10^{-8}$  risk for individual chemicals. Fifty-three chemicals were reported at and around soil, sludge, and sediment data. Of the fifty-three possible contaminants, sixteen chemical compounds have evidence for carcinogenicity. Although Polynuclear Aromatic Hydrocarbons (PAHs) were not analyzed in previous studies, and because the solar ponds were lined with creosote, it is possible that they are present in the underlining soils. Consequently, PAHs were included in the carcinogenic STCM.

#### CONCLUSION:

A preliminary report scheduled for October will include the results of the toxicity assessment, and the calculation of target cleanup levels based on carcinogenic risk. The definition of cleanup levels related specifically to site conditions based on non-carcinogenic endpoints are the next phases of the project.

TABLE 1  
CURRENT SOIL CLEAN UP LEVELS BASED ON  
10-8 CARCINOGENIC RISK

CARCINOGENIC CHEMICALS	MILLIGRAMS PER KILOGRAM
<b>ORGANICS</b>	
Bis(2-Ethylhexyl)Phthalate	4.02E-01
Carbon Tetrachloride	4.27E-02
Chloroform	1.28E-01
1,1-Dichloroethane	5.58E-02
1,2-Dichloroethane	5.50E-02
1,1-Dichloroethene	6.55E-03
Methylene Chloride	5.11E-01
PAHs (Benzo(a)pyrene)	5.06E-04
Tetrachloroethane	1.15E-01
1,1,2-Trichloroethane	9.16E-02
Trichloroethene	4.77E-01
Vinyl Chloride	2.52E-03
<b>INORGANICS</b>	
Arsenic	2.46E-03
Beryllium	1.70E-03
Cadmium	1.62E-02
Chromium	2.40E-03
Nickel	1.22E-01