

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

Report No. 50-133/80-01

Docket No. 50-133 License No. DPR-7 Safeguards Group _____

Licensee: Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94106

Facility Name: Humboldt Bay Unit 3

Inspection at: Eureka, California

Inspection conducted: March 24-28, 1980

Inspectors: G. P. Yuhas 4-21-80
G. P. Yuhas, Radiation Specialist Date Signed

R. F. Fish 4/21/80
R. F. Fish, Radiation Specialist Date Signed

Approved By: F. A. Wenslawski 4/22/80
F. A. Wenslawski, Chief, Reactor Radiation Safety Section Date Signed

Approved By: H. E. Book 4/22/80
H. E. Book, Chief, Fuel Facilities and Material Safety Branch Date Signed

Summary:

Inspection on March 24-28, 1980 (Report No. 50-133/80-01)

Areas Inspected: Routine unannounced inspection by regional based inspectors of the licensee's response to IE Bulletin 79-19, "Packaging of Low-Level Radioactive Waste for Transport and Burial", IE Circular Nos. 79-09, 79-15, 79-21, and the licensee's laboratory counting room equipment quality control program. Areas inspected included: tours of the facility, review of regulatory requirements, burial site requirements, procedures, training, audits, inspection of packages and containers, and review of records associated with shipments of radioactive materials. In addition, the licensee submitted a sample of liquid effluent for independent analysis by the NRC and performed isotopic identification and quantification of samples supplied by the NRC. The inspection involved 38 inspector-hours on site by two NRC regional based inspectors.

Results: Of the ten areas inspected, no items of noncompliance were identified in nine areas; three apparent items of noncompliance were identified in one area (Infraction - failure to post a high radiation area, 10 CFR 20.203(c), Infraction - failure to control access to high radiation areas, 10 CFR 20.203(c)(2)(iii); Deficiency - failure to label a container of licensed material, 10 CFR 20.203(f), Paragraph 5).

RV Form 219 (2)

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DETAILS

1. Persons Contacted

- *E. D. Weeks, Plant Superintendent
- *W. T. Rapp, Power Plant Engineer
- *R. C. Parker, Chemical and Radiation Protection Engineer
- *R. T. Twiddy, Quality Assurance Supervisor
- *D. Peterson, Quality Control Supervisor
- *R. M. Lund, Radiation Protection Foreman
- R. Sargent, Training Coordinator
- J. Marino, Supervisor, Traffic and Transportation (telcon 3/31/80)

*Present at exit interview.

2. Licensee Action on IE Circulars

- a. IE Circular No. 79-09, "Occurrences of Split or Punctured Regulator Diaphragms in Certain Self-Contained Breathing Apparatus". The purpose of this circular was to inform licensees of a high rate of regulator diaphragm failure on specific models of self-contained breathing apparatus. The licensee received the circular and determined that no action was required since they do not possess the affected equipment.
- b. IE Circular No. 79-15, "Bursting of High Pressure Hose and Malfunction of Relief Valve and "O"-Ring in Certain Self-Contained Breathing Apparatus". The purpose of this circular was to inform licensees of occurrences of bursting of the high-pressure hose assembly, and malfunction of relief valves and "O" Rings in main line assemblies of one model of self-contained breathing apparatus. The licensee received the circular and determined that no action was required since they did not possess the affected equipment.
- c. IE Circular No. 79-21, "Prevention of Unplanned Releases of Radioactivity". The purpose of this circular was to inform licensees of recent incidents of unplanned releases of radioactivity and to suggest several preventive measures for consideration that could minimize the occurrence of such events. The licensee received and reviewed this circular. They performed an evaluation of the suggested preventive measure and took action they considered appropriate. This evaluation was not documented, however some actions such as the construction of precautionary dams around liquid rad-waste processing equipment was taken.

3. Laboratory Counting Equipment Quality Control Program

- a. Chemical and radiochemical procedure no. F-1 titled, "Stability Check of Counting Instruments", Revision 1/, dated 4/79 was reviewed. This procedure requires daily and weekly checks of the Sodium Iodide (NaI) multichannel analyzer, single channel analyzer, and internal proportional counter. The inspector reviewed documentation maintained pursuant to this procedure for the periods noted below:

<u>Instrument</u>	<u>Period of Review</u>
Single Channel Analyzer	2-28 thru 3-25-80
Multi Channel Analyzer	2-1 thru 3-17-80
Internal Proportional Counter #279	2-1 thru 3-25-80

Based on review this data it appears the counting equipment is being checked as required and is operating in accordance with the established criteria.

Calibration of this equipment was last performed under the direction of the Chemical and Radiation Protection Engineer in the spring of 1978. These calibrations were performed using standard methodology and commercially available calibration sources. IE Inspection Report No. 50-133/78-09 indicates in Paragraph 14 that licensee representatives were informed that, "The instrument calibration program for the laboratory needs to be finalized with the issuance of approved procedures".

From a review of procedures and from discussion with licensee representatives the inspector determined that no procedures for calibration of laboratory counting instruments have been established. Also, other than periodic split samples with the NRC, the licensee has not established an inhouse quality control program for radioanalytical measurements. This finding was discussed with licensee representatives on March 28, 1980.

The licensee representative stated that within 60 days they will develop a quality control program for the laboratory counting systems that includes written procedures for calibration of instruments using National Bureau of Standards traceable sources and they will develop a sample splitting program with an offsite laboratory.

Establishment and implementation of the radio-analytical quality control program will be reviewed in a subsequent inspection (50-133/80-01-01).

During this inspection, the licensee was provided with four samples to be analyzed and the results compared to those of the NRC reference laboratory. These four samples consisted of the following: two simulated iodine on charcoal, a simulated air particulate and a simulated gas. The licensee also split a liquid waste sample that will be independently analyzed by the licensee and the NRC. The results of comparisons will be reported in a subsequent inspection report (50-133/80-01-02).

b. Results of Sample Analyses

Paragraph 9 of Inspection Report No. 50-133/78-09 describes the samples that were provided by the NRC for the purpose of evaluating the licensee's analytical capability. Attachment A to this report shows the results of this evaluation.

Attachment B describes the NRC criteria for accepting the licensee's results. With respect to the particulate filter the licensee failed to identify the presence of silver 110. While analyzing the gas sample, the licensee recognized an apparent malfunction of the multi channel analyzer. Work was initiated at that time. This malfunction appears responsible for the noted disagreements. Repairs were initiated and completed shortly after the inspector's departure and the system was returned to service.

The licensee's intended action stated in Paragraph 3.a. above should enhance analytical results and minimize future deficiencies.

No items of noncompliance were identified.

4. Transportation of Radioactive Materials

a. Review of Licensee's Response to IE Bulletin 79-19

The inspector reviewed Pacific Gas and Electric Company's response dated September 24, 1979 and found that it contained all the information required by the bulletin and that corrective action commitments were made.

b. Organization

10 CFR 71 Appendix E, Criterion 1. "Organization" states in part, "The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components shall be clearly established and delineated in writing". The licensee response in Paragraph 3. stated that, existing job descriptions and union job definitions describe, by title, the people responsible for the safe transport and packaging of low-level radioactive material.

From discussions with licensee representatives the inspector was informed that:

- The Plant Superintendent has overall responsibility for the radioactive waste program.
- The Chemical and Radiation Protection Engineer has direct responsibility for implementation of the radioactive materials packing and shipping program.

- The Quality Control Supervisor is responsible for development and implementation of quality control measures as they pertain to packaging and shipment of radioactive materials.
- The Radiation and Process Monitor Foreman is responsible for assisting the Chemical and Radiation Protection Engineer and for providing direct supervision of individuals involved in the packaging and shipment of radioactive wastes.
- The Radiation and Process Monitor is responsible for handling, packaging, storing and shipping of solid radioactive wastes, other radioactive materials and for assisting others in the performance of these functions.
- The Nuclear Plant Operators when trained, are involved in the handling packaging and storing of radioactive wastes.

"Job Definitions and Lines of Progress", IBEW local 1245, Exhibit VI-B, Revised 4-28-76 clearly establishes and delineates the responsibilities of the; Radiation and Process Monitor Foreman, Radiation and Process Monitor, and the Nuclear Plant Operators as they pertain to radioactive waste processing.

Review of the other job description indicates that they infer rather than clearly establish and delineate these individuals responsibilities in the radioactive waste program.

The requirements specified in 10 CFR 71 Appendix E became effective January 1, 1979. In the period from January 1, 1979 thru March 1980, according to records maintained by the licensee, the only radioactive materials packaged and delivered to a carrier for transport were spent resins and concentrated liquid wastes. These shipments were planned and executed under a written program titled, "Disposal Project, Resin and Concentrated Liquid Radwaste". Disposal Project Procedure No. 4, titled "Organization of Responsibility", Revision 2 dated 8-9-79 clearly established and delineated the duties and responsibilities of each person and organization involved in the packaging and shipment of this waste.

No items of noncompliance or deviations were identified.

C. Regulatory Documents

Nuclear Plant Administrative Procedure (NPAP) No. E-4, Supplement No. 1, Appendix I designates the Chemical and Radiation Protection Engineer responsible for maintaining the 10 CFR "Rules and Regulation" supplement book. The inspector reviewed this book and noted that the last revision on file was Supplement 21, issued January 29, 1980. Supplement 22, issued February 12, 1980 had not yet been received from the Superintendent of Documents according to a licensee representative.

NPAP No. 4 does not address maintenance of the Department of Transportation (DOT) regulations. The licensee provided for the inspector's review a copy of a request to subscribe to a commercially available DOT regulation update service. The licensee representative stated that this request was denied on the basis that the corporate Traffic and Transportation Department would keep the licensee informed of changes affecting their program. Examination of the DOT regulations available at the facility indicates that they were issued 10-1-78.

On March 31, 1980 the inspector telephoned the Supervisor, Traffic and Transportation at the corporate office to determine what issue of DOT regulations they had available. The inspector was informed that they subscribe to and review the, Federal Register, R.M. Graziano's Tariff, and the Hazardous Materials Newsletter. He stated they had a copy of 49 CFR 100-177 dated 10-1-79 on hand.

The Supervisor, Traffic and Transportation informed the inspector that he will initiate a letter to the Plant Superintendent stating what information was available and that he would accept responsibility to review this information and provide their facilities with any changes that pertain to the shipment of radioactive materials.

No items of noncompliance or deviations were identified.

d. Burial Site Requirements

The licensee has shipped radioactive materials only to the Washington State burial location. The licensee had on hand a copy of Nuclear Engineering Company Inc., Washington License No. WN-1019-2 including Amendments 1-9.

At this time no written provisions have been made to verify the currency of this license prior to each shipment. This matter was discussed with the licensee.

No items of noncompliance or deviations were identified.

e. Procedures

In response to IE Bulletin 79-19, the licensee stated that approved procedures for waste process operations and shipment of radioactive material had been established.

The inspector reviewed the following procedures:

- Radiation Control Standard No. 6, Control of Radioactive Materials, Revision 2, dated 9-1-78.

- Radiation Control Procedure No. 6B, Construction, Testing and Certification of "Type A" Shipping Containers, Revision 17, dated 8-76.
- Radiation Control Procedure No. 6C, Shipping Radioactive Materials, Revision 33, dated 9-79.
- Nuclear Plant Administrative Procedure No. D-502, Receipt of Radioactive Materials Shipments, Revision 2, dated 4-5-78.
- Resin and Concentrated Liquid Radwaste, Quality Plan-General, Revision 0.
- Disposal Project Procedure No. 1, Cask Handling for Resin or Concentrated Liquid Waste Disposal.
- Disposal Project Procedure No. 2, Inspection of Spill Containment Provisions.
- Disposal Project Procedure No. 3, Solidification of Resins.
- Disposal Project Procedure No. 4, Organization of Responsibility.
- Disposal Project Procedure No. 5, Program for Solidification of Wet Radioactive Waste Using the CNSI Portable Solidification System.

Based on this procedure review the inspector concluded that for the radioactive materials packaged and shipped during 1979 the procedures would permit compliance with the applicable regulations. However, if the licensee were to package and ship radioactive materials other than those described in the Resin and Concentrated Liquid Radwaste Quality Plan the procedures may not provide sufficient guidance to insure compliance with the applicable requirements.

One example of an area not covered by written procedures is the methodology to be used for determination of the specific radionuclides and quantity present in a given package or container of radioactive material.

Weaknesses in these procedures were discussed with licensee representatives on March 28, 1980.

The licensee representative stated that prior to the next shipment of radioactive materials the procedures will be reviewed and upgraded to include such areas as, methodologies for radionuclide determination and quantification, designation of responsibilities, maintenance and verification of burial license and regulatory requirements.

These procedural upgrades will be reviewed in a subsequent inspection (50-133/80-01-03).

f. Training

The inspector reviewed the training provided to those individuals directly involved in the packaging and shipment of radioactive materials associated with the resin and concentrated waste disposal project. The Chemical and Radiation Protection Engineer, Power Plant Engineer and Quality Assurance Supervisor were responsible for developing and implementing the necessary training required for this task. The technique selected, consisted of on-the-job training and continuous supervision during processing of each batch of waste. The contractor supplied a trained individual to operate the solidification process.

A review of training records indicates the following non-on-the-job training in radwaste systems operation and packaging for shipment was provided in 1979.

<u>Date</u>	<u>Topic</u>	<u>Attendance</u>
June	Liquid Radwaste Disposal	Radiation and Process Monitors
September	Radwaste Shipping	Radiation and Process Monitors
October	Radwaste Training	Licensed & Non-Licensed Operators.

The inspector noted that key individuals responsible for the radwaste program have not attended outside training in this area in the period 1978 thru the current date of 1980.

Review of Administrative Procedure No. B-250, "Radiation and Process Monitor Training" indicates the required training in radioactive waste disposal for new technicians. The retraining requirement is less specific.

No items of noncompliance or deviations were identified.

g. Audit Program

Radiation Control Procedure 6C, "Shipping Radioactive Materials" requires a verification that all regulatory requirements have been met for each shipment of radioactive material. This verification is to be documented by the Quality Control representative. In addition, for the resin and concentrated waste shipments, a separate check off sheet including quality control hold points was developed and implemented pursuant to Disposal Project Procedure No. 1.

The licensee has implemented their "Quality Assurance Manual for Operating Nuclear Power Plants" in the area of radioactive waste packaging and shipment. On October 8, 1979 a team of individuals from the corporate office conducted an audit of these activities. Audit Report No. 92211 was issued October 12, 1979. No findings of nonconformance were observed.

No items of noncompliance or deviations were identified.

h. Records of Shipments

The inspector reviewed records of shipments of radioactive materials made in the period from July 1978 to March 1980. This review included verification of the data provided in Table D1 of the licensee's Effluent and Waste Disposal Semiannual Report. During the period of review the licensee made 13 shipments of solidified resins and 3 shipments of solidified concentrated liquid wastes in an NRC certified container.

The licensee registered as a user of Chem-Nuclear Systems, Inc., shipping cask Model No. CNSI 14-195H, Docket No. 71-9094 on July 23, 1979.

Review of these shipments indicates compliance with applicable regulations with one possible exception.

10 CFR 71.3 requires that no licensee deliver licensed material to a carrier for transport except as authorized in a general or specific license issued by the Commission or as exempted.

A general license is issued to ship licensed material pursuant to 10 CFR 71.12(b) in a package for which a Certificate of Compliance has been issued provided that the shipper has a copy of the Certificate of Compliance, all documents referred to in that Certificate and complies with the terms and conditions of that Certificate.

NRC Certificate of Compliance No. 9094 for the CNSI-14-195H cask states in Paragraph 5.b.(1) that the cask is authorized to contain, "Process solids, either dewatered, solid or solidified in secondary containers, meeting the requirements for low specific activity radioactive material,...". "Low specific activity" (LSA) is defined 10 CFR 71.4(g) (4) for each group of radionuclides.

From a review of records and from discussions with licensee representatives the inspector determined that the licensee had established compliance with the LSA criteria for Group III and IV radionuclides by performing gamma Spectroscopy on a small sample of the resins.

The licensee utilized a ratio of cesium 137 to strontium 90 previously measured in liquid effluent samples to estimate the amount of strontium present in these resin shipments. The inspector pointed out that this ratio may not be appropriate in this case since previous experience indicates a preferential removal and retention of strontium over cesium in full flow condensate demineralizers.

Since the licensee did not perform a physical analysis of the Group I and II radionuclides present in the resins and since their evaluation did not consider such matters as preferential retention and past transuranic history, the determination of compliance with the LSA criteria is in question.

The licensee has agreed to collect a sample of resins remaining in the retention tank for retrospective analysis. The licensee will perform a in house analysis and will submit a portion of the sample to an independent laboratory for identification and quantification of the Group I and II radionuclides present. If the results of this sampling and analysis can not be completed in 60 days the licensee will notify NRC Region V.

This matter will remain unresolved pending review and evaluation of sample results (50-133/80-01-07).

5. Onsite Observations

On March 25, 26, 1980 the inspector and licensee representatives toured the restricted area.

Except as noted below, the facility was being maintained in accordance with the regulations contained in 10 CFR Part 20 - Standards for Protection Against Radiation".

- a. 10 CFR 20.203 (c)(1) states, "(1) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words:

CAUTION

HIGH RADIATION AREA

The licensee utilizes a below grade vault for the storage of highly radioactive materials. This vault is located within the controlled area near the radwaste processing building. Access to the vaults is possible only by removing concrete shield slabs on top of the vault. On March 26, 1980 the inspector measured a whole body dose rate of 40 mRem/hr while standing on these shield slabs. Records indicate the vault contained 27 drums of radioactive waste with surface dose rates in excess of 1000 mRem/hr. The licensee representative stated that a residue of yellow paint on the concrete slab had once been the required high radiation area sign.

The inspector identified failure to conspicuously post a high radiation area as noncompliance with 10 CFR 20.203(c)(50-133/80-01-04).

The licensee reposted the storage vault on March 27, 1980. The inspector verified the area was properly posted on March 27, 1980.

- b. 10 CFR 20.203 (c)(2)(iii) states that if other conditions are not met then each entrance or access to a high radiation area shall be, "Maintained locked except during periods when access to the area is required, with positive control over each individual entry."

- (1) On March 26, 1980 during the tour of the condenser building the inspector noted that the access gate to the resin regeneration room was not locked. The licensee representative performed a survey about three feet inside the room and measured 150 mRem/hr whole body dose rates.

The licensee locked the access gate to the resin regeneration room.

- (2) On March 26, 1980 while touring the area above the radwaste processing building the inspector noted an installed ladder from that elevation to the Waste Receiver Tank area. The inspector and licensee representative proceeded down the ladder to the vicinity of Waste Receiver Tank No. 2 and measured radiation levels up to 800 mRem/hr.

Normal access to this high radiation area is via a locked gate near the lower elevation of the radwaste processing building. This access was verified locked and posted.

The licensee placed a sign and locked chain across the top of the ladder to minimize unauthorized entry into the high radiation area via this access point. The inspector verified this was completed on March 27, 1980.

Failure to maintain each entrance or access to a high radiation area locked when positive control over each individual entry was not maintained represents noncompliance with 10 CFR 20.203 (c)(2)(iii)(50-133/80-01-05).

- c. 10 CFR 20.203(f) states "(1) Except as provided in subparagraph (3) of this paragraph, each container of licensed material shall bear a durable, clearly visible label identifying the radioactive

contents. (2) A label required pursuant to subparagraph (1) of this paragraph shall bear the radiation caution symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL". It shall also provide sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures."

On March 27, 1980 while touring the controlled area north of the refueling building the inspector noted two 4' x 4' x 8' strong tight containers normally used for storage and shipment of licensed quantities of radioactive material. Neither container was identified, marked or otherwise labeled. The inspector and licensee representative measured dose rates of up to 12 mRem/hr and 6 mRem/hr on contact with these boxes. One box had the lid nailed down, the other box lid was opened and the box found to be full of low level radioactive wastes.

The licensee representative had the boxes resurveyed and properly labeled on March 27, 1980. The inspector verified compliance on March 27, 1980, the licensee estimated each box contained about 2 millicuries of licensed material.

Failure to label a container of licensed material when no exceptions applied represents noncompliance with 10 CFR 20.203(f) (50-133/80-01-06).

No containers of solidified resin or concentrate were available for inspection.

6. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of non-compliance, or deviations. Unresolved items disclosed during the inspection are discussed Paragraph 4.h.

7. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on March 28, 1980. The inspector summarized the scope and findings of the inspection.

The licensee representative stated:

- A quality control program for laboratory counting equipment will be established within 60 days.

- Prior to the next shipment of radioactive material the radwaste packaging and shipping program will be reviewed and upgraded as appropriate.
- The residual resin in the resin storage tank will be sampled and analyzed on site and at an independent laboratory.

Regarding the apparent items of noncompliance, the licensee representative stated that these findings appear minor in nature and not representative of a threat to the health and safety of the workers or the public.

ATTACHMENT A

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: HUMBOLDT BAY
FOR THE 2 QUARTER OF 1978

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		----NRC:LICENSEE----		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
SPIKED PARTICULATE FILTER	SB 125	3.6E-02	9.0E-04	3.2E-02	3.4E-03	8.9E-01	4.0E+01	A
	CS 134	4.9E-02	2.0E-03	4.2E-02	6.2E-03	8.6E-01	2.4E+01	A
	AG 110M	2.2E-02	9.0E-04	0.0	0.0	0.0	2.4E+01	D
	NA 22	9.6E-03	4.0E-04	6.4E-03	8.3E-04	6.7E-01	2.4E+01	P
SPIKED GAS SAMPLE	GAMMA B	2.4E-05	1.2E-06	5.6E-04	3.4E-05	2.3E+01	2.0E+01	D
	GAMMA A	1.0E-05	7.0E-07	3.0E-04	1.7E-04	3.0E+01	1.4E+01	D
	GAMMA A	2.5E-06	2.0E-07	1.8E-06	6.0E-08	7.2E-01	1.3E+01	A
	GAMMA A	4.1E-05	3.0E-06	1.0E-05	6.2E-06	2.4E-01	1.4E+01	D
	GAMMA A	1.2E-06	7.0E-08	7.6E-05	4.9E-05	6.3E+01	1.7E+01	D
	GAMMA A	1.4E-06	8.0E-08	8.2E-05	5.8E-06	5.9E+01	1.7E+01	D
SPIKED CHARCOAL CARTRIDGE	BA 133	1.6E-04	6.0E-06	1.1E-04	2.0E-06	6.9E-01	2.7E+01	P
	BA 133	3.3E-04	9.0E-06	3.5E-04	5.0E-06	1.1E+00	3.7E+01	A
SPIKED LIQUID SAMPLE	CO 57	1.6E-03	6.0E-05	1.7E-03	4.0E-05	1.1E+00	2.7E+01	A
	CS 134	3.8E-03	1.0E-04	3.8E-03	1.1E-04	1.0E+00	3.8E+01	A
	CO 60	3.2E-03	1.1E-04	3.3E-03	1.5E-04	1.0E+00	2.9E+01	A
	H 3	6.8E-03	1.2E-04	6.7E-03	2.0E-04	9.9E-01	5.7E+01	A
	SR 89	4.6E-03	1.5E-04	3.9E-03	4.4E-04	8.5E-01	3.1E+01	A
	SR 90	2.9E-04	1.2E-05	2.8E-04	3.6E-05	9.7E-01	2.4E+01	A

T=TEST RESULTS:
A=AGREEMENT
D=DISAGREEMENT
P=POSSIBLE AGREEMENT
N=NO COMPARISON

UNITS:
LIQUID = MICROCURIES/MILLILITER
GAS = MICROCURIES/MILLILITER
C FILTER=MICROCURIES

ATTACHMENT B

PROCEDURE FOR COMPARING MEASUREMENTS

For Each Comparison:

Divide each of the values in the NRC lab's results by its associated uncertainty to obtain the RESOLUTION.

Divide each of the values in the licensee's results by the corresponding value of the NRC lab's measurements of the same sample and obtain the RATIO.

Find the RESOLUTION in the left-hand column of the Table and reading across on the same line, the corresponding RATIO for the measurement under the columns headed "Agreement" or "Possible Agreement." The licensee's measurement is in "disagreement" if the value of the ratio is outside the ratio limits for the corresponding RESOLUTION in the Table. Note that the Table contains two different values for "Possible Agreement" (A and B) according to the kind of measurement that was made; an explanation of this is given following the table. Make sure you're reading under the proper column.

Criteria for Accepting the Licensee's Measurements

Resolution	Ratio $\left(\frac{\text{Licensee Value}}{\text{NRC Lab Value}} \right)$		
	Agreement	Possible Agreement A	Possible Agreement B
3	0.4 - 2.5	0.3 - 3.0	No Comparison
4 - 7	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
8 - 15	0.6 - 1.66	0.5 - 2.0	0.4 - 2.5
16 - 50	0.75- 1.33	0.6 - 1.66	0.5 - 2.0
51 - 200	0.80- 1.25	0.75- 1.33	0.6 - 1.66
200	0.85- 1.18	0.80- 1.25	0.75- 1.33

In the Table the "A" criteria are used for:

Gamma spectrometry where principal gamma energy used for identification is greater than 250 kev, tritium analyses of liquid samples, and iodine on adsorbers.

In the Table the "B" criteria are used for:

Gamma spectrometry where principal gamma energy used for identification is less than 250 kev, strontium-89 and strontium-90 analyses, and gross beta where samples are counted on the same date using the same reference nuclide.