

FINAL REPORT (Volume I)
RUNKLE RANCH SITE INVESTIGATION
SIMI VALLEY, CA

Prepared for:

GreenPark Holdings, LLC

October, 1999

Prepared by:



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EXECUTIVE SUMMARY

Presented in this report are the results of the sampling program conducted at GreenPark Holdings, LCC (GreenPark) Runkle Ranch Property in Simi Valley, California. The work summarized in this report was conducted by Foster Wheeler Environmental Corporation (Foster Wheeler) at the request of GreenPark from June 28th through July 2nd 1999. There were two primary objectives of the sampling program at Runkle Ranch.

The first objective was to provide an initial reconnaissance evaluation of the presence of radionuclides in surface soils at the site. Radionuclides are specific atoms, which undergo a spontaneous change (or decay) in which energy, or particles, are emitted and a distinctly new atom or element is formed. Samples were analyzed for the following radionuclides of potential concern: cesium-137 (Cs-137), strontium-90 (Sr-90) and tritium (H-3). The second objective was to evaluate the nature of a tailings pile that is present on site. Samples were analyzed for Title 26 Metals, pH, and major cations and anions (Na^+ , K^+ , Mg^{2+} , Ca^{2+} , SO_4^{2-} , NO_3^- , Cl^-).

During 1998, four soil samples taken from the Runkle Ranch property were found to contain measurable concentrations of the radioactive materials, tritium, strontium-90, and cesium-137. Previous studies by the USEPA and QST Environmental concluded that these materials were the constituents of concern in the Runkle Ranch area. The concentrations seen in these early samples were generally very low. All three of these radionuclides exist in nature, with the strontium and cesium present because of worldwide fallout from nuclear weapon tests and the Chernobyl accident. In the July 1995 EPA update entitled "The U.S. EPA Announces Results of Rocketdyne's offsite sampling program for the Santa Susana Field Laboratory" the average concentrations, measured in pico-curies per gram (pCi/g) of soil for the Sr-90 and Cs-137 or pico-curies per liter (pCi/L) of water for the tritium, were reported to be the following:

◆ Strontium (assumed to be 90)	0.103 pCi/g
◆ Cesium-137	0.20 pCi/g
◆ Tritium (H-3)	2,250 pCi/L

A curie is a unit of measure used to quantify radioactivity based on disintegration (or decay) of an element over time per minute, which are measured as radioactive emissions. There are 1,000,000,000,000 pico-curies per curie, as an example, in one gram of H-3 there are 9,800 curies or 9.8×10^{15} pico-curies.

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Foster Wheeler was commissioned to determine the extent and magnitude of these materials and the resulting significance as they may affect the health and well-being of future residents at Runkle Ranch.

The methodology chosen was to collect and analyze soil samples using an accepted protocol and to compare the results with those dose limits previously proposed by the USEPA. The methodology chosen was from MARSSIM, (the Multi Agency Radiation Survey and Site Investigation Manual). This manual provides an approach developed collectively by the Environmental Protection Agency, the Nuclear Regulatory Commission, the Department of Defense, and the Department of Energy. MARSSIM allows calculation of the number of samples required to characterize the site based on a statistical approach. Based on MARSSIM, 58 locations were sampled for strontium-90, cesium-137 and tritium.

The exposure limit chosen was 15 mrem/year above natural background, which is a value already proposed by the EPA, which failed to be approved by the Office of Management and Budget because it is too restrictive. In addition, in 1997, the US Nuclear Regulatory Commission (NRC) established a clean-up limit of 25 mrem/year. 15 mrem/year is generally considered to be an acceptable end point, which is considered to be protective of human health by the USEPA, below which it is not useful or necessary to perform any remedial activity. The use of 15 mrem/year as the limit in this study lends an element of conservatism in an area where agreement on definite limits has yet to be established by the USEPA, US Department of Energy, or US Nuclear Regulatory Commission.

The results of the study indicate that the three radionuclides together will not cause a dose in excess of the 15 mrem/year limit, and that there is little (if any) difference between radionuclides found on the Runkle Ranch and those typical of southern California.

In perspective, the concentrations of strontium-90, cesium-137 and tritium and the annual dose attributable to them, were found to be insignificant. For example, concentrations of cesium-137 were in the range of concentrations normally seen from worldwide fallout, e.g., 0 to 1 pCi/g. Additionally, most concentrations of strontium-90 in soil were lower than the typical background concentration in soil of 0.7 pCi/g (also from fallout). For comparison, the human body contains radioactivity at a concentration of approximately 1.7 pCi/g, and consumer salt substitutes containing potassium chloride contain radioactivity at over 400 pCi/g.

Tritium was not measurable in any of the samples taken, indicating that the concentrations found at Runkle Ranch are less than the analytical sensitivity of 100 pCi/L. At worst, the concentrations are less than 0.5 percent of the EPA drinking water standard for tritium of 20,000 pCi/L.

Finally, the dose possible from exposure to the radionuclides measured was found definitively to be less than 15 mrem/year, and most likely to be less than 5 mrem/year. This is less than 5

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Table 4-2

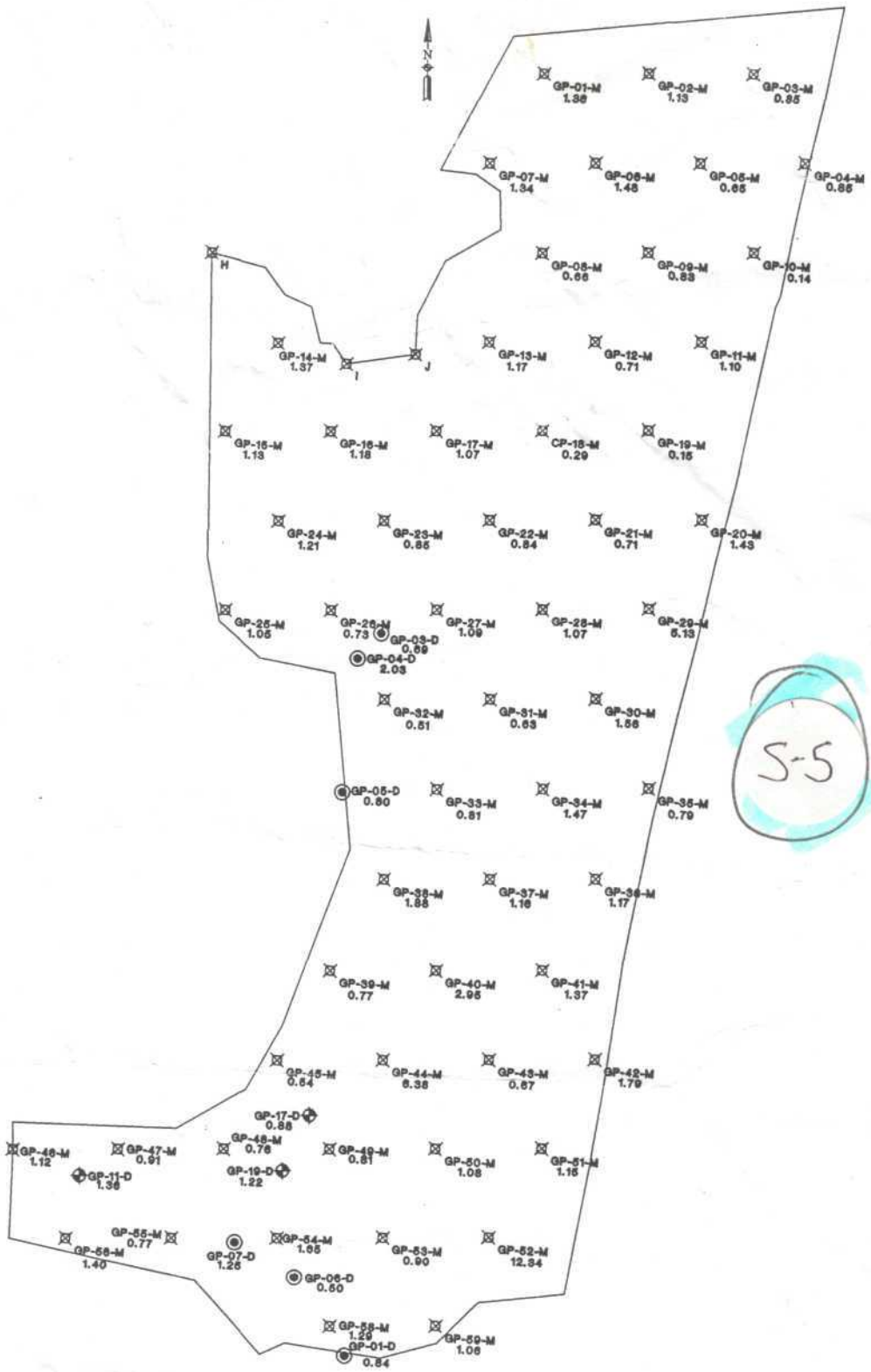
Sr-90 MARSSIM Grid Sample Results

Lab ID	Client ID	Analyte	Result	DCGL Result	Sign	Error	MDA	Units
99-07018-06	GP-01-M	Strontium-90	1.36	-0.14	-1	0.40	0.71	PCI/G
99-07018-07	GP-02-M	Strontium-90	1.13	0.10	1	0.44	0.86	PCI/G
99-07017-20	GP-03-M	Strontium-90	0.85	0.38	1	0.42	0.87	PCI/G
99-07018-05	GP-04-M	Strontium-90	0.85	0.38	1	0.35	0.69	PCI/G
99-07018-04	GP-05-M	Strontium-90	0.65	0.58	1	0.40	0.87	PCI/G
99-07018-08	GP-06-M	Strontium-90	1.48	-0.25	-1	0.43	0.75	PCI/G
99-07018-09	GP-07-M	Strontium-90	1.34	-0.11	-1	0.40	0.74	PCI/G
99-07017-17	GP-08-M	Strontium-90	0.66	0.57	1	0.34	0.70	PCI/G
99-07017-18	GP-09-M	Strontium-90	0.83	0.40	1	0.38	0.75	PCI/G
99-07017-19	GP-10-M	Strontium-90	0.14	1.09	1	0.38	0.92	PCI/G
99-07017-14	GP-11-M	Strontium-90	1.10	0.13	1	0.40	0.73	PCI/G
99-07017-13	GP-12-M	Strontium-90	0.71	0.52	1	0.37	0.76	PCI/G
99-07017-12	GP-13-M	Strontium-90	1.17	0.06	1	0.38	0.69	PCI/G
99-07021-08	GP-14-M	Strontium-90	1.37	-0.14	-1	0.48	0.89	PCI/G
99-07021-09	GP-15-M	Strontium-90	1.13	0.10	1	0.34	0.58	PCI/G
99-07021-12	GP-16-M	Strontium-90	1.18	0.05	1	0.33	0.56	PCI/G
99-07017-10	GP-17-M	Strontium-90	1.07	0.16	1	0.41	0.75	PCI/G
99-07017-16	GP-18-M	Strontium-90	0.29	0.94	1	0.33	0.77	PCI/G
99-07017-15	GP-19-M	Strontium-90	0.15	1.08	1	0.36	0.88	PCI/G
99-07019-13	GP-20-M	Strontium-90	1.43	-0.20	-1	0.41	0.69	PCI/G
99-07019-12	GP-21-M	Strontium-90	0.71	0.52	1	0.34	0.68	PCI/G
99-07019-11	GP-22-M	Strontium-90	0.84	0.38	1	0.35	0.68	PCI/G
99-07021-13	GP-23-M	Strontium-90	0.85	0.38	1	0.34	0.66	PCI/G
99-07021-11	GP-24-M	Strontium-90	1.21	0.02	1	0.43	0.77	PCI/G
99-07021-10	GP-25-M	Strontium-90	1.05	0.18	1	0.39	0.73	PCI/G
99-07017-06	GP-26-M	Strontium-90	0.73	0.49	1	0.37	0.74	PCI/G
99-07019-09	GP-27-M	Strontium-90	1.09	0.14	1	0.39	0.72	PCI/G
99-07019-10	GP-28-M	Strontium-90	1.07	0.16	1	0.39	0.72	PCI/G
99-07019-14	GP-29-M	Strontium-90	5.13	-3.90	-1	0.69	0.84	PCI/G
99-07021-14	GP-30-M	Strontium-90	1.56	-0.34	-1	0.41	0.64	PCI/G
99-07017-07	GP-31-M	Strontium-90	0.63	0.60	1	0.32	0.66	PCI/G
99-07017-05	GP-32-M	Strontium-90	0.51	0.72	1	0.36	0.76	PCI/G
99-07017-08	GP-33-M	Strontium-90	0.81	0.42	1	0.38	0.76	PCI/G
99-07017-09	GP-34-M	Strontium-90	1.47	-0.24	-1	0.42	0.70	PCI/G
99-07019-15	GP-35-M	Strontium-90	0.79	0.44	1	0.35	0.70	PCI/G
99-07021-07	GP-36-M	Strontium-90	1.17	0.06	1	0.41	0.76	PCI/G
99-07020-14	GP-37-M	Strontium-90	1.16	0.07	1	0.39	0.68	PCI/G
99-07019-08	GP-38-M	Strontium-90	1.88	-0.65	-1	0.49	0.85	PCI/G
99-07019-07	GP-39-M	Strontium-90	0.77	0.46	1	0.37	0.73	PCI/G
99-07020-15	GP-40-M	Strontium-90	2.95	-1.72	-1	0.49	0.63	PCI/G
99-07021-06	GP-41-M	Strontium-90	1.37	-0.15	-1	0.42	0.73	PCI/G
99-07020-04	GP-42-M	Strontium-90	1.79	-0.56	-1	0.47	0.75	PCI/G
99-07021-05	GP-43-M	Strontium-90	0.67	0.56	1	0.39	0.83	PCI/G
99-07021-15	GP-44-M	Strontium-90	6.38	-5.15	-1	0.79	0.99	PCI/G
99-07019-06	GP-45-M	Strontium-90	0.54	0.69	1	0.37	0.80	PCI/G
99-07018-16	GP-46-M	Strontium-90	1.12	0.11	1	0.40	0.71	PCI/G
99-07018-17	GP-47-M	Strontium-90	0.91	0.32	1	0.39	0.76	PCI/G
99-07019-04	GP-48-M	Strontium-90	0.76	0.47	1	0.39	0.79	PCI/G
99-07019-05	GP-49-M	Strontium-90	0.81	0.41	1	0.35	0.68	PCI/G
99-07020-12	GP-50-M	Strontium-90	1.08	0.15	1	0.42	0.78	PCI/G
99-07020-05	GP-51-M	Strontium-90	1.15	0.08	1	0.45	0.86	PCI/G
99-07020-11	GP-52-M	Strontium-90	12.34	-11.11	-1	0.86	0.59	PCI/G
99-07020-13	GP-53-M	Strontium-90	0.90	0.33	1	0.39	0.76	PCI/G
99-07018-20	GP-54-M	Strontium-90	1.65	-0.43	-1	0.47	0.81	PCI/G
99-07018-19	GP-55-M	Strontium-90	0.77	0.46	1	0.40	0.82	PCI/G
99-07018-18	GP-56-M	Strontium-90	1.40	-0.17	-1	0.40	0.66	PCI/G
99-07020-09	GP-58-M	Strontium-90	1.29	-0.06	-1	0.42	0.75	PCI/G
99-07020-10	GP-59-M	Strontium-90	1.06	0.17	1	0.37	0.65	PCI/G

Sr-90 DCGL = 1.229 pCi/g Number of Positive Differences (S+) 41
 $\alpha = 0.01$ N = 58 Critical Value = 38

M - MARSSIM Samples

Averages
 58 sample total
 = 81.26
 $81.26 / 58 = 1.39$
 average
 $1.39 / 0.052 = 26.7$
 (background)
 or 27 times background
 $1.39 / 0.231$
 (PRB) = 6.02
 or 6 times PRB
 Highest:
 $12.34 / 0.052 = 237.31$
 or 237 times background
 $12.34 / 0.231 = 53.68$
 or 54 times PRB




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LEGEND:

- ✕ MARSSIM Grid Surface Soil Samples
GP-59-M
 - ⊙ Discretionary Surface Soil Samples
 - ⊕ Discretionary and Tailings Soil Samples
 - Discretionary Surface Water Samples
- NOTE: ANALYTICAL RESULTS IN pCi/g
NOT TO SCALE

ATTORNEY-CLIENT PRIVILEGED AND
ATTORNEY WORK PRODUCT MATERIAL.

FIGURE 4-2
 SR-90 ANALYTICAL RESULTS
 RUNKLE RANCH
 SIMI VALLEY, CALIFORNIA
 GreenPark Holdings, LLC.
 Seal Beach, California
 FOSTER WHEELER ENVIRONMENTAL CORPORATION

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