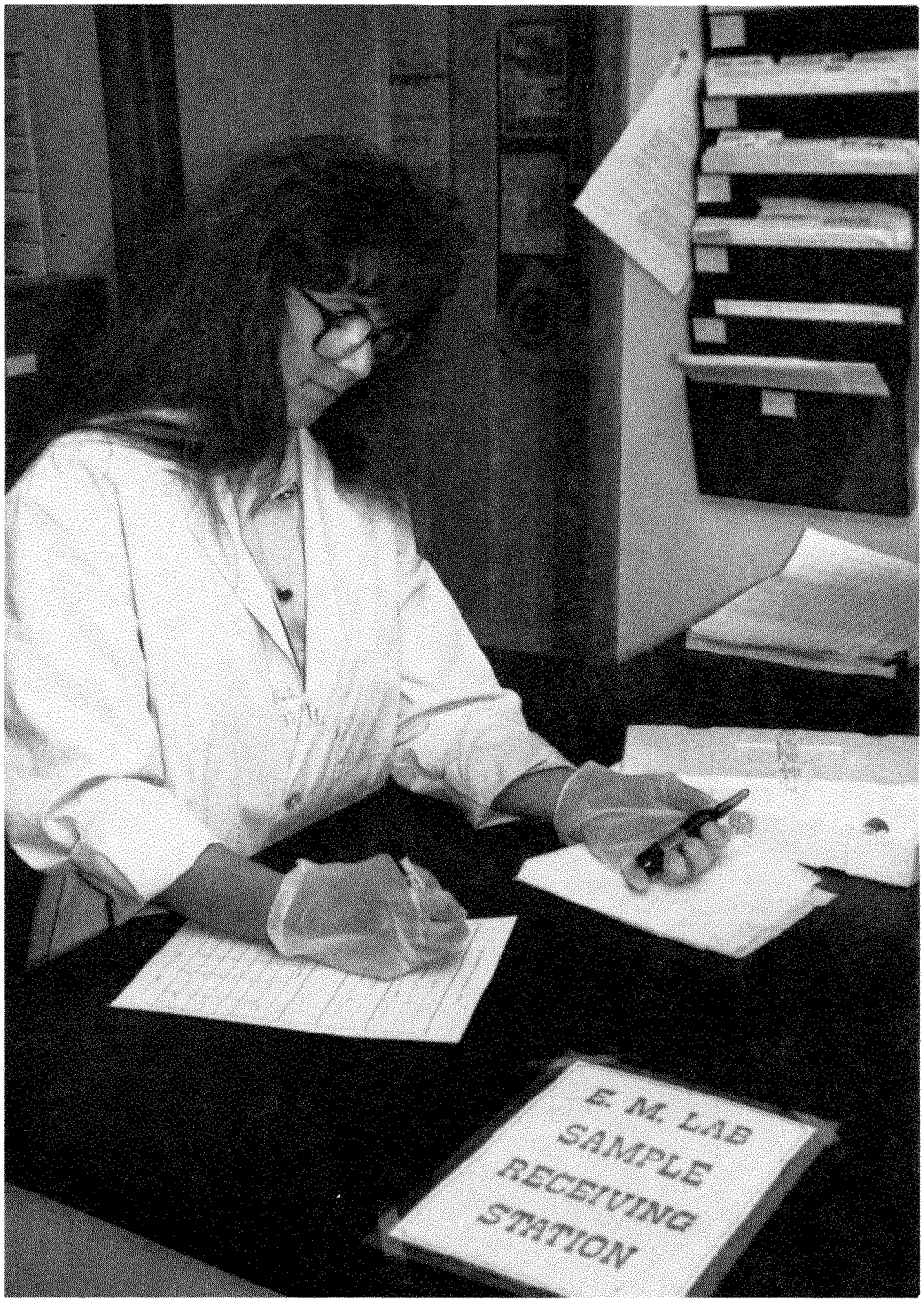

LOGGING A CROSSCHECK SAMPLE

5.0 Standards And Quality Assurance

5.1 Quality Control

Ensuring that the environmental samples and laboratory analyses of these samples are of the highest quality is obviously an important feature of the West Valley Demonstration Project's environmental monitoring program. To achieve the necessary standards, the WVDP follows certain procedures. These include:

- standardized collection procedures that ensure timely collection of representative and appropriate samples
- standardized preparation procedures that ensure reproducible tests
- analytical measurement procedures commonly used at other facilities
- instrument calibrations using NIST (National Insitute of Standards and Technology) traceable standards
- procedures that allow all sample data to be analyzed in the same fashion
- appropriate training of analytical personnel
- evaluation and response procedures that ensure consistent response to the results of sample analyses
- use of both on-site and off-site laboratories to provide crosscheck analyses of samples
- use of blind samples as analytic controls
- documenting that the off-site laboratories adhere to standards and regulations pertinent to handling and storing samples, keeping records, evaluating data, employing qualified personnel, and providing precision and accuracy in the analyses of samples.

Off-Site Laboratories

Off-site laboratories performed most of the analyses requiring radiochemical separation or chemical pollutant analyses for the environmental samples collected during 1989. The documented quality assurance plan used by these laboratories includes periodic interlaboratory crosschecks, prepared standard and blank analyses, routine instrument calibration, and use of standardized procedures. Off-site laboratories analyze blind duplicates of about 10% of the samples analyzed on-site. Simlarly, crosscheck samples are provided by the WVDP Environmental Laboratory.

To ensure that the three contract laboratories followed standard procedures, Project personnel visited each facility as part of the process of qualifying off-site laboratory services. The results of the audits demonstrated that one of the laboratories was not meeting all requirements contractually imposed. No further analyses were performed by this laboratory for the remainder of 1989. It is anticipated that upon successful completion of corrective action and verification, the use of this laboratory will resume in 1990.

The WVDP Environmental Laboratory

Sample collection, preparation, and most direct radiometric analyses were performed at the WVDP Environmental Laboratory. All continuous sampling equipment, measurement devices, and counting instruments were routinely calibrated using standards traceable to the National Institute of Standards and Technology. Specific calibration schedules and operation checks are required and were met in 1989 for critical instruments.

Sampling protocols based on the EPA requirements for nonradiological analyses were set up specifically for groundwater collection. Other collections such as surface water, sediments, and biological samples met standard laboratory procedures and surveillance program schedules. Sampling methods are periodically observed, reviewed, and evaluated in practice by senior laboratory personnel as well as outside agencies such as the Nuclear Regulatory Commission and the New York State Department of Environmental Conservation.

Crosscheck Programs

Formal crosscheck programs between the WVDP Environmental Laboratory, the Department of Energy's Radiological and Environmental Science Laboratory at the Idaho National Engineering Laboratory (INEL), the EPA Environmental Monitoring Systems Laboratory in Las Vegas (EMSL), the New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH ELAP), and the Nuclear Regulatory Commission's Environmental Measurements Laboratory (EML), New York City, included the entire range of environmental sample types monitored in 1989.Tables 1-6 in Appendix D report the results of these crosscheck samples.

- Table D-1 compares data from a variety of environmental media analyzed at WVDP, off-site contract labs, and the Environmental Monitoring Laboratory (EML). Of the thirty analyses of air, soil,vegetation, and water samples reported in Table D-1 for the EML, two uranium-238 samples and one plutonium-239 sample fell outside the "passing" range as determined by EML. The three samples were analyzed by a contract laboratory. The overall test results, including all analyses, averaged a ratio of 1.15, a 90% passing rate.

- Table D-2 summarizes the crosscheck comparison results between the WVDP and the EPA's EMSL for radiological parameters. The passing rate for this round of testing was 89.5% for those samples reported. Five analyzed samples are not reported in the table because the results were not reported by the internal deadline from the contract laboratory. The overall agreement, as represented by the average ratio of 0.95, was quite good.

- Table D-3 gives the crosscheck results from the INEL's gamma-in-water sample. These represent a 100% passing rate for the samples, with an average ratio of 0.98.

- Tables D-4 and D-5 summarize comparisons of water quality parameters in quality assurance samples between the WVDP and NYSDOH ELAP. Combined NYSDOH ELAP crosscheck results for both January and July 1989 corresponded to a 97% passing rate with an average ratio of 1.01, an excellent result.

- Table D-6 demonstrates acceptable agreement between the WVDP laboratory and the NRC for thermoluminiscent dosimeters (TLDs) co-located at eight points around the site. The 1989 comparison ratio is 1.12 for the two systems of TLDs. It should be noted that Project dosimetry is consistently placed at a height of one meter, but the NRC dosimeters are usually placed at 1.5 to 3 meters. This difference in placement may partially account for the variances.

The total number of 118 blind quality assurance parameters and crosschecks measured and reported in 1989 demonstrated an acceptable program with an overall passing rate of 94.0%.

As shown by the various audit and crosscheck results, the WVDP Environmental Monitoring Program is functioning well. The improvements in 1989 have been reflected in a very satisfactory crosscheck record.

5.2 Statistical Reporting

Except where noted, individual analytical results are reported with plus or minus two standard deviations, giving a value at the 95% confidence level. The arithmetic averages were calculated using actual results, including zero and negative values. In the final results, if the uncertainty was equal to or greater than the value, the measurement was considered to be below the minimum detectable concentration (MDC). A result below the MDC is reported as a less-than (<) value. These MDC values will vary among samples, especially in biological media where sample size cannot be easily standardized.

The total statistical uncertainty for radiological measurements, including systematic (processing and physical measurement) uncertainty plus the random radioactivity counting uncertainty, is reported as one value for the 1989 data. In most cases, systematic uncertainties such as those due to laboratory glassware or analytical balance variation are a small percentage of the larger counting uncertainties at typical environmental levels of radioactivity. The notation normally used in reporting raw laboratory data to convey the total uncertainty is the form V.00 plus or minus R.0 or T.0 E-00, where V.00 is the analytical value to three significant figures, R.0 is the random uncertainty to two significant figures,

T.0 is the total of random plus systematic uncertainties, and E-00 is the exponent of 10 used to signify the magnitude of the parenthetical expression. (For examples of this notation see Appendices C1 - C3).

For unique or individual samples analyzed on an infrequent basis, generic minimum detection limits for the entire analytical measurement protocol have not been developed. A lower limit of detection (LLD) based solely on the counting uncertainty (i.e., the statistical margin of error) is calculated for each sample size, equipment, and preparation technique. An average minimum detectable concentration has been calculated for WVDP environmental samples. These are listed in Table 5.1.

5.3 Environmental Standards and Regulations

The following environmental standards and laws are applicable, in whole or in part, to the WVDP:

DOE Order 5400.1, "General Environmental Protection Program," November 1988.

DOE Order 5480.1, "Requirements for Radiation Protection," August 1981.

DOE Order 5480.1A, "Environmental Protection, Safety, and Health Protection Program for DOE Operations," August 1981.

DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," February 1981.

Clean Air Act, 42 USC 1857 et seq., as amended,and implementing regulations.

Federal Water Pollution Control Act (Clean Water Act), 33 USC 1251, as amended, and implementing regulations.

Resource Conservation and Recovery Act, 42 USC 6905, as amended, and implementing regulations.

National Environmental Policy Act, PL 911-190, 42 USC 4321-4347, January 1, 1970, as amended, and implementing regulations.

Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 960, (including Superfund Amendments and Reauthorization Act of 1986), and implementing regulations.

Toxic Substances Control Act, 15 USC 2610, as amended, and implementing reghulations.

Environmental Conservation Law of New York State.

The standards and guidelines applicable to releases of radionuclides from the WVDP are found in DOE Order 5400.5.

Radiation protection standards and selected radionuclide limitations from the Derived Concentration Guides are listed in Appendix B. These listed concentration guides are provided by the Department of Energy to ensure compliance with the performance standard of 100 mrem effective dose equivalent to the hypothetical maximally exposed individual.

Ambient water quality standards contained in the State Pollutant Discharge Elimination System (SPDES) permit issued for the facility are listed in Table C5 -2 in Appendix C. Airborne discharges are also regulated by the EPA under the National Emission Standards for Hazardous Air Pollutants, 40 CFR 61, 1984.

Table 5-1

Minimum Detectable Concentrations for Routine Samples

Measurement	Medium	Sample Size	MDC
Gross Alpha	Water	1 L	8.1 E-10 μCi/mL
Gross Beta	Water	1 L	7.7 E-10 μCi/mL
Cesium-137	Water	500 ml	1.0 E-08 μCi/mL
H-3	Water	5 ml	1.0 E-07 μCi/mL
Sr-90	Water	1 L	1.6 E-09 μCi/mL
Gross Alpha	Air	400 cu. m	7.0 E-16 μCi/mL
Gross Beta	Air	400 cu. m	7.0 E-15 μCi/mL
Cs-137	Air	400 cu. m	1.4 E-14 μCi/mL
Gross Alpha	Soil	100 mg	5.5 E-06 μCi/g
Gross Beta	Soil	100 mg	5.3 E-06 μCi/g
Cs-137	Soil	350 g	6.3 E-08 μCi/g