or loss of negative pressure within the gloveboxes. A stack monitor with alarm is installed to provide continuous sampling of the stack effluents.

Supply Air

All air entering the plant is supplied by the supply air fans. These fans are preceded by filters and precipitators to remove all dust. The heating and cooling coils are contained in the supply air fans, and the fans supply heated or cooled air as required. The supply air fans are housed in an upstairs fan room which is accessible only from outside the building. The heating and cooling coils are supplied by hot water boilers and a chilled water unit in the mechanical room on the first floor of the building. Mixing boxes are used to mix hot air or cool air as required by thermostats for the various spaces within the building. The office, reception and lunchroom area of the plant is heated and cooled using a recirculated air system with 25% fresh air makeup. All other portions of the building are heated and cooled with 100% fresh air.

Room Air Exhaust

All air is supplied to the rooms through ducts and diffusers located in the roof or ceiling of the spaces. The flow of air in the room is from ceiling to floor and all room air is exhausted through the floor into underground exhaust ducts. The underground exhaust ducts connect into an underground exhaust air tunnel, which is connected to the room air exhaust fans, which are on the second floor in a separate fan room.

A differential pressure of approximately 0.10 inches of water is maintained between the clean and potentially contaminated areas. Airlocks are installed between the change rooms and all process or laboratory areas. The change rooms, office, reception and lunchroom operate at normal atmospheric pressure.

A roughing filter followed by an absolute filter is installed in the floor at the entrance of the underground ducts. A bank of absolute filters is

installed in the upstairs fan room ahead of the exhaust air fans. To protect the absolute filters from burning debris, stainless steel wire mesh is installed in the riser through which all exhaust air must flow from the underground ducts to the upstairs fan room.

Thus, room air is exhausted through a roughing filter and two absolute filters before being discharged through a stack to the atmosphere.

Process Exhaust

The glovebox exhaust system is designed to maintain a negative pressure of approximately 0.50 inches of water with respect to the room pressure with 3 volume changes per hour. The air in the gloveboxes is exhausted through three absolute filters before being discharged to the atmosphere.

The first absolute filter is located on the glovebox; the second absolute filter is located in the duct leaving the space; and the third absolute filter is in a bank of filters just ahead of the glovebox exhaust fans. Two fans are supplied for the glovebox exhaust system, one of which will adequately provide the normal air flow. The second serves as a standby fan and as an emergency fan should an increase in flow be required because of rupture of glove ports. The gloveboxes are supplied by room air which enters the gloveboxes through absolute filters.

The open face hoods and slot type hoods in the laboratory areas are exhausted through the laboratory exhaust system. This system consists of two fans and is similar in operation to the glovebox exhaust system. Open face and slot type hoods have an average face velocity of at least 125 linear feet per minute.

Installed ahead of the absolute filter in the glovebox is a roughing filter. Air leaving the glovebox exhaust fans is exhausted into the same stack as the room air exhaust fans.

2.0 ENGINEERED PROVISIONS FOR ABNORMAL OPERATIONS

2.1 Criteria for Accomodation for Abnormal Operations

2.1.1 Process Systems

The primary design basis for process equipment used during the operating period of the plant was to provide containment of radioactive materials for the prevention of air and surface contamination in areas occupied by personnel. All operations involving plutonium were conducted in glovebox enclosures to prevent loss and spread of plutonium contamination. The gloveboxes were fabricated specifically for material containment.

Properly designed, installed, and operated ventilation systems are necessary for the safe, efficient operation of a nuclear fuel processing facility and for protection of the environment around such a facility. The purposes of these systems are to:

Provide positive pressure gradients from clean areas to suspect areas;
Prevent discharge to the environment of hazardous concentrations of radioactivity;
Maintain comfortable working conditions within the facility;
Maintain particulate captive air velocities at all portals to contaminated vessels and enclosures.

The ventilation systems will remain in operation during all forthcoming decontamination and dismantling procedures.

2.1.2 Alarm Systems and Release Prevention

Ventilation System

The following alarms and indicators are provided to aid in the proper operation and maintenance of the ventilation systems.

- Loss of negative pressure in any of the exhaust systems or in any of

the following rooms or areas results in the sounding of an alarm:

health area, maintenance room (116), wet processing room (128), scrap recovery room (127), dry processing rooms (123) and (124), and inspection and assembly room (121),

- Both the cold duct and the hot duct of the suspect area air supply systems is equipped with alarms against loss of pressure.

- The pressure differential across each filter, or filter banks, is indicated.

- Manometers are installed at the door of each room in the process area indicates the direction of air flow when the door is opened.

- All intermediate and final HEPA filters are tested for leakage on a regularly scheduled basis.

- A monitor located in the main stack provides continuous monitoring of particulate radioactive material.

Criticality Detection

A gamma sensitive radiation detection system energizes clearly audible alarms in the event of an accidental criticality. Alarm trip settings are set at 15 mR/hr above the normal or operating background for each of the eight detectors in the system.

The detectors are located in the main process areas to provide plant coverage in accordance with the requirements of 10 CFR 70.24.

Signals from the detectors are fed to a central control panel located in the plant reception area. Capabilities at the central control panel include visual meter readouts of the gamma dose rate at each detector location and visual warning of detector malfunction and/or levels above the trip setting. Adjustable alarm trip settings for each detector and manual reset and control of evacuation alarm system is located on the detectors in the process area.

Activation of the evacuation alarm requires at least two detectors to exceed the alarm trip setting limits. The criticality detection system is connected to the plant emergency power system in addition to normal power.

Contamination Detection

Early warning of high level airborne contamination is achieved by operating continuous air monitors in the general lab and in the process areas. Each monitoring device is equipped with a local alarm and recorder.

2.1.3 Support Systems

2.1.3.1 Structural Performances vs. Site Environmental Factors

2.1.3.1.1 Severe Natural Phenomena

The necessity for protecting employees and the public from radiation and other operational hazards is the key consideration in the design and construction of the CPF. Sequoyah Fuels engaged a consulting engineering firm to evaluate the tornado potential and credible consequences relative to the Cimarron Plutonium Facility. The report is included as Attachment II to this plan.

2.1.3.1.2 Accidents at Neighboring Activities

The CPF is located in a relatively isolated area with the only activity in the area being service stations approximately 1/2 mile south and 1/2 mile north of the site.

Activities other than CPF on the immediate site include the Uranium plant which has been put on standby and a Kerr-McGee Technology Division research project involving coal de-ashing. Credible accidents at these other activities are not expected to be of such nature that the activities at the CPF could be interrupted or that plutonium material containment could be jeopardized.

2.1.3.2 Confinement Barriers and Systems

The primary design basis for the ventilation and exhaust systems is to minimize and effectively control airborne contamination. Spare fans are provided to serve as a standby fan for equipment failure and also as a supplemental fan to increase the air flow to a minimum of 12 air change per hour in any given areas when desired or required by emergency. The supply air is filtered to provide fresh, clean air for all plant areas.

The air flow from ceiling to floor is considered the best design for contamination control and generally minimizes breathing zone airborne concentrations.

The air balance requirement to ensure air flow from areas of non-radioactivity to areas of higher radioactivity is to prevent contamination spread.

The incoming air to gloveboxes is drawn through a high efficiency filter to limit the consequences of box pressurization. Glove box air pressure is maintained negative to the room pressure. This AP is 0.5 inch (water gauge).

The high efficiency filtrations for the exhaust systems are provided to minimize operational losses of material and to comply with regulatory limits by controlling the release of radioactivity to the unrestricted environment.

2.1.3.3 Access and Egress of Operating Personnel and Emergency Response Teams

For security purposes the entire Plutonium Facility is enclosed by 8' chain link fencing with 3 strand barbed wire at the top. The fenceline around the facility has two emergency exits on the west side and one on the south side in addition to a personnel and vehicle gate located on the south side.

There is only one personnel entrance which is at the front of the building and this gate is under continual surveillance by a guard located in the security area of the building entrance.

Access of emergency response teams is necessarily limited to the personnel entrance and subjected to the same security measures as operating personnel. Any member of an emergency response team not previously authorized for plant entry must be accompanied by an authorized person.

2.1.3.4 Fire and Explosion Resistance and Suppression

The Cimarron Plutonium Facility is satisfactorily protected against fire loss or damage. The plant is never left unattended or unguarded. The building is of fire-resistive construction (type A) with the structural materials being steel and concrete and concrete roofing. The facility is equipped with fire fighting equipment and personnel are instructed in fire fighting techniques required for this type plant.

See section 1.3.1 of this plan for information on fire detectors.

Fusible salt heat detectors are located in glove boxes that will provide a fire alarm in the guard station where the location of the fire is shown on a panel board in the hallway. There are no detectors located in the specified areas for waste storage. Due to the criticality hazards normally involved with Plutonium sprinkler systems have not been installed.

2.1.3.5 Shielding

Radiation shielding was used only on glove boxes and glove box windows when required to assure that whole body exposures to personnel would not exceed 3 rem for calendar quarter.

Under the existing conditions at the facility such shielding is no longer used nor is it planned for use during the decontamination procedures.

2.1.4 Control Operations

The criteria for controlling and maintaining the capabilities of plant engineered systems to respond as planned to abnormal conditions are based on the management philosophy of maximum protection of employees and the public from radiation and other operational hazards. In order to maintain a "readiness" status Health Physics, Maintenance, and Security personnel are required to perform routine inspections and checks of all systems on a frequency determined necessary by management personnel to assure proper functioning of all equipment and procedures required for maximum response to emergency conditions.

2.2 Demonstration of Engineered Provisions For Abnormal Operation

2.2.1 Process Systems

As described in applications for license SNM 1174 and amendments 1 through 4 all process systems have been cleaned of plutonium and are in the stages of final decontamination and dismantling. The systems in use for decontamination such as washing, pressure spraying, solvent cleaning, painting, etc., are established methods and are performed only after extremely detailed planning.

The ventilation systems, which have functioned properly since start of the operations in 1970 will continue to function throughout the planned decommissioning operations.

2.2.2 Alarm Systems and Release Prevention Capability

The alarm systems described in 2.1.2 are expected to continue to function satisfactorily. The major requirement for release prevention in operations containing plutonium is the proper operation of the vehtilation systems and the several redundencies in the alarm systems permit ample warning when misoperation has occurred.

The utilization of multiple levels of contamination control almost precludes the accidental release of radioactive material. Personal surveys at the point of contact with radioactive materials (at the glovebox), continuous air monitors in the operating rooms, and continuous stack monitors will maintain control of accidental releases. Although an accidental criticality is considered an extremely small possibility the detection alarm system will be maintained throughout the decommissioning operations.

The continuous stack sampler includes a recorder and alarm system located in the health physics office, with a high level alarm remoted to the guard station.

The minimum detection level of the continuous stack monitor is 96 MPC hours for soluble 239 Pu at the stack. This minimum detection level is based on an observed increase of 5 counts per minute in a time period of 15 minutes with the alarm trip set for 15 counts/minute.

Instrument detection of a 5 c/m increase in a 15 minute period results from a concentration of 2.3 X 10^{-11} uCi/ml at the stack (383.3 MPC for soluble 239Pu and 23 MPC for insoluble 239Pu). An increase to the alarm trip within a 15 minute period results from a concentration of 6.9 X 10^{-11} uCi/ml at the stack (1150 MPC for soluble 239Pu and 69 MPC for insoluble 239Pu).

A detailed stack sampling program includes specific requirements to provide continuous monitoring of radioactive particulates released into the air.

The continuous sampler is calibrated at least monthly with a 239Pu standard source. A weekly sample is counted in a Hewlett Packard (Model 5561A) or other suitable counting system for the purpose of calculating the stack effluent.

Early warning of airborne contamination in excess of concentration guidelines is achieved by operating continuous air monitors in the main process areas.

Each monitoring device is equipped with a local alarm and recorder. These are the fixed filter type systems with a minimum detection capability in 1 hour of at least 10 times the applicable 10 CFR 20 limits.

The continuous air monitors are normally located downstream of the room air flow from the work activity or location being monitored

The set point is variable depending upon the radon-thoron background being encountered, and several other variables depending on the work being performed.

2.2.3 Support Systems

2.2.3.1 Structural Performances vs. Site Environmental Factors

The report referenced in section 2.1.3.1.1 demonstrates that the Cimarron Plutonium Facility reflects through its design, construction and operation an extremely low probability for tornado accidents that could result in the releases of significant quantities of radioactive materials. In addition, the site location and the engineered features included as safeguards against the hazardous consequences of severe meteorological conditions or tornadic winds ensures a low risk of public exposure.

2.2.3.2 Confinement Barriers and Systems

The ventilation and exhaust systems previously described are anticipated to continue satisfactory performance in effectively preventing release of radioactive materials to the environment.

2.2.3.3 Access and Egress

The past experience gained through training and drills for emergencies permits anticipation of continued satisfactory performance during abnormal conditions.

2.2.3.4 Fire Protection

An important safety consideration involved in dismantlement activities is fire protection.

Details of the aspects of fire protection at the Cimarron plutonium plant are described in detail in Section 8 of the license application for standby operations dated August 7, 1976 and is included in this plan as Attachment III. The plant structure is constructed of fire-resistant concrete and steel. The building is manned twenty-four hours per day with operational and security personnel who can detect fires or hazardous conditions. Gloveboxes contain

heat sensors and are connected to a fire detection alarm system. The plant telephone system can readily trigger the plant-wide public address system to announce the presence of a fire or other emergency.

Plant personnel are trained in the use of fire-fighting equipment and assigned to the fire brigade. Arrangements have been made with local fire departments to provide off-site assistance in the event of a serious fire. Fire fighting and alarm equipment is periodically inspected, and fire drills are held periodically. Preparations have been made to prevent, detect, control and extinguish plant fires.

2.2.4 Control Operations

The basic philosophy that each individual is responsible for his and his fellow worker's safety is supplemented by health physics programs to assure and demonstrate that conditions in the plant and in the surrounding environs are safe.

The health physics standards adopted for the Cimarron Plutonium Plant are consistent with those stipulated in the latest amended version of Title 10, CFR Part 20, Standards for Protection Against Radiation. Future amendments to Part 20 will be incorporated into the health physics program as may be required.

Stringent operating precautions are taken and the process equipment is designed to prevent the spread of radioactive materials. Radiation detection and measurement instruments are utilized to reveal the presence of plutonium contamination so that the necessary steps may be taken to control or eliminate contamination.

Details of the program elements are available for review in section 6 of the application for renewal of license SNM 1174 and is included in this plan as attachment IV.

3.0 CLASSES OF RADIOLOGICAL CONTINGENCIES

3.1 Classification System

This radiological contingency plan characterizes several classes of emergency situations and relates them to response levels. The system of classification used consists of largely mutually exclusive groupings and it covers the entire range of credible emergency situations.

Specific implementing procedures have been prepared for emergency situtions and can be found in Attachment I to this contingency plan.

3.2 Classification Scheme

3.2.1 Notification of Unusual Event

Unusual events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

The following unusual events will fall into this category:

1. The release of radioactive materials to the unrestricted areas in an amount when averaged over a 24 hour period would exceed ten times the limits specified for such materials in Appendix B Table II of 10 CFR 20.

   The above contamination would be determined by measurement of stack emissions assuming a dilution factor of 1000 from the stack to the facility boundary. Releases of this level could be caused by moisture transfer of soluble contamination through final HEPA filters or partial failure of final HEPA filters.

2. Failure of both incoming electrical power supplies and the emergency diesel generator can not be started, or loss of the main power switchgear.

3. Sudden increase in the liquid level in the sanitary lagoons which would indicate imminent possibility of overflow.

4. Rumors of the possible gathering of peaceful demonstrators

Licensee Actions

1. Promptly notify Corporate Management (Appendix A of Attachment 1) who will promptly notify NRC Region III and/or Headquarters of nature of unusual condition as soon as discovered.

2. Augment on-shift resources as needed.

3. Assess and respond.

4. Escalate to a more severe class, if appropriate.

or

5. Close out with verbal summary with NRC and any other offsite authorities with written report to follow within 24 hours.

3.2.2 Alert

Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

The following conditions will fall into this Alert category:

1. The release of radioactive materials to unrestricted areas which appears to have been corrected and which the average concentration over a 24 hour period would exceed 500 times the limits specified for such materials in Appendix B, Table II of 10 CFR Part 20. The above measurement would be made at the stack assuming a dilution factor of 1,000 from the stack to the facility boundary. Releases of this level could be caused by failure of the final HEPA filters.

2. Failure of both incoming electrical power supplies and the emergency diesel generator can not be started, or loss of the main power switchgear, and it is apparent that the ventilation system will be inoperable for an extended period of time.

3. Overflow of sanitary lagoon dikes.

4. Rumors of the possible gathering of militant demonstrators.

Licensee Actions

1. Promptly notify Corporate Management who will promptly notify NRC Region III and/or Headquarters, and state and/or local authorities of alert status and reason for alert as soon as discovered. (Appendix A of Attachment 1)

2. Augument resources and activate onsite operational support emergency facilities and equipment. Bring key emergency personnel to standby status.

3. Assess and respond.

4. Dispatch onsite monitoring teams and associated communications.

5. Provide periodic plant status updates to offsite authorities.

6. Provide periodic meteorological assessments to offsite authorities and, if any releases are occurring, does estimates for actual releases.

7. Escalate to a more severe class, if appropriate.

or

8. Close out or recommend reduction in emergency class by verbal summary to NRC and other offsite authorities followed by written summary within 8 hours.

3.2.3 Site Area Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Offsite releases are not expected to exceed EPA Protective Action Guideline exposure levels except near site boundary.

The following conditions will fall into this category:

1. A continuing release of radioactive materials to unrestricted areas which the average concentration over a 24 hour period would exceed 500 times the limits specified for such materials in Appendix B, Table II of 10 CFR Part 20. The above measurement would be made at the stack assuming a dilution factor of 1,000 from the stack to the facility boundary. Continuing releases of this level could be caused by failure of final HEPA filters with the continuous stack monitor alarm system malfunctioning for several days without the malfunction being detected by health physics personnel and without the change in delta pressure across the filters being detected by the utility operators.

2. Complete loss of electrical power and it becomes obvious that the security battery backup power will run down before normal or emergency generator power is available.

3. Breach of sanitary lagoon dikes because of events such as earthquakes or flooding.

4. A gathering of demonstrators or any other threat with a potential for an attempt to occupy or sabotage the plant. This situation results in direct notification of local law enforcement agencies and NRC security by plant personnel.

Licensee Actions

1. Promptly notify Corporate Management who will promptly notify NRC Region III and/or Headquarters, EPA, state and/or local offsite authorities of site area emergency status and reason for emergency as soon as discovered. (Appendix A of Attachment I)

2. Augument resources by activating onsite emergency response organization.

3. Assess and respond.

4. Dispatch onsite and offsite monitoring teams and associated communications.

5. Dedicate an individual for plant status updates to offsite authorities.

6. Make senior technical and management staff available onsite for consultation with NRC and state on a periodic basis.

7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission.

8. Provide release and dose projections based on available plant condition information and foreseeable contingencies.

9. Escalate to general emergency class, if appropriate.

or

10. Close out or recommend reduction in emergency class by briefing NRC Region III and/or Headquarters, EPA, state and/or local offsite authorities followed by written summary within 8 hours of closeout or class reduction.

3.2.4 General Emergency

Events are in process or have occurred which involve actual or imminent loss of confinement integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

The following conditions will fall into this category:

1. The release of radioactive materials to unrestricted areas which the average concentration at the point of release over a 24 hour period would exceed 5,000 times the limits specified for such materials in Appendix B, Table II of 10 CFR Part 20. The above criteria assumes a dilution factor of 1,000 from the stack to the facility boundary. Releases of this level could be caused by loss of containment walls, roof or final HEPA filters due to fire, explosion, tornado, earthquake, plane crash, lightning, or sabotage.

2. Complete loss of electrical power and it becomes obvious that the loss is due to sabotage by a subversive group that may have the intent to attempt a plant entry for theft or take over of the plant.

3. A confirmed criticality event.

4. Take over of plant by radical group or theft of plutonium by stealth.

Licensee Actions

1. Promptly inform Corporate Management who will promptly notify NRC Region III and/or Headquarters, EPA, state and/or local offsite authorities of general emergency status and reason for emergency as soon as discovered (Parallel notification of state/local). (Appendix A of Attachment I)

2. Augment resources by activating onsite emergency response organization.

3. Assess and respond

4. Dispatch onsite and offsite monitoring teams and associated communications.

5. Dedicate an individual for plant status updates to offsite authorities.

6. Make senior technical and management staff available onsite for consultation with NRC and State personnel on a periodic basis.

7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission.

8. Provide release and dose projections based on available plant condition information and foreseeable contingencies.

<u>or</u>

9. Close out or recommend reduction of emergency class by briefing NRC Region III and/or Headquarters, EPA, State and/or Local offsite authorities followed by written summary within 8 hours of closeout or class reduction.

3.3 Range Of Postulated Accidents

The postulated events listed in section 3.2 range from those events which indicate a potential degradation of safety in the unusual events classification to those events listed under the general emergency classification which indicate actual loss of confinement of radioactive materials.

The unusual events are considered most likely to occur and procedures for handling these events are incorporated into the plant Health Physics procedures and standards.

The general emergency classification is considered extremely unlikely to occur and procedures for the postulated events are presented in the attached Emergency Manual.

8.0 RECORDS AND REPORTS

8.1 Records of Incidents

A record of radiological contingencies described in section 3 of this Radiological Contingency Plan as "Unusual Event," "Alert," "Site Area Emergency," and "General Emergency" will be made by the Health Physics personnel. A copy of the report will be provided to the Standby Manager, the Corporate Medical Director and the Director of the Corporate Emergency Control Organization. The original will be maintained in the health physics file until after the license is terminated. The only exceptions are that the records made by Security Personnel concerning security contingencies will be maintained in the security file, and the "unusual event" reports will not be sent to the Corporate Medical Director or the Director of the Corporate Emergency Control Organization.

The reports shall consist of a description of the contingency; the date; time and cause of the contingency; corrective action taken to terminate the emergency; the action taken or planned to prevent a reocurrence of the event; the signature of the person who prepared the report; the date, time and who was notified of the event; and the distribution provided for the written report.

8.2 Records of Preparedness Assurance

The following records are maintained to confirm the maintenance of preparedness to respond to radiological contingencies. Attendance sheets with the signatures of those who attend training sessions are maintained with the training records.

1. Records of the new-hire and annual retraining on the radiological contingency plan and emergency procedures will be maintained in the health physics file.

2. Records of quarterly criticality evacuation training and drills conducted by health physics personnel and quarterly fire brigade training and drills conducted by the Facility Fire Marshall are maintained in the health physics file. Records of quarterly security training and drills conducted by the Standby Manager are maintained in the security files.

3. Inspection, inventory and location records of fire extinguishers and emergency lights made by utility personnel are maintained in the Maintenance and Utility File. Inventory and location records of the emergency building equipment and supplies (listed in attached Emergency Manual) made by health physics personnel are maintained in the health physics file.

4. Maintenance, Surveillance, and testing records on emergency equipment are maintained on record sheets showing the routines performed by Security, Health Physics, and Utility Personnel. The listing below shows who performs the routines and maintains the records on various emergency equipment.

Utility Personnel	Health Physics Personnel	Security Personnel
Emergency Vehicles	Criticality Alarm System	Intrusion Alarms
Emergency Generators	Exhaust Stack Alarm	SNM Detectors
Ventilation Equipment	Room Air Sample Alarms	Metal Detectors
Fire Alarms	Emergency Bldg. Equip.	Explosives Detectors
Emergency Lights		Communication Equip.

5. Records of agreements with outside support organizations (Local police and Fire Departments) are maintained on file by the Standby Manager.

6. Copies of revised radiological contingency plans and emergency procedures will be provided to offsite agencies affected by the change(s). A record distribution of plans and procedures will be maintained. Revisions to the plan and procedures will be covered by documented training sessions for all facility personnel affected by the change(s).

8.3 Reporting Arrangements

Radiological contingencies described in Section 3 of this Radiological Contingency Plan as "Alert," "Site Area EMergency," and "General Emergency" will result in notification of the Corporate Medical Director and the Director of the Corporate Emergency Control Organization by the Cimarron Standby Manager. Corporate Management will notify the U.S. Nuclear Regulatory Commission, U.S. Environmental Protection Agency, and American Nuclear Insurers and state agencies when appropriate. The only exception to this is the reporting of serious physical security events which are reported directly to NRC as well as corporate management by the Cimarron Standby Manager.

Notification of the public on (1) the occurrence of an emergency condition, (2) its effect on the health and safety of operating personnel, the public and the environment, (3) progress on its control, and (4) recovery from the emergency condition will be made by the Corporate Communications/Public Information Department at the direction of the Director of the Corporate Emergency Control Organization.

R3

PURPOSE: To provide a conservative estimate of contamination levels in combustible LSA waste, concrete, and sand that cannot be easily surveyed with alpha detection instrumentation.

I. Equipment Used

A. Ludlum Model 2500 Scaler Ratemeter.
B. Two - 5 inch photomultiplier tubes.
C. Plastic scintillator - 5 inches in diameter and 36 inches long.
D. Drum turn table.
E. Lead lined pit.

II. Equipment Settings

A. Ludlum Model 2500

1. High voltage ≈ 8.2 ≈ 2100 volts.
2. Window - in - 0.30.
3. Threshold - 0.90.
4. Energy Multiplier - 100 KEV.
5. Timer - clock - 4.9 minutes - 10 revolutions of drum for each count.

III. Sources Used

A. 0.1 mCi Cs^{137} Source #1597 G. R.
B. 1 mCi Ra^{226} Source # None.
C. 0.4688g Pu Standard (FFTF pellet encased in brass).
D. 245 cpm 2pi Pu^{239} Source #P-1819 to document 95% confidence level of Hewlett-Packard Model #5560A automatic sample counter.
E. Source #P-1959, P-5983, P-5565, P-1819, P-3029, and 6896 to document Hewlett-Packard automatic sample counter effeciency from 3 dpm to 1,866,000 dpm.
F. ≈ 2,000,000,000 dpm collected on ≈ 4,000 air sample filters and counted with Hewlett-Packard automatic sample counter. These air samples were placed in packages of 100 or 50 samples and sealed in plastic using the bag sealer.

IV. Counter Response

H.V. - 8.20 window in - 0.10 E.M. - 100 KEV count time 1.0 minute.

73.2 NCi/g in 125 lbs. standard drum.

H.V. - 8.20 W - 0.1 E.M. - 100 KEV Count Time 1.0 Min.

Threshold	Bkg. CPM	73.2 NCi/g in 125 Lbs. std. drum	Ratio Net counts/bkg.
0.10	150997	196956	
0.20	60043	80254	
0.30	42880	54403	
0.40	30387	33047	
0.50	10181	15189	
0.60	6816	11280	
0.70	4821	8979	1.86
0.80	3489	7095	2.03
0.90	2598	5433	2.09
1.00	1845	4333	2.34
1.10	1400	3315	2.37
1.20	1110	2413	2.17
1.30	1140	1846	1.62
1.40	881	1437	
1.50	722	1125	
1.60	644	857	
1.70	630	801	
1.80	514	674	
1.90	554	587	
2.00	480	558	
2.10	446	556	
2.20	453	485	
2.30	411	478	
2.40	398	468	
2.50	400	433	

From this data a threshold setting of 0.90 and a window setting of 0.30 was selected.

V. Detector Linearity

H.V. - 8.20 window in - 0.30 threshold 0.90 Energy Multiplier - 100 KEV.

0.488g Pu standard - FFTF pellet encased in brass placed in 1/2" thick 9 inch long lead columniator. See Figure #1.

VI. Construction of Dummy Loads of Combustible Waste

A. Assume uniform distribution of radioactive material in each waste drum. To simulate this with our standards each drum was divided into six load zones. See Figure #2.

B. Four dummy loads were constructed using plastic, pvc pipe, cardboard, tape, and wipes to fill in between these load zones with a net weight of 75 lbs., 125 lbs., 175 lbs., and 225 lbs. Each of these drums was then loaded from ≈ 2 NCi/g of waste to ≈ 90 NCi/g of waste and calibration curves plotted. See Figures #3, #4, #5, and #6.

C. To document response from a point source in zone A, B, and C the 125 lbs. standard was loaded with ≈ 20 NCi/g of waste. Source #42 and #43 were used containing 238,575,384 dpm alpha.

Zone A - center of drum - 9,459 net counts
Zone B - center of drum - 18,094 net counts
Zone C - center of drum - 19,750 net counts

D. After considering this data all combustible drums of waste will be packaged to a minimum of 75 lbs. and a maximum of 225 lbs. To ensure that the value assigned to each drum is in fact less than 73.2 NCi/g we will use the most restrictive calibration factor which was obtained from the 75 lbs. standard drum. Each successive calibration will be done with 75 lbs. standard only.

R_3 VII. Construction of Dummy Loads for Sand and Concrete

A. Assume uniform distribution of radioactive material in each waste drum. To simulate this with our standards each drum was divided into three load zones.

R3 B. Two dummy loads were constructed using washed sand for one and 1 1/2 inch rock for the other with 4" PVC pipe in the center, along outer wall, and half way in between to place standard packs in.

R3 C. After considering this data all concrete and sand drums will be packaged to less than 600 lbs. To ensure that the value assigned to each drum is in fact less than 73.2 NCi/g we will use the most restrictive calibration factor which was obtained from the sand standard. Since our top end standard was only 54.42 NCi/g we will repackage any drum indicating greater then 54.42 NCi/g.

R3 D. Since the difference in backgrounds between sand and gravel were ≈ 2000 counts per 4.9 minutes and this will vary with origin of material we will assign 5 NCi/g to all drums that count 10 NCi/g or less.

VIII. Instructions for Packaging LSA Waste

A. KM-NC-10-82.

B. All packaged trash will be sorted with an Eberline E-500B with an open window GM tube. All packages with 0.3 mr/hr or greater will be handled as TRU waste. All packages less then 0.3 mr/hr will be handled as LSA waste.

C. To prevent shielding problems, metal and combustible waste must be separated. All metal will be surveyed with an alpha survey meter and all combustible will be counted in the LSA drum counter.

D. To prevent shielding problems concrete and sand may not be mixed with metal.

IX. Instruction for Use of LSA Waste Drum Counter

A. Each day that the LSA waste drum counter is to be used:

1. The drum turn table must be timed to ensure it making 10 complete revolutions in 4.9 minutes.

2. Five source counts must be taken using the 73.2 NCi/g - 75 lbs. standard to verify the count system is operating properly and within a 95% confidence level twice daily.

R_3

3. Three 4.9 minute background counts with a 0.0 NCi/g - 75 lbs. standard or sand standard on turn table and the turn table rotating will be taken and averaged. This background will be used for all drums counted that day.

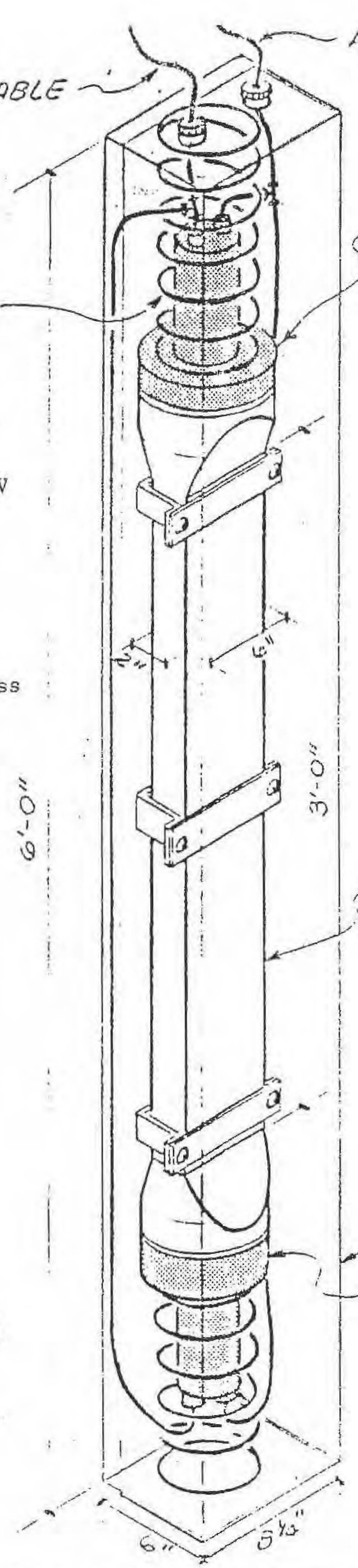
4. Pu Plant waste drum counter count sheet will be used to record all drum counts. See Figure #8 or 9.

5. Net counts times calibration factor will be equal to NCi/g of waste. This will be multiplied by actual grams of waste in drum and converted to total g Pu.

6. At the first of each month a new CHI^2 control chart will be made.

7. After repair and at least yearly, a calibration to obtain a new calibration factor for this counter shall be required.

8. All drums will be counted before being compacted and the net counts above background will be added to arrive at a value for the compacted drum. See attached sheet Figure #10.



DETECTOR LINEAVITY CHECK

H.V. 8.2 Window in .30

Threshold .9 EM – 100 KEV

.4688g Pu Standard

FFTF pellet encased in brass

Columinated in 1/2" lead columinator.

COUNTS/MINUTE	1.0
TOP	6410, 6415
MIDDLE	6962, 7007
CENTER	6704, 6762
MIDDLE	7274, 7181
BOTTOM	6438, 6261

L.S.A. DRUM COUNTER DETECTOR

Figure #1

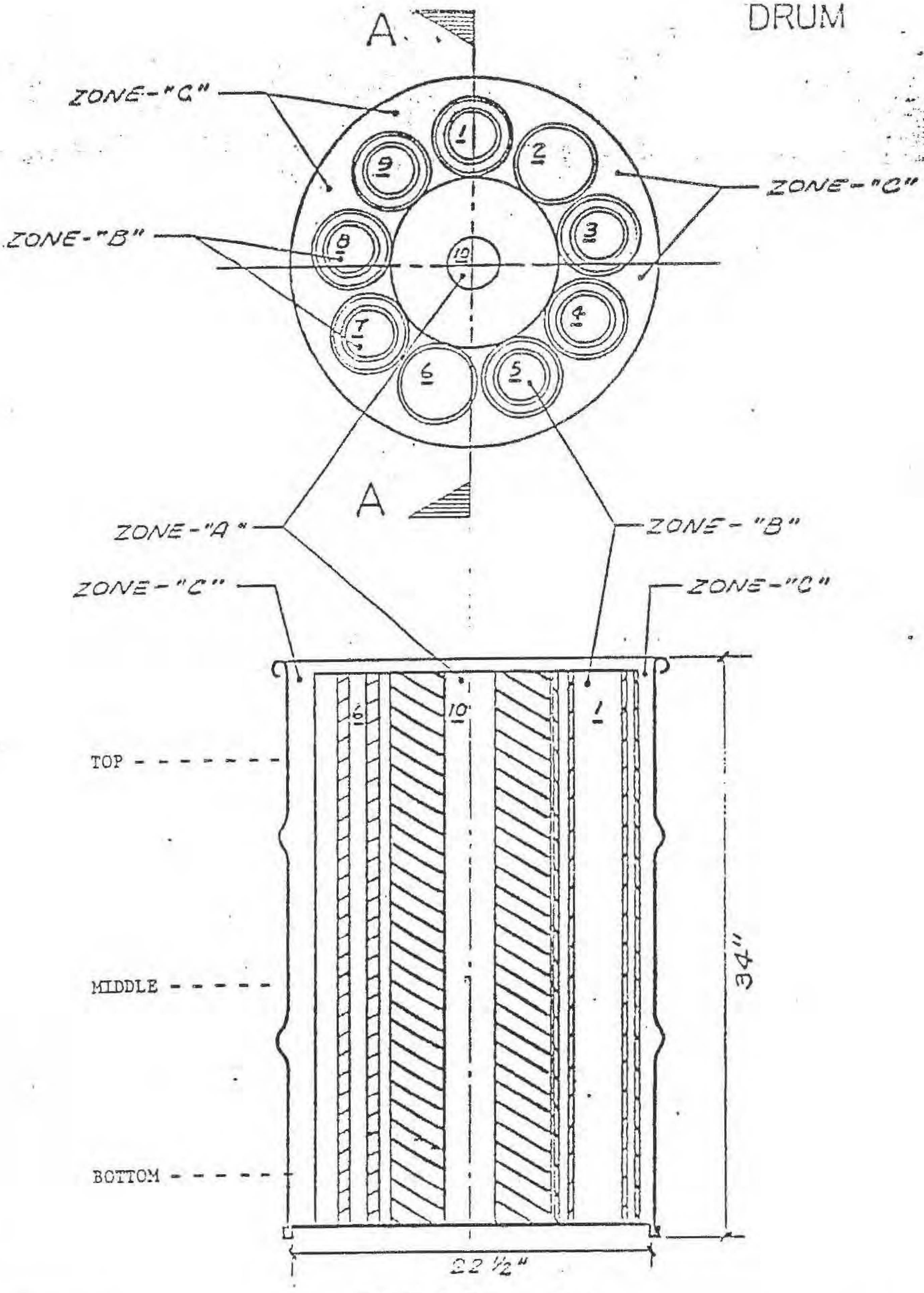


Figure 2

SECTION - A A

SCALE: 1½" = 1'-0"

Figure 3

L S A Drum Counter 10-16-86

75 lb Std.

```
                   GSPL
        363.00 ENT*
      1.642314 GSBA
        473.00 ENT*
      1.642314 GSBA
       3255.00 ENT*
      8.778702 GSBA
       3533.00 ENT*
      8.778702 GSBA
      13232.00 ENT*
     38.562575 GSBA
      12221.00 ENT*
     38.562575 GSBA
      34371.00 ENT*
     72.519632 GSBA
      34250.00 ENT*
     72.519632 GSBA
      37031.00 ENT*
     85.603563 GSBA
      37641.00 ENT*
     85.603563 GSBA
                   GSBL

          2.99   ***
          1.55   ***
 2.227E45133-03  ***
                   LSPS
                   GSBO

   0.390755486   ***
   1.557344038   ***
   0.002227646   ***
```

0.0022 Ci/g/count

Figure 3-[illegible]

LSA Waste Drum Counter For Rock & Sand
3-31-87

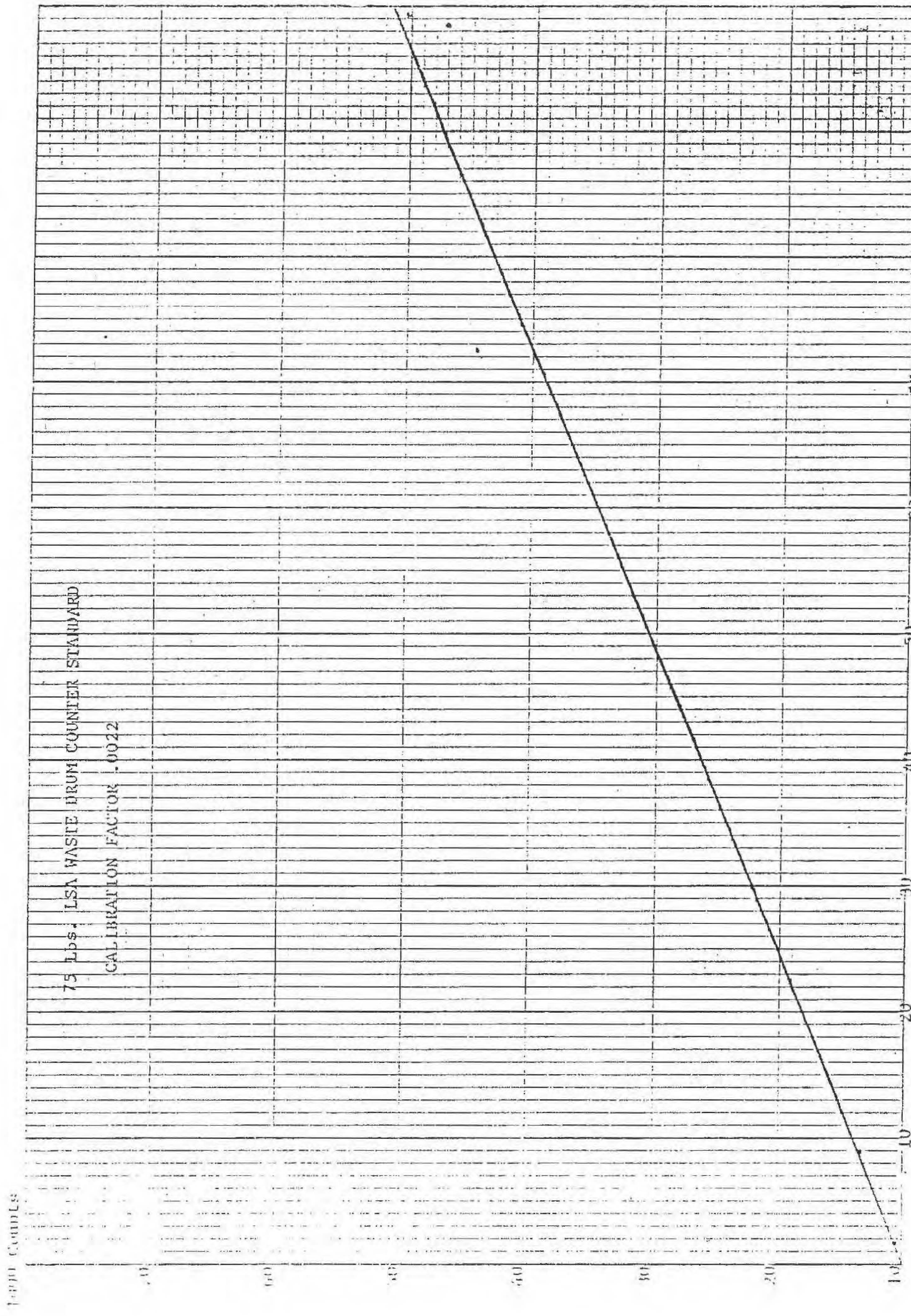
626# total.

```
[illegible]
[illegible]21.606000 ENT↑
[illegible]
7502.000000 ENT↑
[illegible]
20[illegible].00000 ENT↑
[illegible]
[illegible].00000 ENT↑
[illegible]
[illegible]15.00000 ENT↑
[illegible]
[illegible].00000 ENT↑
[illegible]
45[illegible].00000 ENT↑
5[illegible].42000000 [illegible]
[illegible].00000 ENT↑
54.42000000 [illegible]
[illegible]

0.[illegible]
[illegible]
0.00[illegible]
```

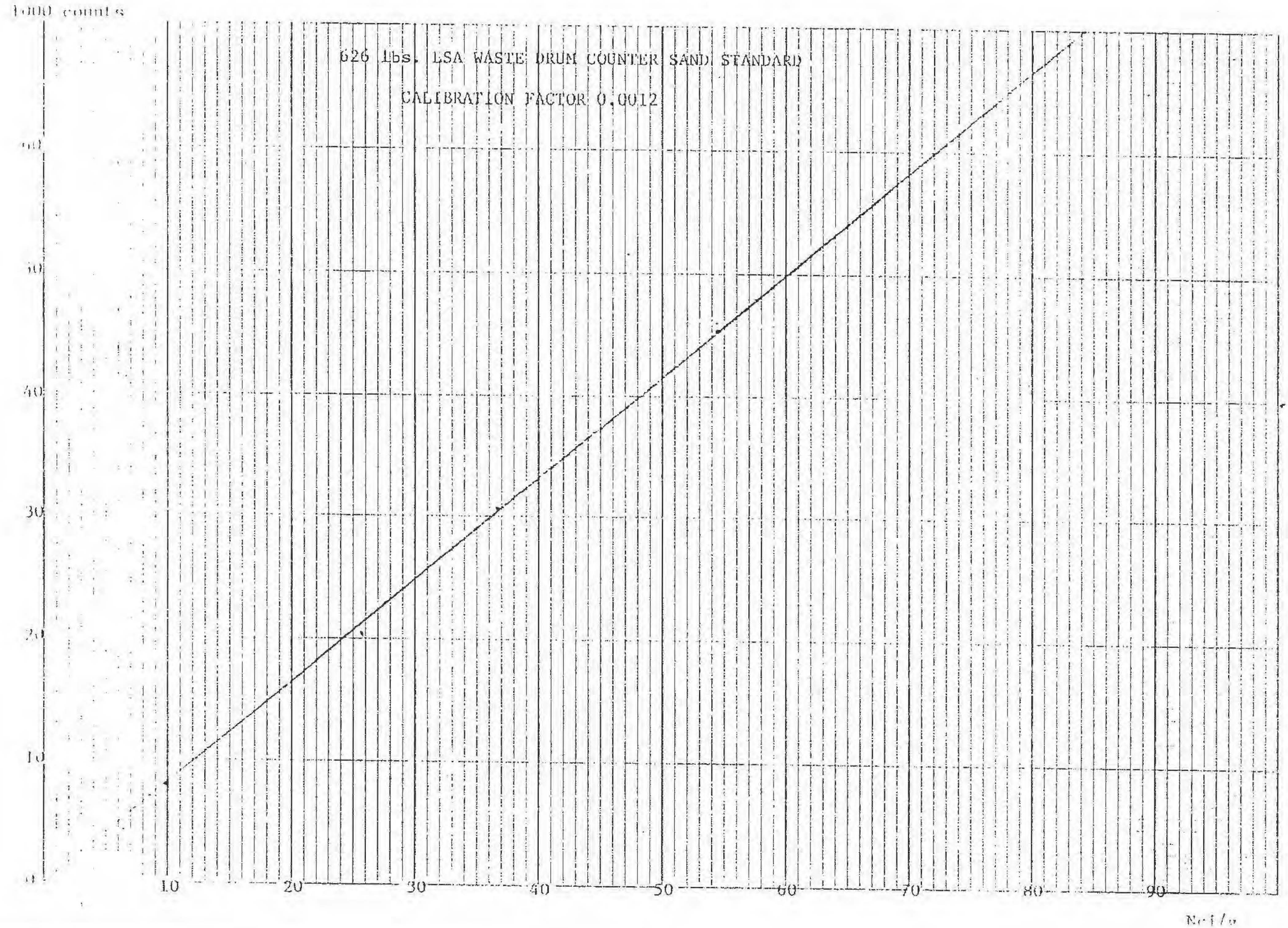
0.0012 nCi/g/count

Figure 4



75 Lbs. LSA WASTE DRUM COUNTER STANDARD
CALIBRATION FACTOR .0022
Nci/g
10
20
30
40
50
60
70
80
90
1000 Counts

Figure 4A



1000 counts
626 lbs. LSA WASTE DRUM COUNTER SAND STANDARD
CALIBRATION FACTOR 0.0012
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90

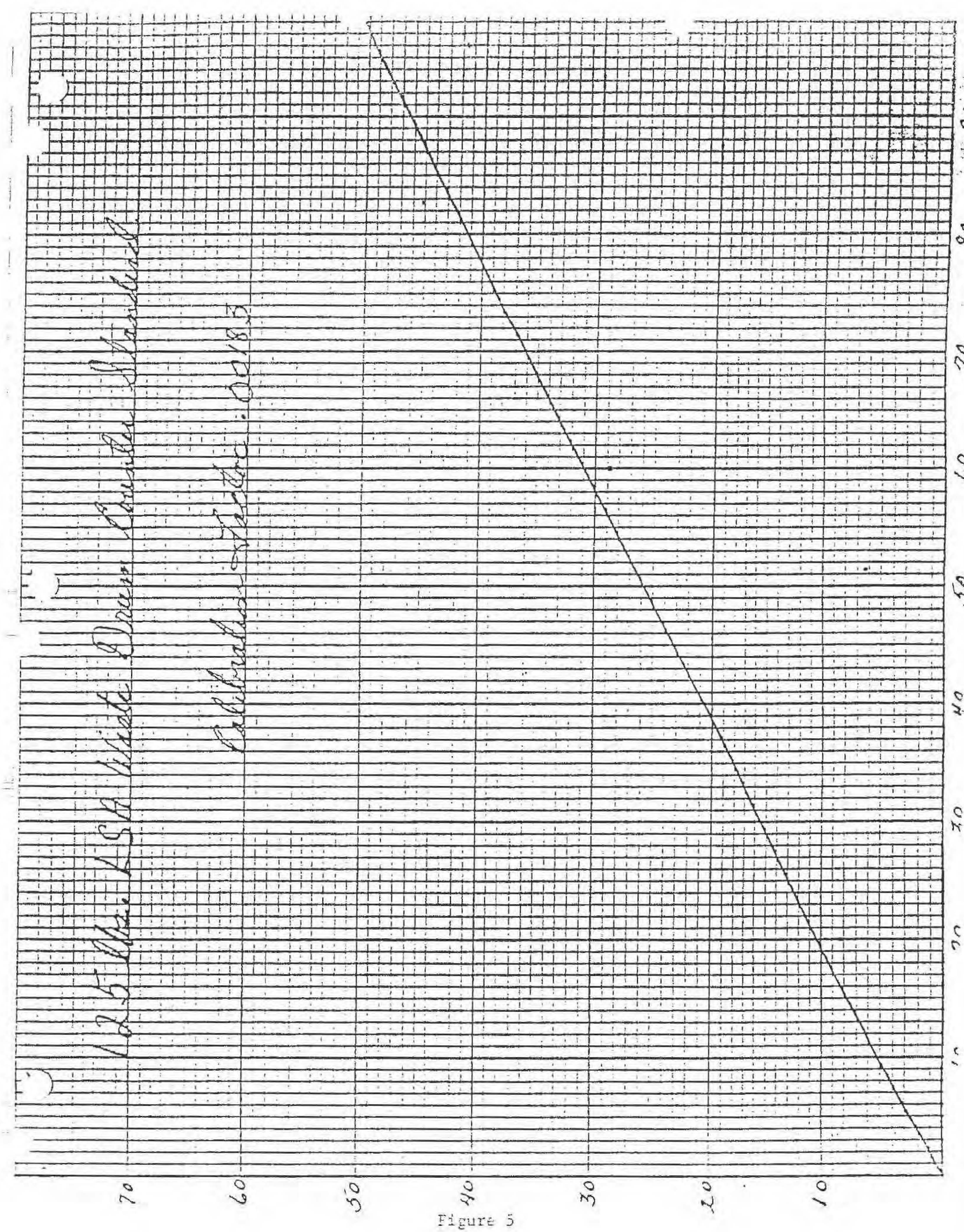


Figure 5

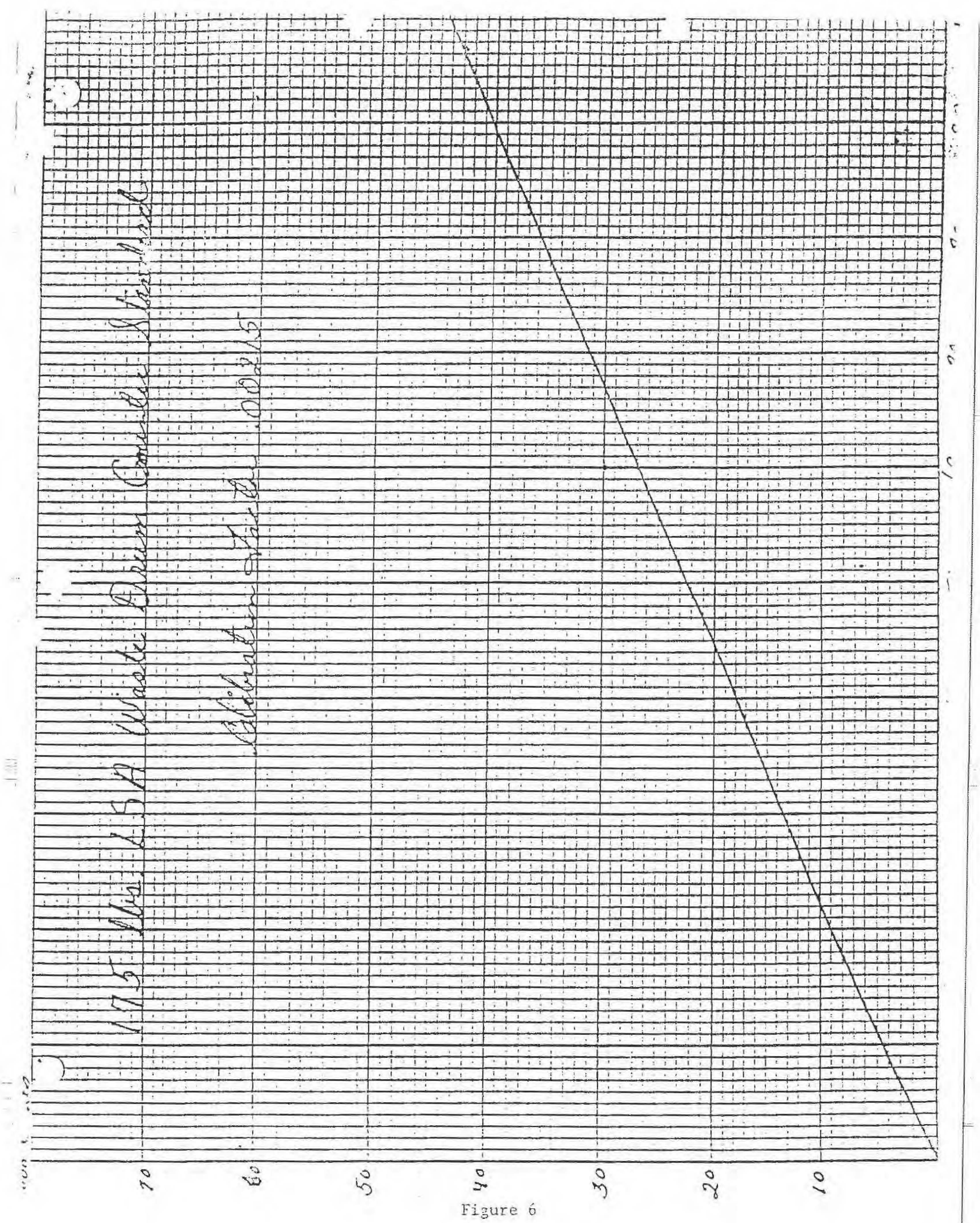


Figure 6

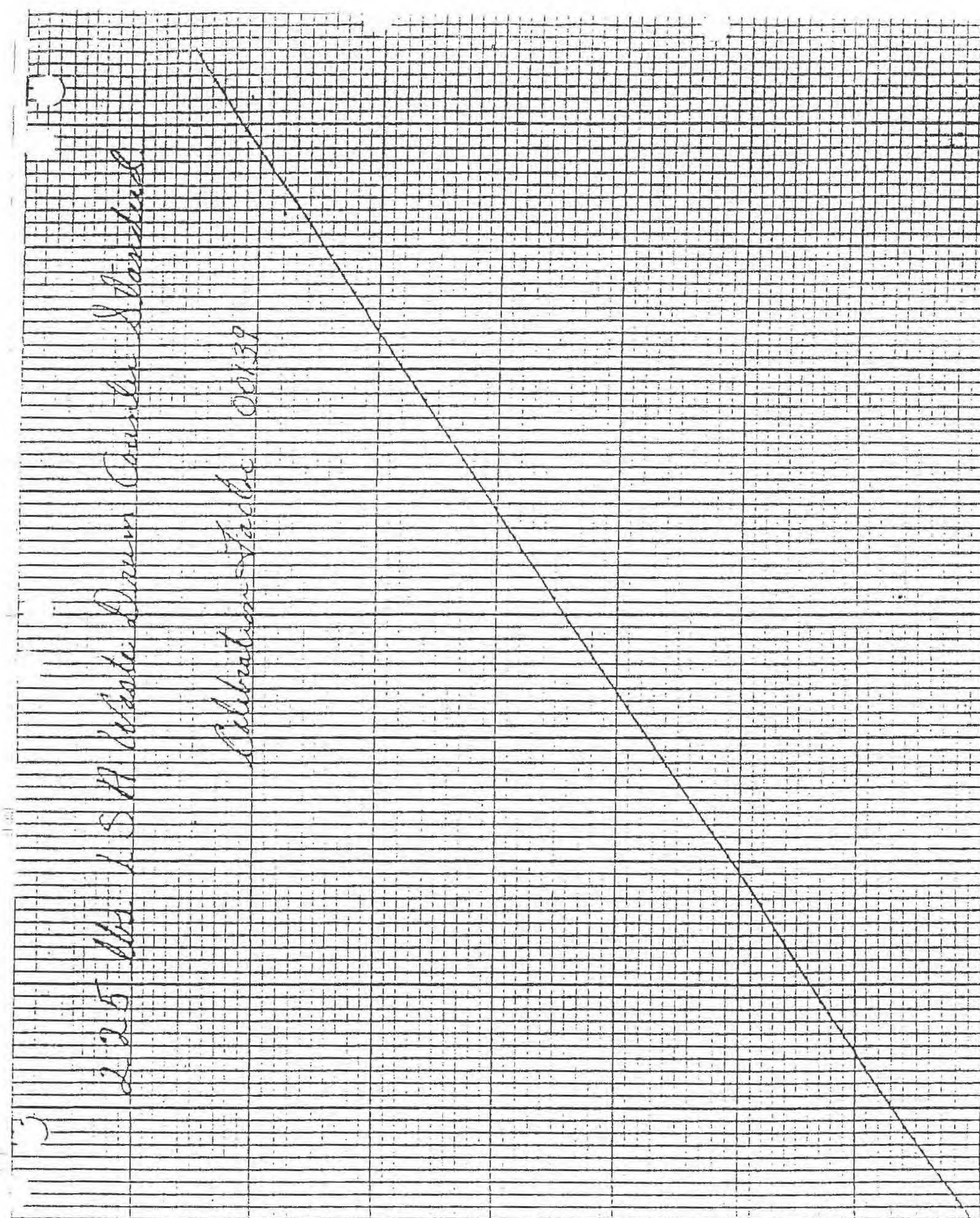


Figure 7

Figure 8

PU PLANT LSA WASTE DRUM COUNTER COUNT SHEETS

DRUM NUMBER ______________ DATE ______________

OPERATOR ______________

H.V. 8.2 WINDOW .3 THRESHOLD .9

E.M. 100 KEV COUNT TIME 4.9 MINUTES

BKG. - 1 ______________

BKG. - 2 ______________

BKG. - 3 ______________

TOTAL ______________ ÷ 3 = ______________ AVG. BKG.

GROSS COUNT - 1 ______________

GROSS COUNT - 2 ______________

TOTAL ______________ ÷ 2 = ______________ AVG. COUNT

\- ______________ AVG. BKG.

______________ NET AVG. COUNT

0.0022 CAL. FACTOR X NET AVG. COUNTS ______________ = ______________ Nci/g
([illegible]2 MAX)

Figure

Pu Plant LSA Waste Drum Counter Count Sheets
For Concrete and Sand

Drum No. ________ Operator ________ Date ________

Gross wt ________ H.V. 8.2 E.M. 100 KEV
Tare ________ Window 0.3 Count time 4.9 min
Net wt ________ Threshold 0.9

Bkg -1 ________
Bkg -2 ________
Bkg -3 ________
Total ________ ÷ 3 = ________ Avg. Bkg.

Gross ct -1 ________
Gross ct - 2 ________
Total ________ ÷ 2 = ________ Avg ct
________ Avg Bkg
________ Net Avg Ct.

.0012 Cal. Factor X Net Avg Ct. ________ = ________ nci/g
(54.42 max)
10 or less assign 5 nci/g

Net wt ________ X 453.592 = ________ grams

________ grams X ________ nci/g = ________ nci total

nci X 10⁻⁹ / 1.045 ci/g = ________ g Pu
or
________ g Pu

PU-PLANT LSA DRUM COUNTER
COMPACTED DRUMS

DATE:__________ DRUM #:__________ OPERATOR:__________

Count #	Net Avg. Counts	
________	________	Gross Wt.________
________	________	Tare ________
________	________	Net Wt.________
________	________	
________	________	
________	________	
Total	________	

Total Net Wt. ________ Lbs. x 453.59 g/lb. = ________ grams

.0028 Cal. factor x total net avg. counts ________ = ________ Nci/g (75.4 max.)

________ grams X ________ Nci/g = ________ Nci total

$\frac{\text{Nci} \times 10^{-9}}{1.12 \text{ Ci/g}}$ = ________ g Pu

or

________ g Pu

PURPOSE: Outline a proven method for handling and counting line generated waste in a safe and efficient manner.

RESPONSIBILITY:	ACTION:
Facility Manager and/or His Designated Alternate(s)	1. Administratively responsible for the practice of procedure conditions. 2. Approve changes in procedure.
Health Physics	1. Perform required surveys. 2. Inspect packages for defects. 3. Suggest improvements in procedures. 4. Maintain records of packages, NDA count results, MBA ledgers, and CHI^2 results. 5. Perform at least a monthly audit of NDA records, count procedures used, and vault physical inventory to insure correct counting and packaging of TRU waste.
Decon Supervisors	1. Follow procedure conditions. 2. Keep Health Physcis informed of unusual requirements. 3. Ensure proper packaging of waste. 4. Ensure that count procedures are strictly followed. 5. Train NDA counter operators. 6. Initiate procedural changes.
Individual Employees	1. Observe procedure conditions.
NDA Counter Operators	1. Strictly follow procedure conditions. 2. Suggest improvements in procedures. 3. Maintain records of packages counted. 4. Inform decon supervisors and Health Physics of any problems.

I. SAFETY AND NUCLEAR SAFETY

A. Observe all SOL(Safe Operating Limits) signs in area.

1. One uncounted package per shelf on transer carts.

2. Two uncounted packages per cart.

3. Maximum of ten uncounted packages in any room (except vault).

4. Two foot spacing, center to center, is to be maintained if packages are placed on the floor.

6. All packages $\gtrsim$ 100 MR/hr shall be counted first and moved to the vault as quickly as possible, to avoid unnecessary personnel exposure.

7. The Cs^{137} sources will be stored in a lead shield when in the count room and not being used to determine package density, to minimize personnel exposure.

8. At the end of each work day all counted packages, Pu check sources, Pu standard sources, and Cs^{137} sources will be returned to the vault for proper storage.

II. EQUIPMENT (Attachment #1)

A. Ludlum 2500 Scaler Rate Meter.

1. Settings.

a. High voltage - adjusted to peak Cs^{137} source at $\approx$ 662 KEV.

b. Cs Threshold - 5.8

c. Pu Threshold - 3.2

d. Window - 1.3

e. Energy Multiplier - 100 KEV

f. Count Time - 0.5 minutes

B. 2" x 2" NaI detector.

C. Five - FFTF mixed fuel powder standards assayed and verified by ERDA.

D. Two - FFTF mixed oxide fuel powder check sources assayed and verified by ERDA.

E. 100 μCi Cs^{137} source.

F. One - adjustable package stand.

G. One - Cs^{137} source stand.

III. EQUIPMENT CHECKS

A. Calibration:

1. Will be done in accordance with procedure KM-NP-15-48 (Sources #2, #7, and #11 will not be used).

2. Will be performed:

   a. At least yearly.

   b. After any equipment failure in the system.

   c. When daily checks will not maintain a 95% confidence level.

B. A CHI^2 control sheet will be made monthly using the 1.934g Pu and 9.681g Pu check sources that are stored in the vault to establish a 95% confidence level.

C. Twice daily when the NDA count system is in use a check will be run using the 1.934g and 9.681g Pu check sources. Five counts will be taken with each source and the results will be plotted on the monthly control sheets.

D. If the counts taken do not fall within the limits on the control charts, no packages may be counted and Decon Supervisor must be notified.

IV. PACKAGES

A. All packages shall be double bagged, except for non-line trash, and must meet proper configuration standards.

1. Maximum length - 16 inches.

2. Maximum surface area - 12 inches x 12 inches square to insure corners are in count window.

B. All packages must have a Pu ID card(KM-3007-A) and be filled out before NDA counting. (Attachment #2).

1. Date.

2. Job No. - (Room No. and Box No.).

3. Material Type.

4. MBA No.

5. Originator.

6. H. P. Release.

a. MR/hr with E-500-B open window.

b. DPM smearable.

c. H. P. signature.

V. COUNTING WASTE

A. At the start of each day a Pu and Cs background and a Cs^{137} source count will be run. (Attachment #3).

1. Ludlum 2500.

a. Take 10, 0.5 minute counts on Pu threshold(3.2) with nothing on the stand. Average the counts for Pu background.

b. Change threshold to 5.8 and take 10, 0.5 minute counts and average them for the Cs background. Place the Cs^{137} source in the center of rear stand and take 10 counts and average them for the Cs^{137} source count. Subtract the Cs background from the CS^{137} source count to get the $Cs^{137}I_o$

c. Record all counts and average on the daily background check sheet.

B. Record all pertinent data on Pu Scrap Counting Worksheet (KM-4949). (Attachment #4).

1. Date.

2. Operator signature.

3. Pu background.

4. $Cs^{137}I_o$

5. Series No.

6. Item No. - Pu ID Card No.

7. MR/hr.

8. Calibration factor.

9. Type of material.

10. Room the package is from.

11. Box the package is from.

C. Place package on package stand at proper elevation so as to be <u>centered</u> with detector.

1. Take two counts on the Pu threshold(3.2) and record on the worksheet. Subtract the Pu background from each gross count to get the net count. Add the two net counts and divide by two to get the #1 average net count.

2. Change threshold to Cs channel(5.8). Take two counts to get Cs background. Place Cs^{137} source in center of rear stand and take two counts. Subtract the background from each gross count to get net count. Add the two net counts and divide by two to get the average net count. Divide the average net count by the Cs^{137} I_o to get the Ti factor of Cs^{137} fraction. Match this fraction with the one on Pu correction factor sheet to get the Pu correction factor. (Attachment #5).

3. Mutiply the #1 average net Pu counts times the calibration factor then divide by the correction factor to get the g Pu for side #1.

4. Turn the package 180^o degrees and repeat steps 1-3 to get the g Pu for side #2.

5. Add #1 g Pu and #2 g Pu and divide by two to get the average g Pu.

   a. For all packages meeting proper dimensions (Section IV, paragraph A) multiply average g Pu by 1 to get total g Pu for package.

b. If cylinder calibration is used multiply average g Pu by the length in feet to get total g Pu.

c. If a plane surface calibration is used multiply average g Pu by number of square feet to get total g Pu.

6. After the package is counted the total g Pu is also recorded on the Pu ID card along with the initials of the NDA counter personnel. (Attachment #2).

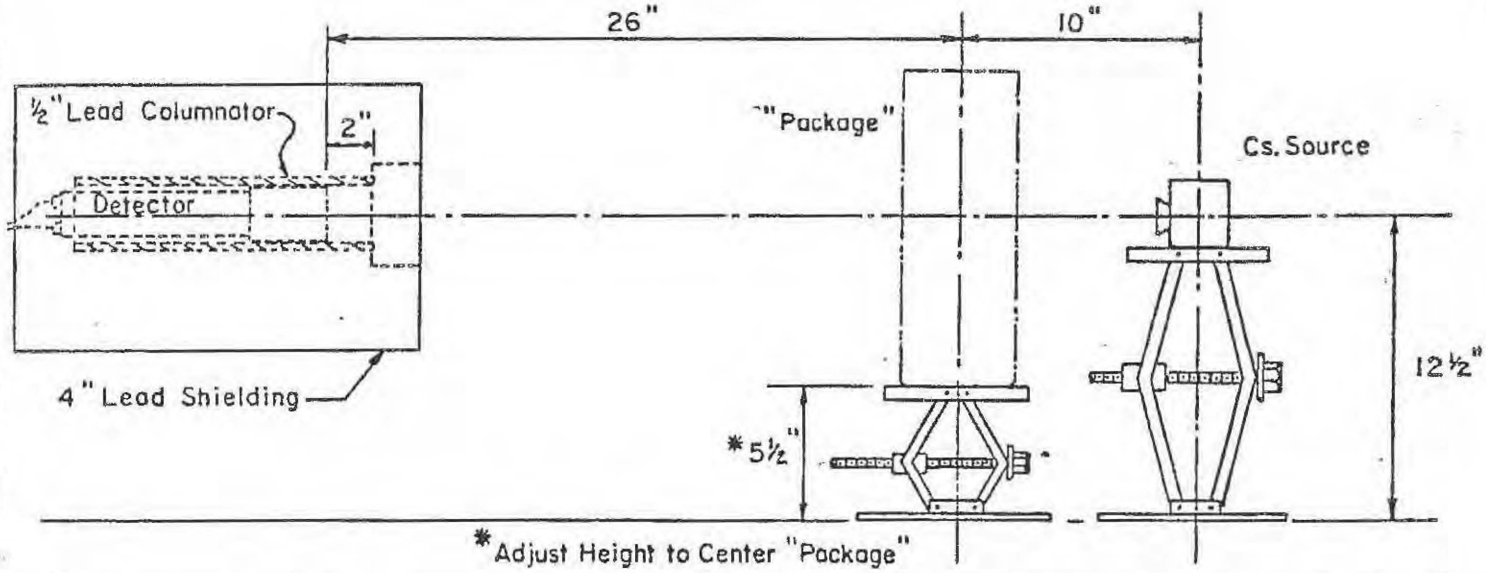
7. At the end of the shift, the NDA counter personnel should go to the vault and obtain from the vault custodian the location of each package counted that day, by drum No., and record this on the bottom of the corresponding Pu Scrap Counting Worksheet (Attachment #4). This way the worksheets can be put in the appropriate file in the H. P. office.

8. If a package is counted at $>$ 9.680 g Pu, it is to be sent back and bagged into the same box it was taken out of to be split up so as to be $<$ 9.680 g Pu.

9. If a counted package does not exceed the minimum detectable limit, it will be assigned a value of 1/2 the minimum detectable limit.

ATTACHMENT #1

N.D.A. - I
PACKAGE SET-UP



Cs. THRESHOLD ________ **Pu. THRESHOLD** ________

WINDOW ________ **WINDOW** ________

HIGH VOLTAGE ________

CALIBRATION FACTOR ________

MINIMUM DETECTABLE LEVEL ________

ASSIGN ______ TO ALL PACKAGES LESS THAN OR EQUAL TO ______ G. Pu.

MAXIMUM VALUE THAT CAN BE COUNTED ________ G. Pu.

ATTACHMENT #2

NO. 60951

CAUTION

RADIOACTIVE MATERIAL

PLUTONIUM IDENTIFICATION CARD KM-3007-B

DATE

JOB NO | LOT NO

MATERIAL TYPE | CODE

MBA | NET WEIGHT gms

ORIGINATOR | SAMPLE NO.

HP RELEASE

m/r | d/m

SURVEYED BY

WASTE COUNTER

SOURCE | MATERIAL | Pu ________ gms

DISPOSITION

Transferred to Storage on
Internal Transfer Number

BY

ATTACHMENT #3

Pu SCRAP COUNTER FORM

DAILY CHECK SHEET

SERIES # ________________ DATE: ________________

OPERATOR: ________________

H.V. __________ Pu T. ______________ Cs^{137} T. ____________ Window ________

Multiplier ______ Recess ______________ Distance ________ Count Time ________ min.

	Background Pu Channel	Background Cs Channel	100 uCi Cs^{137} Cs Channel
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
SUM			
AVG			

Avg. 100 uCi Cs^{137} - Avg. Cs Channel Bkgd = Cs I_o

Cs I_o = __________

Avg. Pu Channel Bkgd.= __________

ATTACHMENT #4

PU SCRAP COUNTING WORKSHEET KM-4949

TE	PU PKGD/ 0.5 MIN.	SERIES NO.
OPERATOR	$I_0 C_S$ 137	ITEM NO.
MR/HR	Calibration Factor (GPu/ 0.5 Min. Ct.)	
TYPE OF MATERIAL (PIPE, PLASTIC, FLANGE, ETC.) AND BOX REMOVED FROM		
IF CYLINDER SHAPE, LENGTH Ft.	IF PLANE SHAPE, LENGTH Inches x Inches Width ÷ 144 = Sq. Ft.	

Cs^{137} 0.5 MIN. CTS.

0 DEGREES			180 ~~90~~ DEGREES		
BACKGROUND	GROSS	NET	BACKGROUND	GROSS	NET

Average Net ________ | Average Net ________

$\frac{\text{Average Net}}{I_0}$ = (T_1) ________ | $\frac{\text{Average Net}}{I_0}$ = (T_1) ________

Correction Factor = ________ | Correction Factor = ________

Pu 0.5 MIN. CTS.

0 DEGREES			90 DEGREES		
BACKGROUND	GROSS	NET	BACKGROUND	GROSS	NET

1 Average Net ________ | # 2 Average Net ________

$\frac{\text{\# 1 Avg. Net x Calib. Factor}}{\text{Correction Factor}}$ = (#1 GPu) ________ | $\frac{\text{\# 2 Avg. Net x Calib. Factor}}{\text{Correction Factor}}$ = (#2 GPu) ________

$\frac{\text{\#1 GPu + \#2 GPu}}{2}$ = Avg. GPu ________

________ x ________ = ________
Avg. GPu b GPu in Package

Package: b = 1
Cylinder: b = # of Ft.
Plane: b = # of Sq. Ft.
24 x 24 x 12 Filter: b = 1

Pu WASTE COUNTING(LUDLUM 25 & 2x2 NaI)

Pu Correction Factor for Self Absorption & Package Density

$$(\text{Pu Corrected Counts}) = \frac{\text{Pu Counts}}{\text{Correction Faction}}$$

Cs^{137} Fraction	Pu Correction Factor	Cs^{137} Fraction	Pu Correction Factor	Cs^{137} Fraction	Pu Correction Factor	Cs^{137} Fraction	Pu Correction Factor
.05	.21	.29	.52	.53	.72	.77	.87
.06	.23	.30	.53	.54	.73	.78	.88
.07	.26	.31	.54	.55	.73	.79	.88
.08	.27	.32	.55	.56	.74	.80	.89
.09	.29	.33	.56	.57	.75	.81	.90
.10	.30	.34	.57	.58	.75	.82	.90
.11	.31	.35	.58	.59	.76	.83	.91
.12	.33	.36	.59	.60	.77	.84	.91
.13	.35	.37	.59	.61	.77	.85	.92
.14	.36	.38	.60	.62	.78	.86	.92
.15	.37	.39	.61	.63	.79	.87	.93
.16	.39	.40	.62	.64	.79	.88	.93
.17	.40	.41	.63	.65	.80	.89	.94
.18	.41	.42	.64	.66	.81	.90	.95
.19	.42	.43	.64	.67	.81	.91	.95
.20	.43	.44	.65	.68	.82	.92	.96
.21	.44	.45	.66	.69	.82	.93	.96
.22	.45	.46	.67	.70	.83	.94	.97
.23	.47	.47	.67	.71	.84	.95	.97
.24	.48	.48	.68	.72	.84	.96	.98
.25	.49	.49	.69	.73	.85	.97	.98
.26	.49	.50	.70	.74	.85	.98	.99
.27	.51	.51	.70	.75	.86	.99	.99
.28	.52	.52	.71	.76	.87	1.00	1.00

NOTE: For all Cs^{137} Fractions less than 0.5 use .21 as Pu Correction Factor.

CIMARRON CORPORATION

CIMARRON FACILITY

EMERGENCY MANUAL

SECTION TEN

FINAL RECOVERY PLAN

10.1 Introduction

After actions to(1) terminate the emergency cause, (2) rescue personnel, and (3) secure the immediate area around the accident site have been accomplished, a more thorough damage assessment is to be made. A careful evaluation of remaining hazards is to be conducted. Mechanical hazards may remain from spilled chemicals and solvents, downed electrical wires, broken gas pipes, water pipes, and debris. Radiological hazards may also be present in the form of radioactive material possibly contaminating a large area down wind of the accident site.

10.2 Area Control

In the event radioactive contamination spread is likely, the Health Physics survey team which made the preliminary survey for re-entry and rescue purposes is to be assigned to demarcate an exclusion area for the protection of the general public. Within the exclusion area a "hot line" contamination control point is to be established near the perimeter of the contamination spread area. The exclusion area boundry is to be no less than 50 yards from the contamination area. A path, such as a roadway, will be the only connection between the exclusion area and the "hot line". Ideally the "hot line" should be upwind and up hill from the scene of the accident.

Usually an 8 point radial survey is made, depending upon the situation. For plotting purposes the following recordings are to be made:

a. Reference point, direction from reference and distance from reference.

b. Distance of instrument detector from emitter, intensity, and time of measurement.

c. Type of radiation detected, (α, β, γ); by swipe or direct.

d. "Hot spot" location.

Air samples are to be taken near and downwind of the exclusion area boundry. The exclusion area boundry will be established and maintained by field measurements to include:

a. All areas ≳ 1 MPC (See Section 7.1.5.2).

b. All contaminated areas ≳ 500 d/m fixed/60 cm^2 and/or ≳ 100 d/m smearable/100 cm^2. If the uranium plant only is involved, all contaminated areas ≳ 1320 d/m fixed/60 cm^2 and/or ≳ 220 d/m smearable/100 cm^2.

c. All areas ≳ 0.5 mrem/hr.

R1 Make a map of the exclusion area boundry and a copy to the Civil police who will patrol outside the exclusion area perimeter if the need is established by the Emergency Director.

All personnel authorized to enter the hazard area are to do so by using the established path to the "hot line". At the "hot line" two(2) personnel are assigned the duty of monitors. They will issue anti-C clothing, protective equipment and dosimeters to those entering and monitor those who are leaving, and collect their anti-C clothing and equipment. The monitors will maintain a log of all who enter and exit. They will also record the personal dosimeter readings.

If safe to use, the Emergency Building will be the control center and may also be the "hot line" location. If unsafe to use, an alternate location will be established.

10.3 Decontamination

Several monitors will need to be assigned for a thorough survey of the affected areas during decontamination. Alpha cannot be detected if the surfaces to be measured are wet. If plutonium is the contaminant, gamma can be detected by suitable instruments.

Airborne contaminants may be reduced by using water as a fixative agent but care must be exercised not to cause run-off of contaminated liquids.

Earth moving and handling equipment may be needed to drum contaminated soil and debris for subsequent proper burial.

Hard surface decontamination is accomplished by using various cleaning methods such as vacuum, water, detergents, steam, solvents, acids and abrasion. Temporary fixation may be accomplished by using tape or plastic patches, oiling, or painting.

10.4 Release Limits

Personnel performing decontamination work and monitoring may cross the "hot-line" if they desire to leave the contamination area but do not desire to exit exclusion area; when monitoring shows less than:

a. 500 d/m/60 cm^2 fixed alpha and/or 100 d/m smearable alpha,

b. 2 mrad./hr·beta and gamma.

Personnel and their equipment may only exit the exclusion area when monitoring shows:

a. <20 d/m/100 cm^2, smearable alpha

b. <100 d/m/100 cm^2 fixed alpha,

c. <0.2 mrad/hr from fixed beta and gamma isotopes.

It will be the duty of the "hot-line" monitors to ascertain from the individuals exiting the contamination area if they also desire to leave the exclusion area. They will monitor accordingly and record the persons location ("in" or "out") of the exclusion area. They will maintain a log of who is in the contamination area.

10.5 Outside Help

In the event of contamination spread beyond Kerr-McGee property, the NRC is to be promptly notified. This agency can supply any and all help, if needed including manpower and equipment. This help could

begin arriving within 3-4 hours from the time of notification.

Use the Outside Assistance Plan portion of this manual to secure local help and assistance from the NRC. See Appendix A for telephone numbers.