

**STRONTIUM-90 IN SOILS IN SURVEY UNIT OOL-08-03**

**YA-EVAL-00-002-06**

**Approvals**

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## TECHNICAL EVALUATION YA-EVAL-00-002-06, REV. ORIGINAL

## STRONTIUM-90 IN SOILS IN SURVEY UNIT OOL-08-03

PURPOSE

This technical evaluation addresses investigation activities regarding concentrations of Strontium-90 (Sr-90) in soils observed during Final Status Surveys in survey unit OOL-08-03. The purpose of this evaluation is to summarize this investigation and provide a basis for the conclusion that Sr-90 at 1 pCi/g may be attributed to environmental fallout.

DISCUSSION

In May 2006, Final Status Surveys were performed in Survey Unit OOL-08-03. This unit was assigned a survey classification 3. The classification was based on existing data which provided a high degree of confidence that there is no reasonable potential for residual contamination. The survey design provided for the collection of fifteen randomly located soil samples, two of which were sent off-site to be analyzed for hard-to-detect radionuclides. Gamma spectroscopy of the fifteen samples did not identify unexpected concentrations of plant-derived radioactivity, however off-site analysis indicated concentrations of Sr-90 close to the DCGL<sub>w</sub> for 10 mrem/yr.

The first step of the subsequent investigation was to analyze the balance of the fifteen samples for hard-to-detect radionuclides. Although the Sr-90 results for these samples were lower, further investigation was warranted. The survey plan was revised to provide for the collection of eight additional samples. All samples were sent off-site for Sr-90 analysis. The results confirmed the original concentrations. In fact, four of the eight additional samples had Sr-90 results slightly higher than the original samples. Analysis results are presented in Attachment 1. The Sr-90 concentrations in survey unit OOL-08-03 range from 0 thru 0.978 pCi/g, yielding an average value of 0.241 pCi/g. A posting plot of this data is presented in Attachment 2.

The next step in the investigation was to review off-site background data. In 1998 sixty samples were collected from off-site to determine background concentrations for Cs-137 and Sr-90. Several technical documents were prepared in association with this effort. Document RP 98-20 demonstrated that undisturbed soils exhibit notably higher concentrations than disturbed soils. Considering the survey unit's location outside of the site's affected area, the heavily wooded quality of the unit, and the fact that the unit was not used during plant operations, soils in survey unit OOL-08-03 may be treated as "undisturbed" and non-impacted.

Document RP 98-72 establishes the (averaged) background concentration for Sr-90 to be 0.274 pCi/g. The concentrations of Sr-90 in the background study ranged widely from 0 thru 0.952 pCi/g, and are noted to be similar to the wide range observed in survey unit OOL-08-03. Although a posting plot for the off-site data is not available, there is evidence that a localized region contained Sr-90 concentrations from 0.94-1.1 pCi/g. Reviews of the data suggest that off-site Sr-90 concentrations are similar to those found in survey unit OOL-08-03.

Technical report YRC-1178, "Radionuclide Soil Concentrations Surrounding YNPS Resulting From Gaseous Releases During Plant Operation," was prepared by Duke Engineering Services. This report calculated maximum soil concentrations of radionuclides deposited off-site (i.e. non-impacted areas) during plant operation based on quarterly release data of radioactive effluents during plant operations and the application of an atmospheric deposition factor. The report concluded that, under conservative assumptions, no area exists outside the affected area would be expected to have detectable residual radioactivity from plant operations. In the context of this report, non-impacted areas are typically greater than 200 meters from the center of the site's industrial area. This report also cites NCRP Report No. 50, "Environmental Radiation Measurements," identifying a background concentration for Sr-90 in soil to be 1 pCi/g.

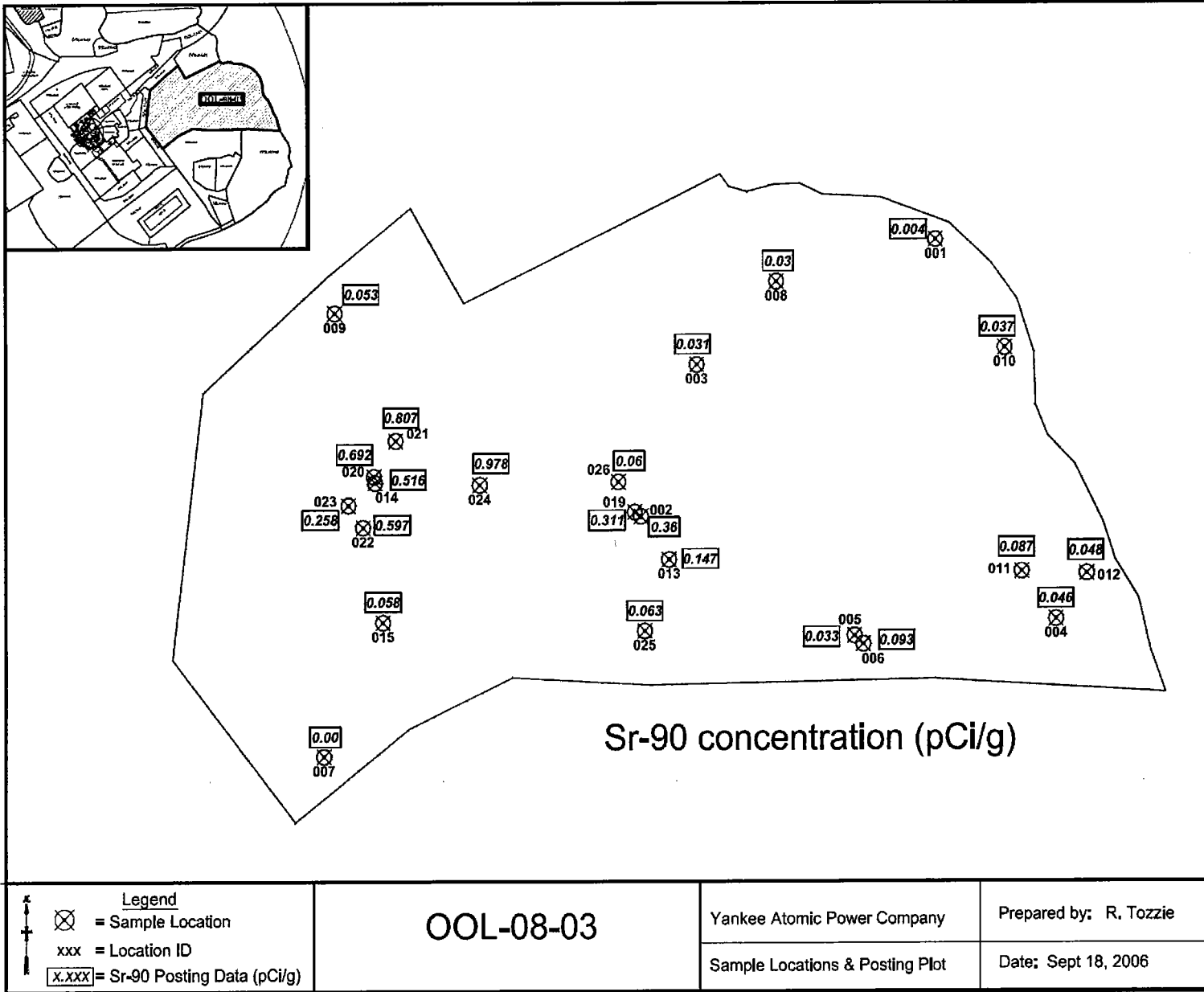
The proximity of survey unit OOL-08-03 from the site's release point (stack) is at about 60° from true north (see Attachment 3). Wind rose summary data presented in YRC-1180, "Background Concentrations of Cesium-137 in Soil And Sediment To Support YNPS," indicates that this survey unit is situated in an area that would be minimally impacted by airborne effluent releases. Minimal impact is substantiated by the low concentrations of Co-60 and Cs-137 observed in the survey unit's soils, further indicating that the Sr-90 in survey unit OOL-08-03 is not from plant operations.

## CONCLUSION

In conclusion, concentrations of Sr-90 observed in survey unit OOL-08-03 are consistent with those found in both non-impacted off-site locations and with the value published in NCRP Report No. 50. Based on these similarities and indications that the survey unit was not impacted by plant operations, it is recommended that the Sr-90 concentrations in survey unit OOL-08-03 be considered environmental background due to fall-out. The Sr-90 data should be excluded when demonstrating compliance with the 10 mrem/yr criteria.

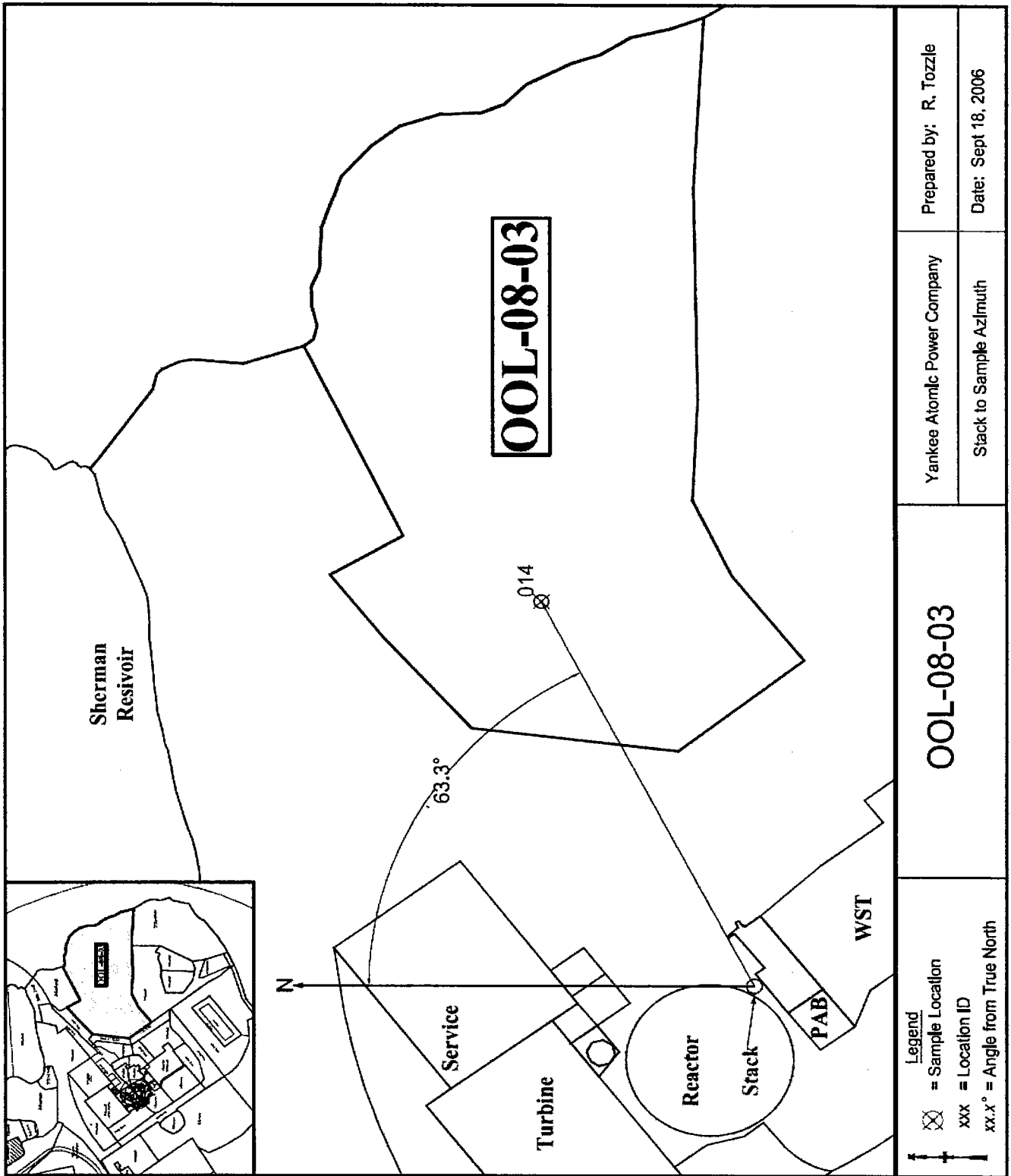
ATTACHMENT 1  
Soil Sample Results For Survey Unit OOL-08-03

<b>Sample ID</b>	<b>Co-60 Activity</b>	<b>Cs-137 Activity</b>	<b>Sr-90 Activity</b>
OOL-08-03-001-F	1.09E-02	2.29E-02	3.79E-03
OOL-08-03-002-F	8.91E-04	1.91E+00	3.60E-01
OOL-08-03-003-F	1.52E-02	3.44E-01	3.07E-02
OOL-08-03-004-F	1.79E-03	7.04E-01	4.62E-02
OOL-08-03-005-F	8.86E-04	3.47E-01	3.25E-02
OOL-08-03-006-F	9.06E-04	7.46E-01	9.31E-02
OOL-08-03-007-F	9.70E-03	3.13E-01	-
OOL-08-03-008-F	3.88E-03	5.32E-01	2.98E-02
OOL-08-03-009-F	2.12E-02	1.59E+00	5.33E-02
OOL-08-03-010-F	5.61E-03	1.21E+00	3.66E-02
OOL-08-03-011-F	6.89E-04	6.96E-01	8.74E-02
OOL-08-03-012-F	5.84E-03	5.85E-01	4.79E-02
OOL-08-03-013-F	4.57E-03	2.23E+00	1.47E-01
OOL-08-03-014-F	4.60E-02	9.52E-01	5.16E-01
OOL-08-03-015-F	5.33E-03	1.75E+00	5.84E-02
OOL-08-03-019-F-I	5.50E-03	5.13E-01	3.11E-01
OOL-08-03-020-F-I	3.53E-03	4.75E-01	6.92E-01
OOL-08-03-021-F-I	1.10E-03	3.91E-01	8.07E-01
OOL-08-03-022-F-I	2.11E-03	3.17E-01	5.97E-01
OOL-08-03-023-F-B	3.01E-02	5.26E-01	2.58E-01
OOL-08-03-024-F-I	4.27E-02	4.29E-01	9.78E-01
OOL-08-03-025-F-I	1.48E-02	6.01E-01	6.30E-02
OOL-08-03-026-F-I	3.08E-03	2.84E-01	6.00E-02
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mean			2.41E-01
std dev			2.91E-01
max			9.78E-01



ATTACHMENT 2  
Survey Unit OOL-08-03 Posting Plot

ATTACHMENT 3  
Proximity Of Survey Unit OOL-08-03 To Discharge Point



ATTACHMENT 4  
Lower Level Wind Rose Summary

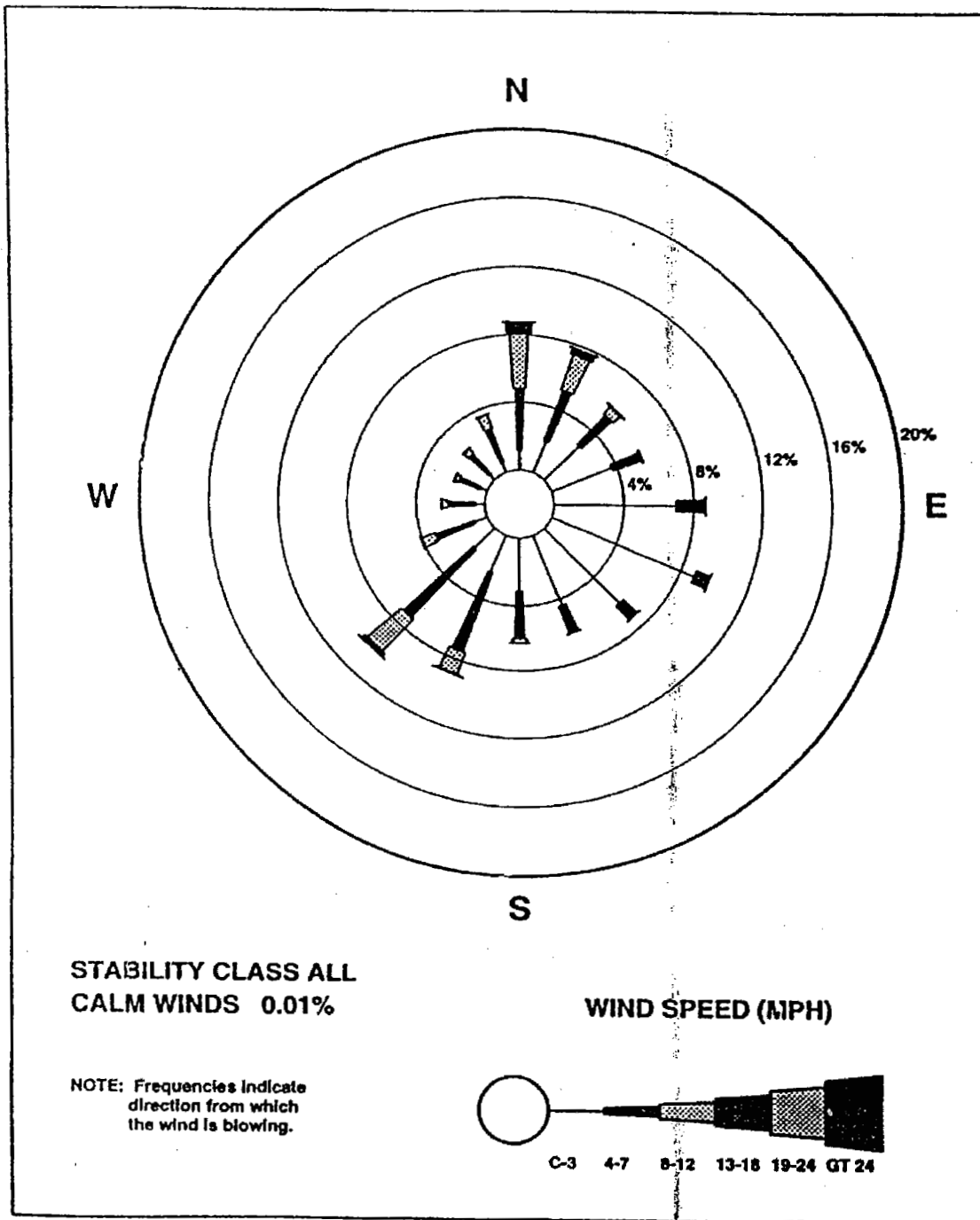


Figure 3-1: YNPS Lower Level Wind Rose Summary from 1982-1991

