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Idaho National Engineering Laboratory Radiological Control Performance Indicator Report

Fourth Quarter Calendar Year 1994

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MASTER

Lockheed
Idaho Technologies Company

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**Idaho
National Engineering Laboratory
Radiological Control
Performance Indicator Report**

Fourth Quarter Calendar Year 1994

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INEL RADIOLOGICAL CONTROL PERFORMANCE INDICATOR REPORT

FOURTH QUARTER – 1994

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INEL Radiological Control Performance Indicator Overview

Fourth Quarter 1994

		<u>Actual</u>	<u>Goal or Average</u>
Collective Year-To-Date Penetrating Radiation Dose		246 Person-rem	323 Person-rem (Goal)
Year-To-Date Average Worker Dose		0.161 rem	0.154 rem (4 Year Average)
Maximum Year-To-Date Penetrating Dose To A Worker		1.417 rem	1. rem (Goal)
Maximum Year-To-Date Neutron Dose To A Worker		0.136 rem	0.123 rem (4 Year Average)
Year-To-Date Skin Contaminations		40	32 (3 Year Average)

Legend

Needs Attention

OK

Good

		<u>Actual</u>	<u>Goal or Average</u>
Year-To-Date Clothing Contaminations		76	70 (3 Year Average)
Year-To-Date Airborne Events		5	12 (3 Year Average)
Year-To-Date Radioactive Material Intakes		96	82 (3 Year Average)
Contamination Area - Ft ²		198,885	195,200 (3 Year Average)
High Contamination Area - Ft ²		285,635	293,100 (3 Year Average)
Airborne Radioactivity Area - Ft ²		80,312	80,033 (3 Year Average)
Year-To-Date Spills		16	46 (3 Year Average)

INEL Area Radiological Control Performance Indicator Overview

Fourth Quarter 1994

	CFA	CPP	RWMC	TRA	TAN/SMC
Collective Year-To-Date Penetrating Radiation Dose (rem)	4.4	152.0	11.2	57.8	12.0
Year-To-Date Average Worker Dose (rem)	0.056	0.269	0.086	0.183	0.140
Maximum Year-To-Date Penetrating Dose To A Worker (rem)	0.336	1.417	0.339	0.687	0.596
Maximum Year-To-Date Neutron Dose To A Worker (rem)	0.136	0.045	0.089	0.117	0.089
Year-To-Date Skin Contaminations	0	14	0	23	2

Legend

Needs Attention

OK

Good

NOTE: Only major INEL areas are represented on this overview. Other contributing areas, such as PBF or WERF, are included in INEL totals but are not included in this Area report.

	CFA	CPP	RWMC	TRA	TAN/SMC
Year-To-Date Clothing Contaminations	4	5	0	64	2
Year-To-Date Airborne Events	0	4	0	1	0
Year-To-Date Radioactive Material Intakes	0	18	2	54	22
Contamination Area - Ft ²	30,000	65,187	5,703	54,378	42,023
High Contamination Area - Ft ²	2,200	251,961	0	2,599	0
Airborne Radioactivity Area - Ft ²	0	78,712	0	1,600	0
Year-To-Date Spills	0	2	0	13	1

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Executive Summary
Radiological Control Performance Indicator Report
Fourth Quarter 1994

This document provides a report and analysis of the Radiological Control Program through the fourth quarter of calendar year 1994 (CY-1994) at the Idaho National Engineering Laboratory (INEL) under the direction of Lockheed Idaho Technologies Company (LITCO). The Radiological Performance Indicator Report is provided in accordance with Article 133 of the INEL Radiological Control Manual.

- The total INEL penetrating radiation exposure through the end of 1994 was 246 person-rem.
- The average penetrating radiation dose to an INEL radiation worker through the fourth quarter of 1994 was 0.161 person-rem.
- The maximum penetrating radiation dose to an INEL worker through the end of 1994 was 1.417 rem.
- The maximum neutron radiation dose to an INEL worker through the fourth quarter of 1994 was 0.136 rem.
- The total number of skin contaminations through the fourth quarter of 1994 at the INEL was 40, of which 22 resulted in Occurrence Reports.
- The total number of clothing contaminations through the fourth quarter of 1994 was 76, of which 28 resulted in Occurrence Reports.
- The total number of airborne radioactivity events exceeding 10% Derived Air Concentrations (DAC) through the end of 1994 was 5.
- The total number of radioactive material intakes through the fourth quarter of 1994 was 96, of which eight were assigned exposure of 10 mrem or greater. None of the intakes met DOE reportable criteria.
- The total Contamination Area at the INEL at the end of 1994 was 198,885 square feet. The total High Contamination Area was 285,635 square feet, and the total Airborne Radioactivity Area was 80,312 square feet.
- The total number of radioactive spills at the INEL through the end of 1994 was 16, of which 4 resulted in an Occurrence Report.

Radiological Control Performance Indicator Charter

The INEL Radiological Control Performance Indicators are provided quarterly, in accordance with Article 133 of the INEL Radiological Control Manual. They are used as a measure of performance of the Radiological Control Program and as a motivation for improvement, not as a goal in themselves. These indicators should be used by management to assist in focusing priorities and attention.

The ALARA committee establishes ALARA goals for the INEL based on forecasts and goals provided by each facility organizational manager or supervisor. These goals includes DOE, LITCO and all subcontractor and vendor personnel.

Performance goals are realistic and measurable. Stringent goals are set at least annually to reflect expected work loads and improvement of radiological performance. Goals higher than previous goals may occasionally be set due to changes in work loads or mission.

The INEL Radiological Control Performance Indicators consist of:

- Collective dose in person-rem.
- Average worker dose, maximum dose to a worker, and maximum neutron dose to a worker.
- The number of skin and personal clothing contaminations, including the number of contaminated wounds and facial contaminations.
- The number of radioactive material intakes.
- The area of Contamination, High Contamination, and Airborne Radioactivity Areas in square feet.
- Airborne Radioactivity events.

These indicators also provide tracking and trending for at least the previous four quarters (where information is available).

Other Radiological Control Indicators suggested in the Radiological Control Manual are tracked and trended in other reports.

- The volume and Curie content of radioactive waste are reported by the Shipping and Material Management Department, found in the INEL Quarterly Waste Reduction Report and on the Radioactive Waste Management Information System (RWMIS).
- Releases of liquid and airborne radioactivity discharges are reported by the Environmental Protection Department in the INEL Environmental Monitoring Report and the INEL National Emission Standard for Hazardous Pollutants - Radionuclide Annual Report.

Radiological Control Performance Indicator Report Criteria

The INEL Radiological Performance Indicator Report is comprised of the following list. A description of the indicator and the criteria used for measurement is added for clarification.

Collective Radiation Dose -

This indicator reports the INEL collective total penetrating radiation exposure received and the associated quarterly and annual ALARA goals for DOE, LITCO, construction, and vendor personnel.

Average Worker Radiation Dose -

This indicator reports the average penetrating radiation dose to a radiological worker at the INEL based on the collective dose and the total number of personnel receiving radiation exposure. Included are all DOE, LITCO, construction, and vendor personnel.

Maximum Radiation Dose To A Worker -

This indicator reports the highest penetrating radiation dose received by a worker at the INEL for all DOE, LITCO, construction, and vendor personnel.

Maximum Neutron Dose To A Worker -

This indicator reports the highest neutron radiation dose received by a worker at the INEL and includes all DOE, LITCO, construction, and vendor personnel.

Number Of Skin Contaminations -

This indicator reports the total number of radioactive skin contaminations occurring at the INEL. It also reports the number of those skin contaminations that resulted in an Occurrence Report, the number of facial contaminations, and the number of contaminated wounds.

Number Of Clothing Contaminations -

This indicator reports the total number of radioactive clothing contaminations occurring at the INEL. It also reports the number of those clothing contaminations that resulted in an Occurrence Report.

Airborne Events -

This indicator reports the number of occupied facility areas that exceed the DOE reporting limit of 10% Derived Air Concentrations (DAC).

Total Year-To-Date Intakes -

This indicator reports the total number of positive bioassay results that indicated an intake of radioactive material from an INEL occupational exposure. The total number of positive bioassays that resulted in an Occurrence Report and those that resulted in a dose of 10 mrem or greater are also tracked and trended.

Contamination Area -

This indicator reports the total area in square feet that falls within the description of a Contamination Area as defined in Table 2-3 of the INEL Radiological Control Manual.

High Contamination Area -

This indicator reports the total area in square feet that falls within the description of a High Contamination Area as defined in Table 2-3 of the INEL Radiological Control Manual.

Airborne Radioactivity Area -

This indicator reports the total area in square feet that falls within the description of an Airborne Radioactivity Area as defined in Table 2-3 of the INEL Radiological Control Manual.

Radioactive Spills -

This indicator reports the total number of radioactive spills occurring at the INEL. A spill is considered an inadvertent loss or release of radioactive contamination outside of a Radiologically Controlled Area.

INEL Collective Year-To-Date Penetrating Radiation Dose CY-94

It is DOE and LITCO policy to maintain personnel radiation exposure As-Low-As-Reasonably-Achievable (ALARA). Measuring collective radiation exposure provides an indicator of the effectiveness of the Radiological Control and ALARA programs.

The goal is adjusted quarterly to provide realistic values. Work schedules may change during the course of the year and the goal is adjusted to reflect these changes.

The INEL Performance Indicators continue to reflect a challenging yet positive control of occupational radiation exposure. The collective radiation exposure through the fourth quarter CY-1994 was 246 person-rem. This collective exposure represents 76% of the revised annual ALARA goal of 323 person-rem.

Increases in radiological work performed since 1992 have resulted in a steady increase in collective penetrating radiation exposure at the INEL.

INEL Year-To-Date Average Worker Dose CY-94

Tracking the average worker radiation exposure provides an indicator of the effectiveness of the Radiological Controls and ALARA programs and how well managers are managing their workers radiation exposure. Large increases are investigated, root causes determined and appropriate measures taken.

The average worker radiation exposure has increased from 0.123 rem at the end of the third quarter to 0.161 rem at the end of the fourth quarter. The major sources of this increase are related to work on the ICPP Tank Farm Upgrade Project and the ICPP High Level Liquid Waste Evaporator Project.

INEL Maximum Year-To-Date Penetrating Dose To A Worker CY-94

The maximum penetrating radiation dose to a worker provides another indication of how well worker radiation exposure is being managed. Managers should use these reports as an aid in management of their workers radiation exposure.

The maximum penetrating radiation dose to a worker through the end of 1994 was 1.417 rem. (1417 mrem). This individual was involved with construction activities related to the ICPP Tank Farm Upgrade Project.

INEL Maximum Year-To-Date Neutron Dose To A Worker CY-94

Tracking the maximum neutron radiation dose to a worker provides an indication of how well worker exposure to neutron radiation is managed. Health effects of neutron radiation are not as well known as those of alpha, beta, and gamma radiation. Neutron radiation is included in the total penetrating radiation dose, but is also tracked separately as an aid in detection of any health effects related to neutron exposure.

The INEL maximum neutron radiation dose to a worker through the end of 1994 was 0.136 rem (136 mrem).

INEL Year-To-Date Skin Contaminations CY-94

Skin contamination events are a measure of the overall effectiveness of the radiological protection program, specifically, how well radioactive contamination is controlled.

There were a total of forty skin contaminations at the INEL during 1994. Of these, twenty-two resulted in Occurrence Reports. Five reportable skin contaminations occurred during the fourth quarter of 1994. One occurred at the Test Area North (TAN), one at the Idaho Chemical Processing Plant (ICPP), one at the Waste Experimental Reduction Facility (WERF), and two at the Test Reactor Area (TRA).

The rise in the number of skin contaminations can be partly attributed to better radiation detection instruments and techniques.

There were eight facial contaminations during 1994. Four occurred during the first quarter of the year, three during the second quarter, and one during the fourth quarter. There were no contaminated wounds during the year.

INEL Year-To-Date Clothing Contaminations CY-94

Clothing contamination events are a measure of the overall effectiveness of the radiological protection program, specifically, how well radioactive contamination is controlled and how well workers adhere to safe radiological work practices.

There were a total of seventy-six clothing contaminations at the INEL through the end of the fourth quarter of 1994. Of these, twenty-eight resulted in Occurrence Reports. Two reportable clothing contaminations occurred during the fourth quarter, one at the Test Area North (TAN) and one at the Test Reactor Area (TRA).

The rise in the number of clothing contaminations since 1992 can be attributed partly to better radiation detection instruments and techniques.

INEL Year-To-Date Airborne Events CY-94

Air samplers monitor occupied facility areas to quantify concentrations of airborne radioactivity. The DOE unit of measure is a Derived Air Concentration (DAC). A Derived Air Concentration is the atmospheric concentration of a radionuclide which, if inhaled continually for one work year (2000 hours), would result in an internal dose of 5.0 rem Committed Effective Dose Equivalent (CEDE). An area which exceeds 10% of one DAC must be posted as an Airborne Radioactivity Area. Investigation of areas exceeding 1% DAC for consecutive reporting periods allows corrective actions to be initiated before limits are exceeded.

One airborne event exceeding 10% DAC occurred during the fourth quarter of 1994, bringing the year-to-date total to five events. Alpha airborne activity at 1.43 DAC (143%) was detected at the ICPP in the sample corridor of building CPP-604. The cause of the airborne activity is under investigation.

INEL Year-To-Date Radioactive Material Intakes CY-94

This indicator depicts the total number of positive bioassay results that indicate an intake of radioactive material from an INEL exposure during occupational work activities. This is further separated into the total number of positive bioassay results that are assigned a dose of 10 mrem or greater and those that meet DOE Order 3000.3B reportable criteria.

The total number of positive bioassays indicating an intake of radioactive material at the INEL for Calendar-Year 1994 (CY-94) was ninety-six. Of the positive indications, none were reportable in accordance with DOE Order 3000.3B reportable criteria. Eight positive indications resulted in as assigned effective dose equivalent equal to 10 mrem or greater.

INEL Contamination Area CY-94

This indicator is used to report the total area of Contamination Area as described in Table 2-3 of the INEL Radiological Control Manual. Area is reported in units of square feet. The reported area is further separated into that area which is permanent and in-use. This establishes a baseline for future reporting and allows areas other than permanent and in-use to be evaluated for decontamination.

The total Contamination Area at the INEL at the end of 1994 was 198,885 square feet. Of this area, 128,100 square feet was designated as permanent and in-use.

INEL High Contamination Area CY-94

This indicator is used to report the total area of High Contamination Area as described in Table 2-3 of the INEL Radiological Control Manual. Area is reported in units of square feet. The reported area is further separated into that area which is permanent and in-use. This establishes a baseline for future reporting and allows areas other than permanent and in-use to be evaluated for decontamination.

The total High Contamination Area at the INEL at the end of 1994 was 285,635 square feet. Of this area, 283,435 square feet was designated as permanent and/or in-use.

INEL Airborne Radioactivity Area CY-94

This indicator is used to report the total area of Airborne Radioactivity Area as described in Table 2-3 of the INEL Radiological Control Manual. Area is reported in units of square feet. The reported area is further separated into that area which is permanent and in-use. This establishes a baseline for future reporting and allows areas other than permanent or in-use to be evaluated for decontamination.

The total Airborne Radioactivity Area at the INEL at the end of 1994 was 80,312 square feet. Of this area, 78,062 square feet was designated as permanent and in-use.

INEL Year-To-Date Spills CY-94

This indicator is used to report inadvertent loss or release of radioactive material. It includes all events, as well as those losses or releases of radioactively contaminated material that meet DOE reportable criteria.

The INEL had sixteen radioactive contamination spills through the end of 1994, four of those spills resulting in Occurrence Reports. Two spills, both reportable, occurred during the fourth quarter of the year. One spill occurred at the ICPP and the other at the TAN area. Root causes were identified and appropriate steps taken to prevent similar occurrences.