SAFETY CONCERN STATUS REPORT

SC # 88-138

INITIATOR: [redacted] LDG: 771

EXT: [redacted]

DATE ASSIGNED FOR REVIEW: 11-16-88

* *

ASSIGNED TO: T. Ray
Company Representative

ASSIGNED TO: T. Ziegler
Union Representative

* *

SAFETY DISCIPLINE NOTIFIED: Vince Rosser
Nuc. Saf. DATE: 11-16-88

STATUS:

YOUR SAFETY CONCERN HAS BEEN ASSIGNED TO THE ABOVE JOINT COMPANY/ UNION SAFETY COMMITTEE MEMBERS. THEY WILL BE IN CONTACT WITH YOU TO DISCUSS THIS CONCERN. **CONTACT WILL NORMALLY OCCUR WITHIN TEN [10] WORKING DAYS.**

cc:
J. D. Leigh - Company/JCUSC
J. L. San Pietro - Union/JCUSC
Safety Discipline - (as appropriate)

JCUSC:DOC:1.14

JOINT COMPANY/UNION SAFETY COMMITTEE CONCERN FORM

(Use Black Ink Only)

Case No. 88-138

Employee Name [redacted] Employee Number [redacted]

Department Maintenance Bldg. 771 Phone [redacted] Shift 5 Day-Days

I have previously discussed this concern with my supervisor: X Yes ____ No

Concern (briefly) Tank Surveillance Scanning Equipment and Production Bag-out Gram Estimators have not been properly maintained and calibrated since 8/29/88. In September this was designated as a U.O.R. and last week a criticality infraction ona barrel of full flow filters was caused by the interruption of Maintenance calibration. This equipment is still being used today in spite of the calibration deficiencies. (REFER TO EMPLOYEE SUGGESTION #84823.)

[redacted] 10/24/88

Employee Signature Date

Immediate Supervisor Response (within 5 working days)

Steve Dewitt manager of Production in Bldg. 771, after learning of above deficiency ceased using equipment. Maintenance has been instructed not to calibrate any equipment.

J. Hawkins 10-27-88

Supervisor Signature (legibly please) Date

J.D. Gray G.L. Blum For K.J. Freiberg 10-27-88

Direct Report Manager Signature Date

NOTE: Timeliness in completing this form is of the utmost importance.

THIS IS A PLANT WIDE PROBLEM

____ I am satisfied with the results.

✓ I am not satisfied. Referral to the JCUSC for investigation because:

Some of the equipment is neither calibrated or Tagged-out and completely taken out of service. Those that are calibrated may not be done properly.

To be completed by the JCUSC Co-Chairperson(s)

Assigned To: Union: T. Tegeler Date 11/15/88

Company: J. Ray Date 11/15/88

Distribution: White - Safety Committee Green - Employee
Yellow - Supervision Goldenrod - Union Steward

RF-45500 (Rev. 11/86) Destroy Previous Issues

Internal Letter

Rockwell International

Date · 19/20/88

No. · 88.135

TO (Name, Organization, Internal Address)
· [redacted]
· Alarm Tech.
· Building 750

FROM (Name, Organization, Internal Address, Phone)
· S. Cordova/J. Leigh
· J.C.U.S.C.
· 5298/4711
·

SUBJECT · **SAFETY CONCERN 88.138**

A meeting was held on December 09, 1988, and it was agreed all gram estimator models that are not calibrated and/or performance tested will be removed from all work areas in all buildings by January 15, 1989.

U.O.R. 88-9-771-88-4 assigns specific responsibilities for performance testing of instruments. Gene Crusan and Criticality Engineering have accepted the responsibility to develop an appropriately approved calibration and/or performance test procedure for all the gram estimator models by January 23, 1989. The interim U.O.R report will be issued on January 12, 1989. The assigned responsibilities should resolve your safety concern.

Thank you for your participation in the Safety Program. If you have any further problems with this concern, its answer, or the implementation, please feel free to contact the Joint Company/Union Safety Committee.

Steve Cordova, J.C.U.S.C.

Jack Leigh, J.C.U.S.C.

cc:
J. SanPietro

Internal Letter

Rockwell International

Date: June 6, 1989

No.: POTTER.606

TO (Name, Organization, Internal Address):
G. L. Potter
Radiological Health
Building 123

FROM (Name, Organization, Internal Address, Phone):
E. Crusan
Rad. Instr.
Building 123
7279

SUBJECT: **GRAM ESTIMATOR ACTION: UOR RFP 88-9-771**

Please be advised that a record of survey instruments procured between 11/85 and 4/89 has been delivered by J. D. Leigh of the Joint Company/Union Safety committee.

We cannot find any additional information from the procurement history which would cross reference or indicate any additional "gram estimating" survey instruments that have not already been accounted for.

E. Crusan
Manager
Radiation Instrumentation

pc:
G. F. Giebler
R. L. Kennard
J. D. Leigh
UOR file

Internal Letter — **Rockwell International**

Date · April 5, 1989

No. · ERF.459

TO (Name, Organization, Internal Address)
· R. J. Erfurdt
· HS&E
· Building 111

FROM (Name, Organization, Internal Address, Phone)
· G. L. Potter
· Rad. Health
· Building 123
· 4098

SUBJECT:

TANK SCANNING AND GRAM ESTIMATING INSTRUMENTS

Four (4) types of instruments are used for estimating the amount of radioactive materials placed in containers or in related operations; e.g., bag-out tasks. These are Ludlum devices - Models 12, 2220, 2300, and 2200-12. My understanding of who uses, calibrates, and maintains these instruments is summarized below in Table 1:

TABLE 1

MODEL NO.	QUANTITY	USER	CALIBRATION RESPONSIBILITY	MAINTENANCE RESPONSIBILITY
12	36	PuOps Prod., NDT,NDA	HS&E	HS&E
2220	3	PuOps, NDA	CSL	HS&E in July MTCe Undefined
2300	3	PuOps Prod., NDA	HS&E Undefined	~~Undefined~~ HS&E
2200-12	4	NDA	HS&E Undefined	~~Undefined~~ HS&E

LEGEND:
- CSL = Central Standard Lab
- PuOps = Plutonium Operations
- HS&E = Health Safety and Environment
- Prod = Production
- NDT = Nondestructive Testing
- NDA = Nondestructive Analysis

I have directed Gene Crusan, Radiation Instrumentation Manager, to assume responsibility for calibration and maintenance of Ludlum Models 2300 and 2200-12. He will continue calibrating and maintaining the Model 12 Units. He has prepared a plan which details how and when he will control inventory, write procedures, train technicians, and incorporate these instruments into his calibration recall and maintenance systems.

Internal Letter

Rockwell International

Date · July 5, 1989

No. · UOR.88-9

TO (Name, Organization, Internal Address)
· L. R. Bailey
· Safety Review Group
· Building 020

FROM (Name, Organization, Internal Address, Phone)
· E. Crusan
· Rad. Instr.
· Building 123
· 7279

SUBJECT · **UOR 88-9 771 88-4: INSUFFICIENT PROCEDURE FOR CALIBRATION OF INSTRUMENT (GRAM ESTIMATOR/TANK SURVEILLANCE)**

Please be advised that actions assigned to the Radiation Instrumentation Group concerning the UOR have been cleared, with the following exceptions:

1) New design Ludlum Model 12-12 Gram Estimators expected delivery date is July 15, 1989. Test and evaluation will commence immediately upon receipt.

2) Programmable Ludlum 2200-12 Tank Surveillance Instrument estimated delivery date is July 30, 1989. Acceptance testing and evaluation will begin upon receipt of instruments.

3) Formal calibration procedures will be written and implemented based on new instruments. Interim procedures (authorized and signed) are in place for instruments in use.

E. Crusan

E. Crusan
Manager
Radiation Instrumentation

cc:

S. Cordova
G. F. Giebler
D. C. Hunt
R. L. Kennard
G. L. Potter
J. D. Leigh

Internal Letter **Rockwell International**

Date · 02/28/89

No. · 1.4

TO (Name, Organization, Internal Address)
. R. J. Erfurdt
. HS&E
. B111

FROM (Name, Organization, Internal Address, Phone)
. J. D. Leigh
. Rad. Mon.
. B771
. 4711

SUBJECT · SAFETY CONCERN #88-13

Several implementation dates for resolution of this concern have not been met, therefore, it is being referred to you for resolution.

When you have established a meeting time, the Company and Union co-chairmen suggest the following persons be in attendance:

[redacted] - Alarm Tech.
G. L. Potter - Rad. Health
E. Crusan - Rad. Instrumentation
S. Cordova - J.C.U.S.C.
J. D. Leigh - J.C.U.S.C.
J. L. SanPietro - J.C.U.S.C.
W. F. Weston - Dir. Pu Ops.
J. C. Bretzke - Bldg. Mgr. 771
L. R. Bailey - S.R.G. - Windsite

J. D. Leigh, Jr.

J. D. Leigh
Area Manager, Rad. Mon.

cc:
[redacted]
G. L. Potter
E. Crusan
S. Cordova
J. D. Leigh
J. L. SanPietro
W. F. Weston
J. C. Bretzke
L. R. Bailey
File

Internal Letter

Rockwell International

Date · April 28, 1989

No. · Leigh.428

TO (Name, Organization, Internal Address)

· J. D. Leigh
· JCUSC
· Building 750

FROM (Name, Organization, Internal Address, Phone)

· G. L. Potter
· Rad. Health
· Building 123
· 4098

SUBJECT · **ISSUANCE OF LUDLUM INSTRUMENTS WITHOUT PERFORMANCE TESTING**

This letter is in response to an employee concern brought to the attention of the Joint Company Union Safety Committee regarding nonperformance-tested Ludlums being issued on 21 April 1989 in Building 776.

My staff did issue Ludlum 12-1a instruments to Radiation Monitors that had not been performance tested as required by RI-0004. The situation was corrected immediately when it was brought to my attention. All instruments passed the performance test when returned to the shop, thereby reaffirming that no employee was at risk from faulty instruments during that portion of the day that the units were used without testing.

It was alleged that supervision had knowingly issued nonperformance-tested instruments. This accusation is untrue. The overtime Electronics Technician (ET) mentioned to his foreman at 8:30 a.m. that he had not performance tested the Ludlums during the preceding shifts. The foreman observed that the Day-Shift ET had been issuing the instruments and the foreman erroneously presumed that the Day-Shift ET had performance tested the instruments before issuance per procedure. The foreman may have exercised poor judgement by not directly verifying that performance testing had been completed, but he did not deliberately and knowingly allow untested instruments to be issued.

I and my Radiological Instrumentation staff recognize the importance of performance testing instrumentation to confirm and document proper operability of our units used for protection of plant workers. We have taken corrective actions. We will continue to upgrade our overall instrumentation programs for improved protection of plant workers.

G. L. Potter
Manager
Radiological Health

cc:

E. Crusan
R. J. Erfurdt

UOR - RFP #88-9--771 88-4

INSUFFICIENT PROCEDURE FOR CALIBRATION

INTERIM REPORT

PREPARED BY

HS&E, SAFETY REVIEW GROUP

ORIGINATOR: L. R. Bailey
APPROVED BY: M. F. Hickey, Manager

ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT

RFP 88-9--771 88-4
Interim JAN 1 6 1989

1. UOR - RFP 88-9--771 88-4

Insufficient Procedure For Calibration of Instrument

2. STATUS & DATE:

INITIAL 10/14/88
INTERIM JAN 1 6 1989
FINAL

3. DIVISION OR PROJECT:

DP - Rockwell International, AERO, Rocky Flats Plant
Support Operations, Plant Support, Maintenance Department

4. FACILITY, SYSTEM, OR EQUIPMENT:

RI - Building 771, Maintenance
Preventive Maintenance Operations [PMO], Calibration Program for Ludlum 2220 Counting Instruments used for tank surveys.

5. DATE OF OCCURRENCE:

September 1, 1988

6. TIME OF OCCURRENCE:

Approximately 1100 Hours

7. SUBJECT OF OCCURRENCE:

Calibration Procedure being used by Maintenance for Ludlum Model 2220 instruments was not approved. The certification and traceability of the source used was in question.

"REVIEWED FOR CLASSIFICATION" (W)
By Barbara Kordyak
Date 1-10-89

8. APPARENT CAUSE: DESIGN ____ MATERIAL ____ PERSONNEL P
PROCEDURE S OTHER ____

9. DESCRIPTION OF OCCURRENCE:

Ludlum 2220 gamma counting instruments are used to determine through surveys, the amount of radioactive residue build-up in process tanks.

These instruments were placed on a periodic calibration PMO in April 1988, at the request of the Tank Surveillance Organization, Tank Gamma Scan Group. Maintenance wrote a calibration procedure and obtained the necessary approvals. However, the procedure was placed in use in June without certification testing.

The Electrician Technician who worked with this procedure in late June 1988, found it would not work and formulated a workable calibration procedure based on Tank Survey Procedure 1075. This procedure was reviewed by Maintenance Engineers and the Analytical Nuclear Engineers, and placed into interim use in July pending approval.

A Rockwell International auditor was notified on September 1, 1988, that an unapproved procedure was in use to calibrate tank survey instruments. The certification of the source, and methodology used in determining tank survey results was also questioned. The concerns were reported during the audit appraisal and were included as a finding in the formal audit report.

[Refer also to Attachment A - "Events and Causal Factors Chart"].

10. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:

Calibration of Tank Surveillance Instruments with a draft procedure.

11. IMMEDIATE EVALUATION:

Maintenance did not enforce the compliance to the requirement for use of an approved calibration procedure. The personnel directly involved did not understand the importance of following established and approved procedures.

The Maintenance system for approval of calibration procedures is lacking in that there is no mandatory requirement for demonstrating that a new calibration procedure has been tested.

The first procedure had not been tested prior to the approval and implementation. The technician found the deficiencies during the field work and devised a procedure for the calibration. This unapproved procedure was placed into service and was used.

11. IMMEDIATE EVALUATION: [continued]

The use of this instrument's capability and intended use were not fully understood or known by various organizations. Some believe the readings to be a precise measure of residue build-up in process tanks. Others believe it to be a rough indicator of the quantity of material in a process tank.

The source used was to calibrate Ludlum 2220 is certified by the Standards Laboratory.

Employees were not exposed to unsafe conditions and tracking of nuclear materials was not compromised.

RESULTS OF DETAILED INVESTIGATION

SYNOPSIS

Safety Review Group [SRG] investigations broadened to include all portable, Ludlum gram estimators used for tank surveys, in-line filter checks, and glovebox bag-out operations.

Ludlum gram estimators play an important role in the Rocky Flats Criticality Control Program.

All gram estimators must be included in a periodic, documented, single point calibration program which includes built-in Measurements Quality Assurance [MQA] internal audits.

A training program with reference manuals must be developed for all users of Ludlum gram estimators such that operators are trained in the proper use and limitations of this instrument.

The Ludlum Model 2300 gram estimator should be seriously evaluated as a replacement for all Ludlum Model 12 and Model 2220 instruments.

ANALYSIS

Viability of Gram Estimator Measurements

The SRG investigation broadened to include all Ludlum gram estimating equipment resulting in the following known applications of these instruments:

MODEL	TYPE	APPLICATION	TOTAL NUMBER IN USE
0012	Analog	Dry Bag-Out Operations	Unknown
2220	Digital	Tank Survey	Unknown
2300	Digital With Computer	Wet Filter Bag-Out	Unknown

11. **IMMEDIATE EVALUATION:** [continued]

These instruments were originally designed as count rate meters. Studies in the early seventies by RF Research and Development personnel, resulted in calibration of these instruments to specific fissile material gram weights for use in tank surveys. Eventually, various models of Ludlum's were modified and "calibrated" for use in various bag-out operations. Because Ludlum's provide only approximate gram weight estimates, the loading limits for drums were reduced by at least a factor of two to compensate for these inaccuracy limitations.

The validity of fissile material gram estimates made by Ludlum gram estimators was questioned by auditors. Based on this investigation, it is apparent that Ludlum passive gamma ray instruments are an important part of the RF Criticality Control Program [refer to Attachment B]. Some of these instruments are periodically calibrated by trained technicians using written procedures, test equipment, and radioactive sources certified by the Standards Laboratory. After single point plutonium source calibration, Model 12 gram estimators have an estimated accuracy of approximately +150/-100% under field measurement conditions.

A few people interviewed felt because of the limited accuracy of the Ludlum gram estimators, their use should be discontinued. There is no hard data available to substantiate that intuitive educated guesses about fissile material concentrations in bagged-out packages is a more reliable field estimating method.

Even though Ludlums provide limited accuracy, they appear to reduce the number of criticality infractions. Evidence of the useful role of gram estimators stands out when consideration is given to the fact that approximately 66,000 barrels have been filled and counted in the last three years, with only five criticality infractions at the drum counter. In addition, the newer Ludlum computer controlled 2300 instruments can provide gram estimates of +/- 35% when properly "tuned" to a single bagged-out item, such as full flow wet filter. The Model 2300 should be seriously evaluated as a replacement for all Model 12 and 2220 Ludlums.

The portable Ludlum gram estimators cannot be truly "calibrated" for field use because of the very large number of variables that effect gamma transmission and detection by these instruments. In most cases, an infinite number of certified standards would have to be developed in order to duplicate this material matrix of all possible bag-out configurations, or process tank fissile material build up. Because of this formidable problem, Ludlum gram estimators are simply used for low cost, portable, course, pre-screening estimates before mixed waste is loaded into drums and sent to the drum counters.

11. IMMEDIATE EVALUATION: [continued]

Calibration Requirements

The issue of whether the gram estimators can be calibrated, and who should calibrate them, was raised by a number of people during the investigation. National Institute of Standards & Technology [NIST, formerly NBS] defines calibration as comparing an instrument, device or material with appropriate national standards. Given this definition, Ludlum Gram Estimators can quite easily be calibrated for example, to a five gram plutonium source, certified traceable to NIST. As Attachment B indicates, there is little direct correlation between that single point repeatable calibration and field measurements of fissile material accumulations in full flow process filters, tank surveys or bag-out operations. For this reason, the Ludlums are appropriately called gram estimators.

According to NIST requirements, approved calibration programs must be closely managed, documented, including Measurement Quality Assurance [MQA] internal audits, and all standards certified traceable to NIST. When a comprehensive MQA based calibration system is in place, it is perfectly appropriate to have the organization that uses, and/or repairs, the gram estimators also provide the calibration function.

Training/Familiarization

During the investigation, questions about training for users of gram estimators were raised. There is an informal training program with procedures for the Tank Survey crew, but no informal familiarization program is provided for routine bag-out operations. It is important in order to prevent misunderstanding about the true role of gram estimators fit into the Criticality Prevention Program, and what factors limit the accuracy of portable field measurements of fissile activity in a random or unknown matrix.

12. IMMEDIATE ACTION TAKEN AND RESULTS:

Maintenance management stopped all work involving calibration of Tank Surveillance Instrumentation in Building 771. The calibration procedure written by the Electrician Technician was approved within one week.

13. IS FURTHER EVALUATION REQUIRED:

NO X

14. FINAL EVALUATION AND LESSONS LEARNED:

To be supplied in the Final report.

15. CORRECTIVE ACTION:

ACTIONS TAKEN:

A. Maintenance put a tested and approved Ludlum 1110 calibration procedure in place September 6, 1988.

B. A letter was issued by Maintenance management to all Maintenance personnel re-emphasizing adherence to PMO calibration procedures, on September 15, 1988.

C. Plant Support held a training class on October 12, 1988, for all Maintenance supervision on the need to follow established procedures.

D. Plant Support Policy 5.1, requiring certification testing of PMO procedures before management approval.

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15. CORRECTIVE ACTIONS [continued]

FURTHER RECOMMENDATIONS:

	EVENT	CAUSE
1.	Rockwell International auditors questioned adequacy of calibration program for a Ludlum gram estimator.	No group has sole responsibility for calibration of all Ludlum gram estimators on Plantsite.
2.	SRG investigations further determinded that there is no accurate inventory of Ludlums in use and their calibration status.	No group has sole responsibility for calibration of all Ludlum gram estimators on Plantsite.

CORRECTIVE ACTION TO: G. L. POTTER

WHAT/WHEN:

1. Take ownership of all gram estimators and develop an implementation plan and schedule, approved by your director, for a Measurements Quality Assurance [MQA] program for all Ludlum gram estimators.

   WHEN: 03/01/89

2. Determine how many and what model Ludlums are used for gram estimating on Plantsite and remove any unnecessary or inoperable instruments.

   WHEN: 02/15/89

G. L. Potter, Manager
Radiological Health

1/11/89
Date

15. CORRECTIVE ACTIONS [continued]

FURTHER RECOMMENDATIONS:

3. EVENT

SRG's investigation indicated confusion about measurement capabilities and limitations of various Ludlum gram estimators.

CAUSE

Limited informational material available about the role, proper use, and limitations of gram estimators.

CORRECTIVE ACTION TO: J. D. NEHR AND G. L. POTTER

WHAT/WHEN:

3. Develop an overview familiarization program and/or pamphlets or video tapes for users of gram estimators. Include, as a minimum, information about their role in the Criticality Control Program, proper use, and field measurement limitations. Submit a letter to L. R. Bailey, SRG, Building 250, stating the content of the inplace program.

WHEN: 03/15/89

J. D. Nehr, Manager
Training Program Development

1/11/89
Date

With technical support from:

G. L. Potter, Manager
Radiological Health

1/11/89
Date

15. CORRECTIVE ACTIONS [continued]

FURTHER RECOMMENDATIONS:

EVENT	CAUSE
4. Nuclear Materials Safety Procedural Infractions. Drum exceeded 500 grams resulting in a Criticality Infraction.	Ludlum Model 2300 was not available for filter bag-outs and a Model 12 was used instead.

CORRECTIVE ACTION TO: D. M. McGUIRE

WHAT/WHEN:

4. Determine which Ludlum gram estimator is technically best for each gram measurement application. Send a copy of your recommendations to L. R. Bailey, SRG, Building 250.

   WHEN: 03/15/89

D. J. McGuire, Manager
Proc Instr & Contrl

JAN. 11, 1989
Date

16. PROGRAMMATIC IMPACT:

Tank surveys in Building 771 were not affected.

Actions taken by management during investigation required significant manpower resources.

17. IMPACT UPON CODES AND STANDARDS:

None known.

18. SIMILAR UNUSUAL OCCURRENCE REPORT NUMBERS:

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19. SIGNATURES:

L. R. Bailey, Chairperson
Safety Review Group — 1-10-89 Date

G. L. Potter, Cognizant Supervisor
HS&E, Radiological Health — 1/11/89 Date

R. J. Erfurdt, Director
Health, Safety & Environment — 1/12/89 Date

C. P. Bader, Director
Support Operations — 1/13/89 Date

Committee Members

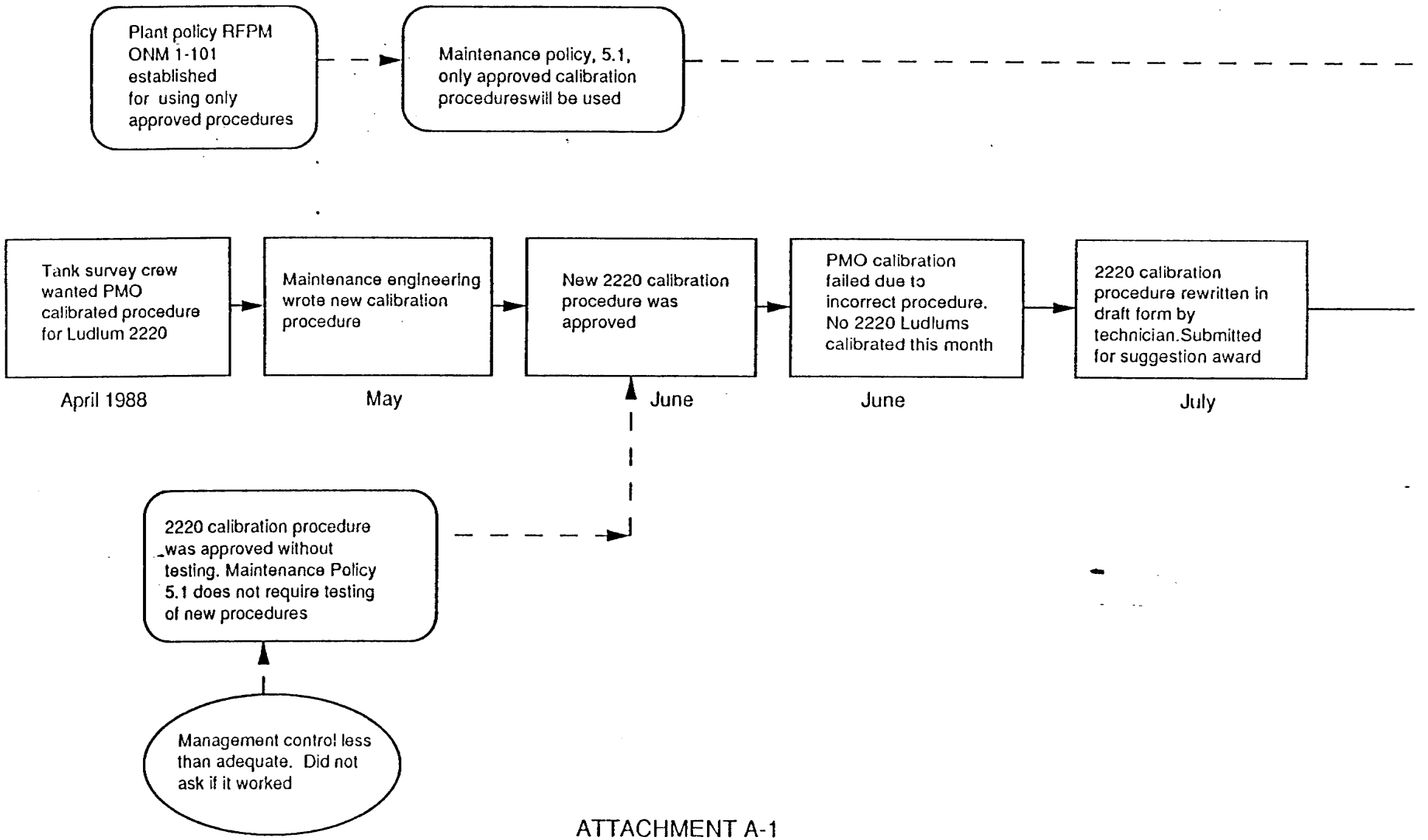
S. Cordova, Union Safety Representative — 1-11-89 Date

Approved

Margaret F. Hickey, Manager
Safety Review Group — 1/11/89 Date

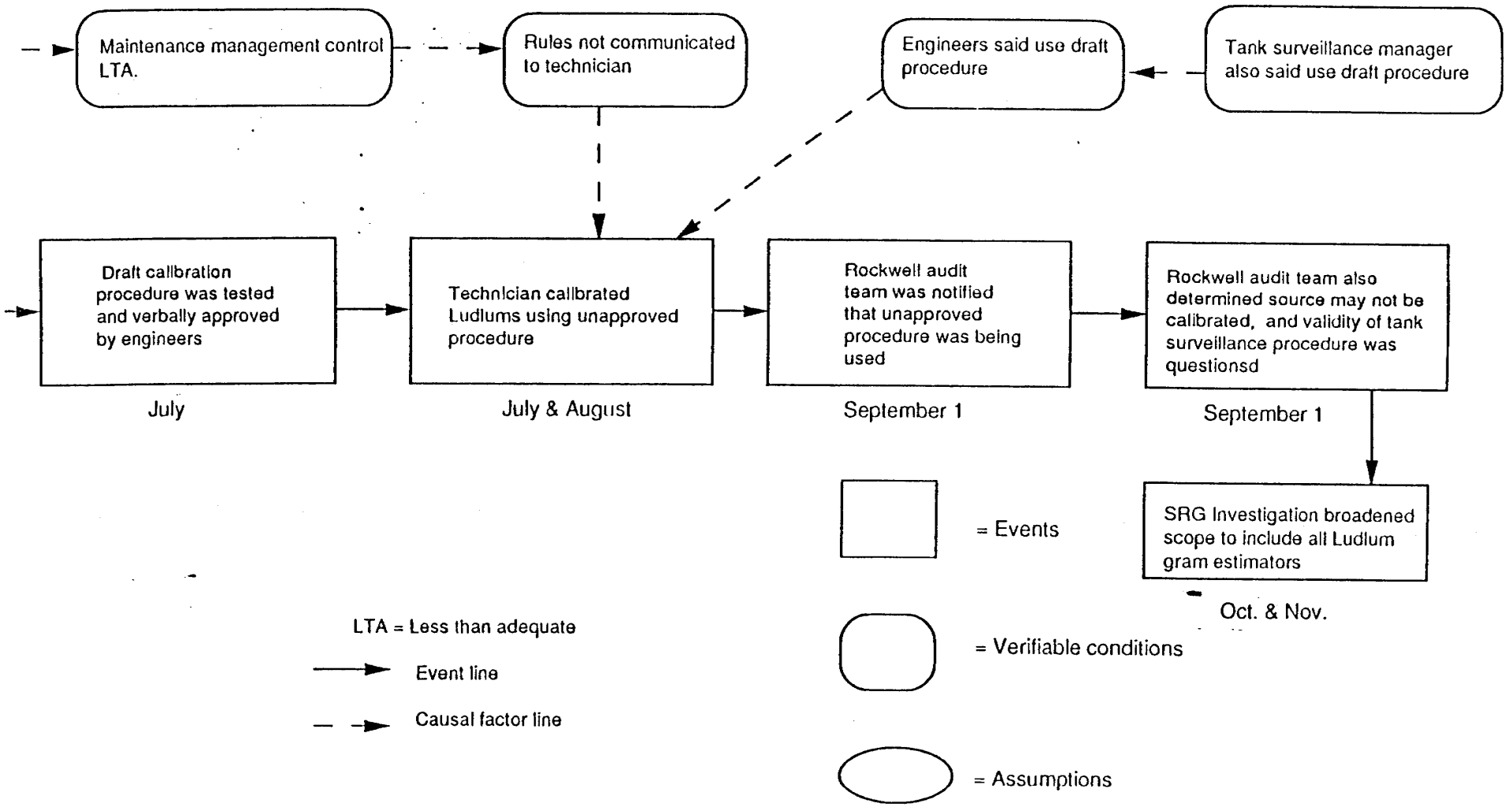
DOC:1.3/UOR

UOR 88-9-771 88-4 EVENTS AND CAUSAL FACTORS DIAGRAM - INTERIM REPORT



ATTACHMENT A-1

INTERIM REPORT



ATTACHMENT A-2

Jess Castro
Vice President

Michael T. Davidson
President

Ken Cash
Recording Secretary

Jim Scruggs
Financial Secretary

Ray Malito
Treasurer

United Steelworkers of America

AFL-CIO-CLC

Local Union 8031 4510 Indiana Street Golden, Colorado 80403

Crit infract 10-21-88
Full Flow filters.

September 26, 1988

A UNION CHRONOLOGICAL SYNOPSIS OF THE FACTS IN THE 771 LUDLUM CALIBRATION U.O.R.

My name is David M. Navarro, #508485. On Thursday, Sept. 22, 1988 I was requested to attend a meeting with Charles Schanarr of the newly formed Safety Review Group for the purpose of getting my side of the story in the recent 771 Ludlum Calibration Procedure Controversy which is being treated as an U.O.R. Mr. Schanarr requested at that meeting that I present a chronological synopsis of the facts to the best of my memory.

I am a maintenance Electrician Technician (E.T.). I was transferred to 771 building on Monday, 5/16/88. Since 771 has only one E.T. the previous E.T. was held over for one week to cross-train me. During that week the previous E.T. walked me through a 'hands-on demonstration' of the calibration procedure for the Ludlum Model 12 Gram Estimator (Zap Gun) weekly P.M.O. I perfomed the weekly P.M.O.'s thereafter until September 1, 1988 when all Ludlum calibrations in 771 building were stopped. During that period I also calibrated a Ludlum Model 2300 Digital Gram Estimator (Zap Gun) on a weekly basis in the exact same procedure.

None of the Tank Surveillance Scanning Equipment (Models 2220 and 2200-12) were due for the designated monthly calibrations during the week of 5/16/88 to 5/20/88 when the previous E.T. was held over. Consequently, I did not receive any hands-on cross-training on these two Ludlum Models. During the week of 6/13/88 to 6/17/88 I attempted to calibrate some of these 2220's without any success. I was using a new maintenance P.M.O. procedure that was dated 6/7/88. However, this procedure would not set up the instrument in its operating range and therefore was unusable. I could not locate any maintenance P.M.O. procedure at all for the Ludlum Model 2200-12.

Although I could not find workable maintenance P.M.O. procedures at this time for the Ludlum Model 2220 and 2200-12 it is extremely important to note that I DIDNOT UNILATERALLY OR INDEPENDENTLY ATTEMPT TO CALIBRATE THIS EQUIPMENT WITHOUT FULL KNOWLEDGE AND DIRECT ASSIGNMENT BY MAINTENANCE AND TANK SURVEILLANCE MANAGEMENT. Two work orders were written by Ray Trujillo of Tank Surveillance (#535404 and #536280) to "Furnish L&M to Calibrate and Pulse 14 Ludlum Scanners Once a Month, Attach Calibration Sticker & Maintain Logbook". Work Order #535404 was dated 4/12/88, planned by maintenance, initaled by Tom Grey the 771 A.M.S., and assigned to me by my foreman Jim Hawkins.

Ken Higashi, the 771 Maintenance Engineer had wriiten the first Maintenance Calibration Procedure for the Ludlum Model 2220 and had it officially signed off on 6/7/88. The problem with this procedure was that a few steps had been inadvertantly omitted and a Cesium source was required which I did not have access to. This proceedure was written to eliminate the monthly work orders and to officially create the Maintenance P.M.O. Calibration Procedure. This was a giant step in the right direction. All he had to do was to clean it up a little and get it officially signed off again.

It was during the week of 6/13/88 to 6/17/88 that I began an in-depth search for guidance and a procedure for each of the Ludlum Models so I could properly calibrate them. First I went to Ray Trujillo, foreman for the Tank Surveillance Group. He referred me to their operators document #CO-1075. This document includes some calibration information which was the basis for a procedure that I eventually wrote myself to calibrate the 2220's. Mr. Trujillo also referred me to Ron Harlan, an R&D Engineer who ordered and setup this scanning equipment for the Tank Surveillance Group. I considered Ron Harlan to be the Rocky Flats "in-house expert" on operation, calibration, and maintenance of this equipment. I called Ron the first time during this week. I talked to Mr. Harlan via phone and in person at least 3 other times after that. It was this interaction with Ron Harlan that I obtained yet more information and verified what I already had.

During the following week of 6/27/88 to 6/30/88 I reported for the first time to my foreman Jim Hawkins that I was not able to calibrate the Ludlum equipment because of the calibration procedure problems. The Ludlum Model 2200-12 Scanners are computerized and partially self-calibrating automatically. I was able to Pulse these and therefore attached a calibration sticker to them and I made the proper annotation in the log book I started for these calibrations. The Ludlum Model 2220's could not be calibrated. As of today this is the only model that is on our Maintenance Monthly P.M.O. list. None of the ten 2220 machines were signed off for the month of June. They all went delinquent.

Jim Hawkins referred me to Ken Higashi. At about this time Ken was on vacation and could not be reached. Jim Hawkins then referred me to Fritz Corressel. Fritz was in charge of all maintenance P.M.O.s for the entire plant. I called to set up a meeting with Fritz to discuss the problems. On Wednesday, 7/13/88 I met with Fritz and his manager Herman Gaines. Herman said "Yes, we have some calibration deficiencies. I will have Ken Higashi get with you and someone from Tank Surveillance to correct the problems."

On Wednesday, 7/13/88 I submitted Employee Suggestion #84823 which I wrote on Tuesday, 7/12/88. The suggestion is entitled "Calibration Traceability of Tank Surveillance Equipment (Criticality) and Production WR Material Bag-out Scanning Equipment." This suggestion documents most of the calibration procedures deficiencies. Jim Hawkins and Tom Grey both evaluated (read, commented, and signed the suggestion) on 8/10/88.

On Tuesday, 7/19/88 I met with Ken Higashi and Ron Harlan in the 771 cafeteria. We looked at the procedure I had written for the Ludlum 2220. We all aggreed that it was functional and I should use it in the interrim until Ken was able to make it an official procedure. The one reservation that Ken had was that maybe it was not quite comprehensive enough. He wanted to call a Ludlum service representative and hopefully get more information from them. Some of the 2220's could not be found for July's calibration. But, the other 2220's that were available were calibrated by me for the month of July and the appropriate PMO sheet signed off by myself even though the calibration had not been bought off officially yet. Not only did Trujillo and Hawkins have knowledge of this; they both exerted considerable pressure since none of the 2220's had been calibrated for the month of June.

I also was corresponding with a Ludlum service representative named Bobby Bentle. Through him and other sources I compiled more data yet for these calibrations. Three or 4 times I sent more material to Jim Gleason to aid in correcting these deficiencies that my suggestion addressed. I began to get uncomfortable with the lack of progress on the procedures becoming official. I asked Jim Gleason what was happening to all of this material. Jim Gleason told me that everything he had received from me including the original suggestion was forwarded to Bob Nelson, the maintenance manager of the entire PSZ side of the plant.

One of the other problems we had with the calibration was that the Ludlum Model 500 Pulser that we used to pulse all the meters on the Ludlum equipment with, was not subject to any routine calibration itself. Therefore, as far as the meters are concerned there does not appear to be any traceability of standard. In an effort to correct this I contacted Jim Meyers in the Standard Labs. Jim was very surprised when I called. The reason being that he had that week (sometime in July) just talked to Ken Frieberg about the problem already.

Once again Trujillo and therefore Hawkins pushed to get as many 2220's as possible calibrated by the end of the month of August. Around this time Ken Higashi was going to be transferred to another area and an official procedure still had not been presented or bought off. I calibrated and signed off the 2220's that I could find. Concerned that I might be at square one once Ken Higashi was moved, I mentioned the situation to Steve Cordova the last week of August. Steve Cordova was the Union Representative on the mini TSA Audit Team.

On Wednesday, 8/31/88 a woman by the name of Nancy wanted me to meet with Bill Thomas who was on the Mini-TSA Audit Team. Steve had given Bill a copy of my Employee Suggestion. Jim Hawkins gave me permission to go. On Thursday, 9/1/88 I met with Bill Thomas and discussed the calibration deficiencies. Bill informed me that inspite of the great lenghts above and beyond my job responsibilities that I had gone to, I would be fired if caught by a TSA Audit Team.

Immediately after the meeting with Bill Thomas I returned to 771 building to report to Hawkins and Grey what had transpired. I also took the stand at that time that regardless of whether they wanted to continue or not I was going to refuse to perform any more calibrations until I received official procedures. At that time I also took the stand that I would not perform the weekly production PMO's by myself anymore. That is, I would demand a second person to fulfill the two-person rule for handling radioactive material (source). Jim Hawkins, Ray Trujillo, and Steve Dewitt in Chemical Operations claim that I dont need a 2nd person when I am working in the production areas where other people are usually always present. Tom Gray tells me not to touch the Ludlums from this point on, on Wednesday, 9/14/88.

Thursday, 9/22/88 Charles Schanarr calls me. He introduces himself, says he would like to meet with me to get my side of the story, and advises me to bring a steward with me. Tom Gray tells me I cannot leave the building to go to the meeting. I call Ted Tegeler, Ted calls Schanarr, Schanarr calls Freiberg, Freiberg calls Grey, Grey calls Gene McCain, McCain calls me and tells me to go to the meeting after all. At the meeting Freiberg calls Schanarr and wants to be included in the meeting. Schanarr tells Freiberg I got your side yesterday you are not welcome to this one. One last note; one of the Tank Surveillance operators asked me previously to move a calibration sticker. Her reason was, "It covers the adjusting pots. The foreman has supplied us all with our own tweekers so that we can adjust the calibration if we have to." After I made it clear to the operator that under no circumstances is anybody but myself to adjust the calibration; I asked Ray Anthony, the new Tank Surveillance Manager, about the comment his operator made? Ray Anthony's reply was, "If anything like that occurred before I nave no knowledge of it. Regardless, I guarantee you that nothing like that will happen from here on out."

[redacted]

[redacted]

DO NOT WRITE IN THIS BLOCK	DATE RECEIVED	SUGGESTION NO.
		84823

SUGGESTER

X) HOURLY [redacted]

☐ MS (LAST NAME) (FIRST NAME) (INITIAL)

BLDG	DEPT. NAME	EMPLOYEE NUMBER	SHIFT
771	Maintenance	[redacted]	Day

JOB TITLE: Electrician Technician

TELE. EXT.	SUPERVISOR'S NAME	TELE. EXT.	DATE
[redacted]	Hawkins, Jim	2607	7/12/88

CO-SUGGESTER

☐ MR N.A.

☐ MS (LAST NAME) (FIRST NAME) (INITIAL)

BLDG	DEPT. NAME	EMPLOYEE NUMBER	SHIFT
N.A.	N.A.	N.A.	N.A.

JOB TITLE: N.A.

TELE. EXT.	SUPERVISOR'S NAME	TELE. EXT	
N.A.	N.A.	N.A.	N.A.

THE TITLE OR SUBJECT OF MY SUGGESTION IS:

CALIBRATION TRACEABILITY OF TANK (CRITICALITY) SURVEILLANCE EQUIPMENT AND PRODUCTION WR MATERIAL BAG-OUT SCANNING EQUIPMENT

SEE REVERSE SIDE BEFORE COMPLETING OR MAILING THIS FORM.

PRESENT METHOD OR PROBLEM:

1. The Ludlum Model 500 Pulser which is used to calibrate the Tank Surveill scanning equipment used in Bldgs. 771, 774, 371, and 374 for WR materi criticality control; is not subject to any routine calibration itself.
2. ~~None of the six (6) Ludlum Model 2200-12 Analyzer RFAM-V Tank Surveilla~~ scanners are scheduled for any routine maintenance PMO calibration.
3. The maintenance PMO procedures as written for the Ludlum 2220 Portable Ratemeter does not work and needs to be completely rewritten.
4. ~~The Ludlum 2300 Digital Portable Gram Estimator used by Production in~~ (3) Three 771 bldg., room 114, is not scheduled for any PMO maintenance calibrati
5. The twelve (12) Ludlum Model 12 Gram Estimators used by production in 771 bldg. are not identified so that specific instrument calibration ~~can be verified when scanning bag-outs.~~

PROPOSED METHOD OR SOLUTION:

1. The Standards Lab initiate and maintain a routine calibration of the Ludlum Model 500 Pulser in the 771 Tech. Shop in room 166A.
2. All Tank Surveillance Scanning Equipment (Ludlum Model 2200-12 Analyzer RFAM-V and Ludlum 2220 Portable Ratemeter) and Production Bag-out Scannin equipment (Ludlum Model 12 Gram Estimators and Ludlum 2300 Digital Portable Gram Estimators) be added to if not already included in a PMO maintenance calibration procedure.
3. New simple, workable maintenance PMO procedures be written up.

REVIEWED FOR CLASSIFICATION

BY _____ DATE _____

I have read the Policy and Rules on the reverse side of this form and my foregoing suggestion is submitted for consideration under the stated terms of the Company and Employee Suggestion Program. I understand and agree that if my suggestion is adopted, Rockwell International Corporation and its subsidiaries and the successors and assignees thereof, shall have the right to make full use of same.

[redacted] 7/12/88 — N.A.

SUGGESTER 3:00 p.m. DATE — CO-SUGGESTER DATE

RF 47031A (4/85) IF SKETCH IS NECESSARY ATTACH ADDITIONAL SHEET

FOLD HERE

ROCKWELL INTERNATIONAL

Production PMO's

Bldg 771/774 Neutron Control / Gram Estimators
Ludlum Model 12 Count Ratemeter
Portable Weekly PMO

PMO #	Ludlum Serial #	Inventory #
194 034	2093	
194 035	3155	771 6052 22783
194 036	3164	771 06045 22783
194 037	3177	771 6053 22783
194 038	3180	
194 039	5594	771 6561 53373
194 040	5598	771 6562 53373
194 041	22708	
194 042	27191	
194 043	27257	
194 044	31454	
194 045	31504	

HDD # To PMO List

Ludlum 2300 Digital Ratemeter
Portable Scaler Production

PMO #	Ludlum Serial #	Inventory #
194 050	PR02 7932	111 4562 21746
194 051	PR02 7933	111 4563 21746
194 052	PR 02 7934	111 4564 21746

TANK SURVEILLANCE PMO'S

BLDG 771/774 LUDLUM 2220 RATEMETER
HAND HELD PORTABLE
03 MONTHLY PMO

Source	PMO #	LUDLUM SERIAL #	INVENTORY #	Aug 88 CALIB.	LOCATION
PU	654-003	21755	771 7846	093252 ✓	TECH SHOP
OY	654-004	26261	771 7847	✓	774
	654-005	26510	771 7848		771
OY	654-006	26270	771 7849		371
PU	654-007	32771	771 8167	✓	371
OY	654-008	32770	771 8169	✓	771
PU	654-009	32782	771 8170		771
PU	654-010	46606	771 8923		771
	654-011	46607	771 8921		771-1074
PU	654-012	46605	771 8922	✓	771
	654-013	50071			

BLDG 771/774 LUDLUM 2200-12 ANALYZER RFAM-V
SELF CALIBRATING ON CARTS
03 MONTHLY PMO'S

PMO #	LUDLUM SERIAL #	INVENTORY #
654-020	31598	
654-021	53373	
654-022	44398	771-8774-73177
654-023	44401	771-8775-73177
654-024	44402	771-8754-73179
654-025	36502	371-4215-30288
654-026	? ON ORDER	

Add to PMO List

PMO Corrections

I. Ludlum Ratemeter 2220's
   A. Entire PMO Procedure Incorrect, needs Rewriting
   B. On Run Sheet
      1. Add "Ludlum" to Short MFR Name
      2. Add "Portable Ratemeter" to Short Noun Description
      3. Add 654013 Serial # 50071 ?
      4. Add "2220" to Short Model Number

II Ludlum 2200-12 Analyzer RFAM-V
   A. Add All to Monthly PMO Procedure (6 Now + 1 more)
   B. On Run Sheet
      1. Add "Ludlum" to MFR Name
      2. Add "2200-12" to Model No.
      3. Add "Analyzer RFAM-V" to Noun Description
   C. Take Ser. # 31596 Inv. # 771 7796 88966
      Out of Service due to intermittent problem not worth fixing, scrap for parts
   D. Write Monthly PMO Procedure

III. Ludlum 12 Portable Production Gram Estimators
   A. Add Serial No. & Inventory No. To PMO List
   B. Add New Ones, Delete # 31499
   C. On Run Sheet
      1. Add "Ludlum" to MFR Name
      2. Add "12" to Model No.
      3. Add. "Bagcut Gram Estimator" to Description
      4. Add All Serial No's
      5. Add All Inventory No's

IV Ludlum 2300
   "Ludlum" "2300" "Digital Gram Estimator"
   Add 3 To PMO List & Monthly & Weekly PMO Procedure

2300

PRELIM. ① SET HV = 500 VOLTS
② SET THRESHOLD @ 100
③ SET WINDOW @ 1000

ADJUST. ⓐ PUSH "ENT"
ⓑ PUSH - "STD" (WHATEVER GRAM VALUE ~~EQUIV.~~ OF SOURCE)
ⓒ PUSH - "ENT" (BACKGROUND "0" SHOULD APPEAR)
ⓓ PUSH "COUNT"
(a BACKGROUND IS TAKEN & LOG 0 APPEARS)
ⓔ PLACE ~~STA~~ SOURCE UNDER HORN & PRESS "COUNT"
(1) "LOG = SAVE X" WILL APPEAR
(2) PRESS ENTER
(3) GRAM READING WILL APPEAR
REPEAT FOR CONSISTENCY
ⓕ ADJUST THRESHOLD & ~~HV~~ WINDOW FOR FINE TUNE & HV FOR COARSE.

MODEL 2300 RATEMETER

1. PLACE 15' AWAY BEFORE SAME ~~BKG~~ COUNT RETURNS
   0 MG
2. 5GR SOURCE READS - 5.12G.
3. -331- 50GR READS 5.78G
4. -RESET STANDARD TO 50 G SOURCE -
5. - STANDARD READS 49-51 GRAM
6. - 5G Pu II - 400074 READS - 44.5G. CA
7. - FIND PROCEDURE FOR CAN COUNT 400074 SOURCE -
   A. SOURCE, AS METAL READS 4 GRAMS
   B. " , " 331 " 3 "
8. 43G/331 PKG READS ↓

43GRAM/331 READS - 62.8 → 64.7 — OVERFLOW ON 1-MIN ~~RATE~~

A. WITH 50GR STAN // STD CONVERSION RATIO IS 66 GPMG
   ALSO SHOWS 999K, OVERFLOW ON 1. MIN
B. RESET CONVERSION TO 5G SOURCE = 593 CTS/MG
   CTR - 297074 / 5GS.
   SIDEWALLS - 3.84G / 227835
   228059

5/1 - CHECK TO SEE IF THERE IS -100 G FF SOURCE
   - COMPARE W/ 50G & PKG
~~X~~ SET 5G SOURCE @ CORRECT FUL FLO DISTANCE

LUDLUM SCANNING EQUIPMENT 2220 CALIBRATION PROCEDURES

PROBLEM #3 PROPOSED SOLUTION

I. REQUIREMENTS FOR CALIBRATION & RECALIBRATION

A. REGULARLY SCHEDULED ONCE A MONTH CALIBRATION

B. RECALIBRATION REQUIRED IMMEDIATELY IF ANY OF THE FOLLOWING OCURR.

1. ANY TIME DETECTORS ARE INTERCHANGED
2. ANY TIME DETECTORS ARE REPAIRED (CRYSTALS ARE INTERCHANGED)
3. ANYTIME DETECTOR IS DROPPED
4. WHEN A CABLE IS REPAIRED OR REPLACED
5. ANYTIME THERE IS EVIDENCE OF TAMPERING WITH THE CALIBRATION STICKER.

II. CALIBRATION INSTRUMENT SET-UP

A. SET THE TIMER TO 1 MINUTE

B. SET THE RANGE TO LOG

C. SET THE WINDOW IN/OUT SWITCH TO IN

D. ADJUST THE WINDOW TRIMPOT TO 999

E. ADJUST THE THRESHOLD TO A RANGE OF 95 TO 115 (IF NECESSARY ADJUST HIGH VOLTAGE FIRST)

III. CALIBRATION

FEB. 15, 1989

FINDINGS OF A PARTIAL WALKTHROUGH BY [redacted] IN BLDG.S 771, 371, & 374 ON FEB 15, 1989. THE PURPOSE WAS TO VERIFY COMPLIANCE OF ACTION ITEMS MANDATED BY; (1) U.O.R. RFP # 88-9-771 ; DUE TO BE COMPLETED BY G.L. POTTER BY 2/15/89.

(2) SAFETY CONCERN 88.138; DUE TO BE COMPLETED BY GENE CRUSAN by 1/15/89.

(3) GRAM ESTIMATOR ACTION PLAN INITIATED BY GENE CRUSAN; DUE TO BE COMPLETED BY JAN. 31, 1989.

I. THESE LUDLUM MODEL 2200-12 TANK SURVEILLANCE WET SCANNERS WERE FOUND IN 374 WITHOUT EITHER ANY CALIBRATION TAGS WHATSOEVER; MUTILATED, UNREADABLE CALIBRATION TAGS ; OR CALIBRATION TAGS WITH PAST DUE DATES.

SERIAL NO.	PROBLEM
53373	MUTILATED STICKER DATED 9/26/88
31602	NO CALIBRATION STICKER
44402	NO CALIBRATION STICKER
42370	CALIBRATED 9/2/88 DUE 9/30/88

II. These Ludlum Model 12 Gram Estimators were Niether Calibrated / Performance Tested, Nor Removed From The Production Area.

Serial No.	Bldg No.	Location	Problem
3180	771	Rm 147 Wall	No Cal. Sticker
3156	771	Rm 114 Col. T9	No Cal. Sticker
2093	771	Rm 114 Col T9	No Cal. Sticker
* 5594	771	Rm 114 Col. T9	Cal. 11/23/88 Due 2/23/89 Contaminated 30,000 c/m Direct
21676	371	Hallway By Rm 3163	No Cal. Sticker
21732	371	Rm 2412 Labs	No Cal. Sticker

III These Ludlum Model 2220 Tank Surveillance Wet Scanners Had Expired Calibration Tags

Serial No.	Location	Problem
26610	771 Mtce Tech Shop	? Cal. 11/7/88 Due 5/1/88
32769	771 Mtce Tech Shop	? Cal 10/26/88 Due 4/26/88

IV Not Any of The Ludlum Gram Estimators Have Tamper Seals on the Calibration Trim Pots.

V None of the 3 Ludlum Model 2300 Digital, Programable Gram Estimators Are Available For Use; In Spite of Criticality Infraction 88-26 that occured on Oct. 14, 1988 which was caused by not having any 2300's Available then

VI The frequency of calibration was changed from monthly to every 3 months. Why? Can an independent, qualified expert substaniate that this was not done soley to benefit H.S.E with their lack of manpower problem.

VII All of the 371 Ludlum Model 12 Gram Estimators are located in a main hallway in the cold area.

(A) This is total inefficient for production and will greatly encourage cheating or complete disregard for Gram Estimators in the Bag-Out Procedure.

(B) There is no control to prevent unauthorized personnel from handling this equipment, especially since no tamper seals are being used.

[redacted]

UOR 88-9-771--88-4

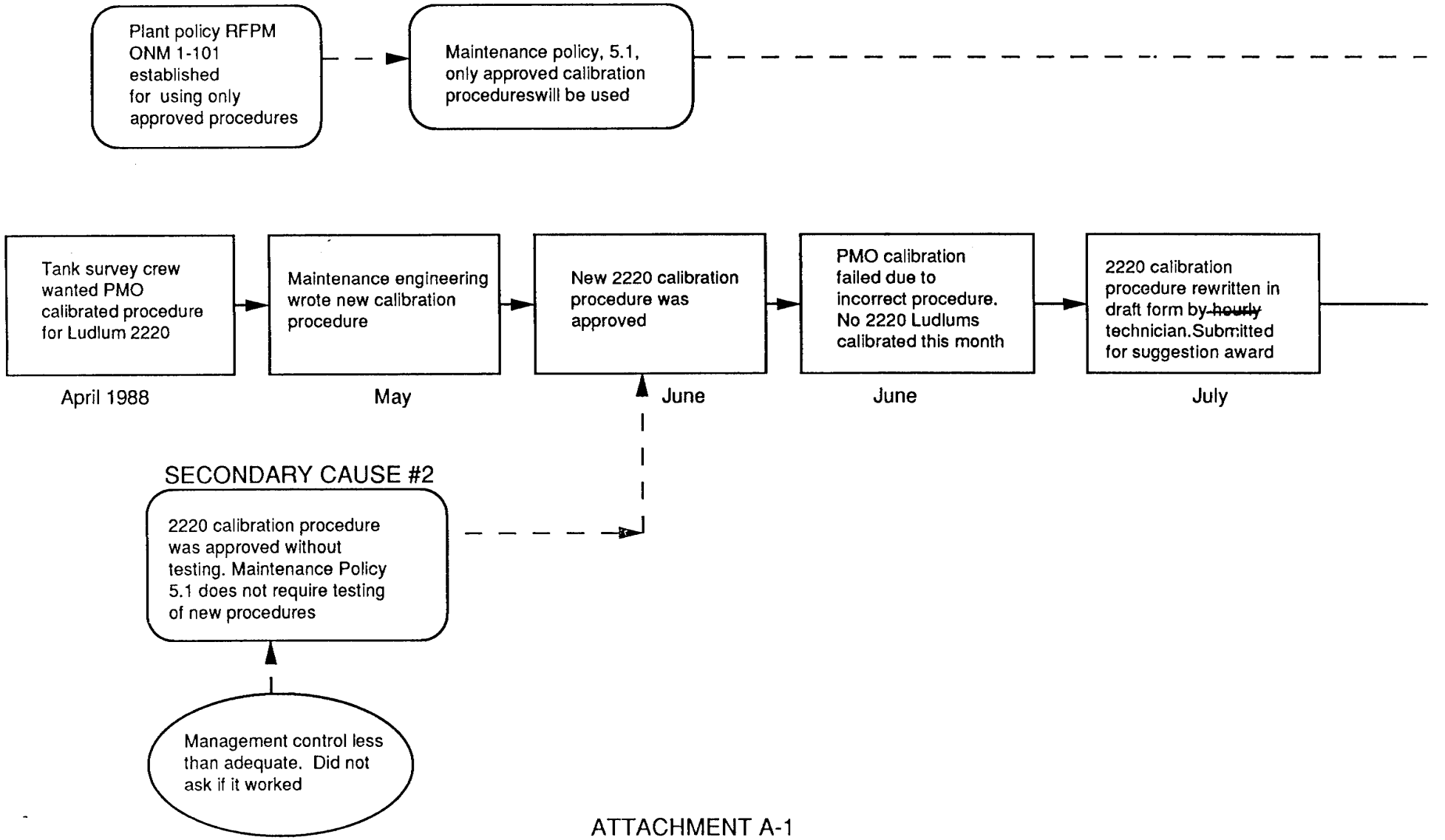
INSUFFICIENT PROCEDURE FOR CALIBRATION

SAFETY REVIEW GROUP

BRIEFING MEETING

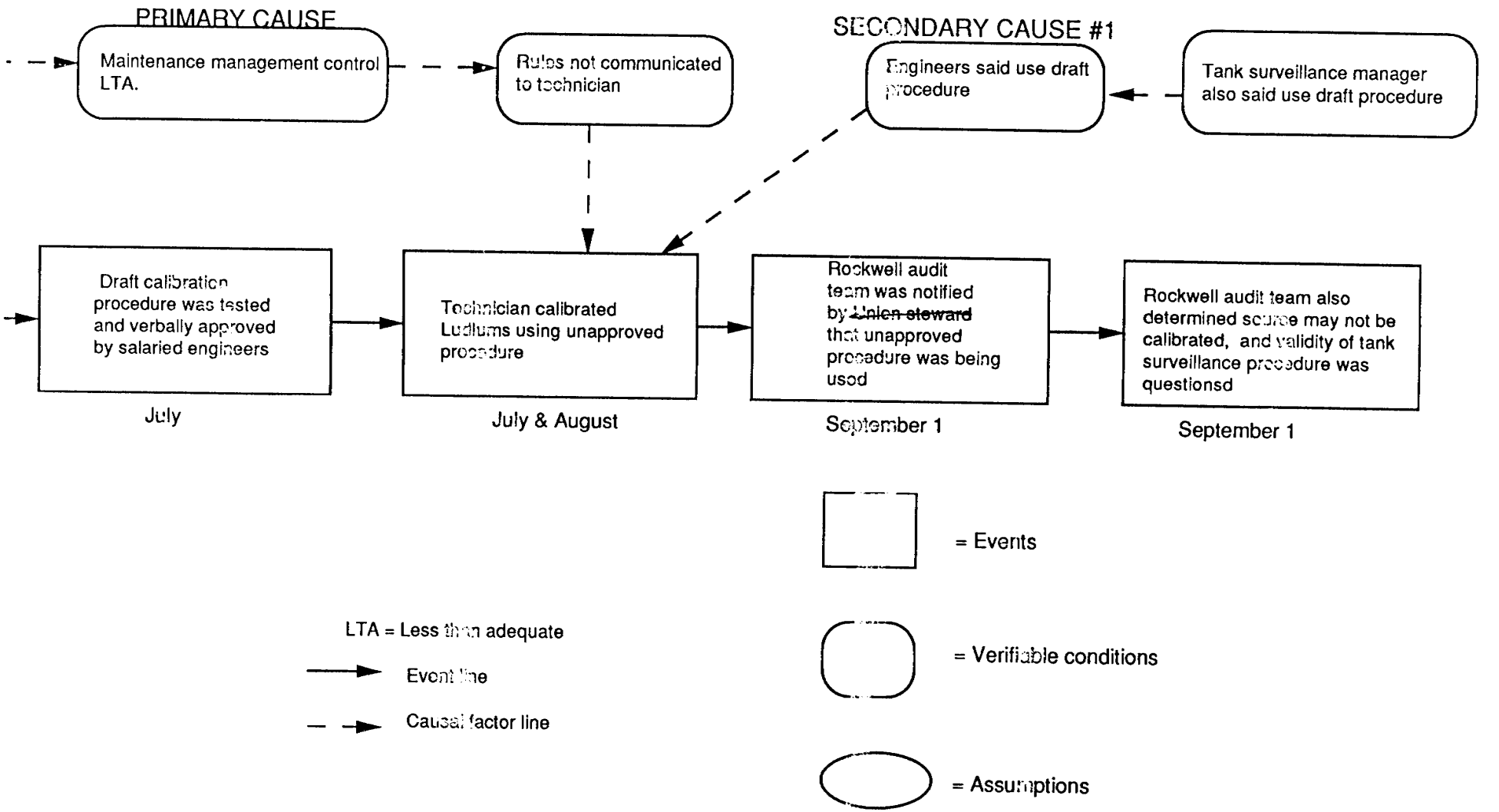
DECEMBER 7, 1988

UOR 88-9-771 88-4 EVENTS AND CAUSAL FACTORS DIAGRAM - INITIAL REPORT



ATTACHMENT A-1

INITIAL REPORT



ATTACHMENT A-2

ATTACHMENT B

K. J. FREIBERG

EVENTS, CAUSE AND CORRECTIVE ACTION CORRELATION CHART

EVENT	CAUSE	CORRECTIVE ACTION
LUDLUM 2220 CALIBRATION PROCEDURE WOULD NOT WORK AS WRITTEN	LUDLUM 2220 CALIBRATION PROCEDURE WAS APPROVED WITHOUT TEST VERIFICATION	ADD STATEMENT TO MAINTENANCE POLICY 5.0 REQUIRING CERTIFICATION TESTING OF PMO PROCEDURES BEFORE MANAGEMENT APPROVAL
LUDLUM 2220'S WERE CALIBRATED USING UNAPPROVED PROCEDURES	MAINTENANCE POLICY REQUIRING MAINTENANCE TO USE ONLY APPROVED PMO CALIBRATION PROCEDURES WAS NOT ADEQUATELY COMMUNICATED TO MAINTENANCE PERSONNEL	LETTER WAS ISSUED TO ALL MAINTENANCE PERSONNEL REEMPHASIZING ADHERENCE TO RULES AND PROCEDURES A TRAINING CLASS WILL BE HELD FOR ALL MAINTENANCE SUPERVISION REINFORCING THE REQUIREMENT THAT ALL POLICIES MUST BE FOLLOWED INCLUDING USING ONLY APPROVED PMO PROCEDURES

UOR 88-9-771--88-4

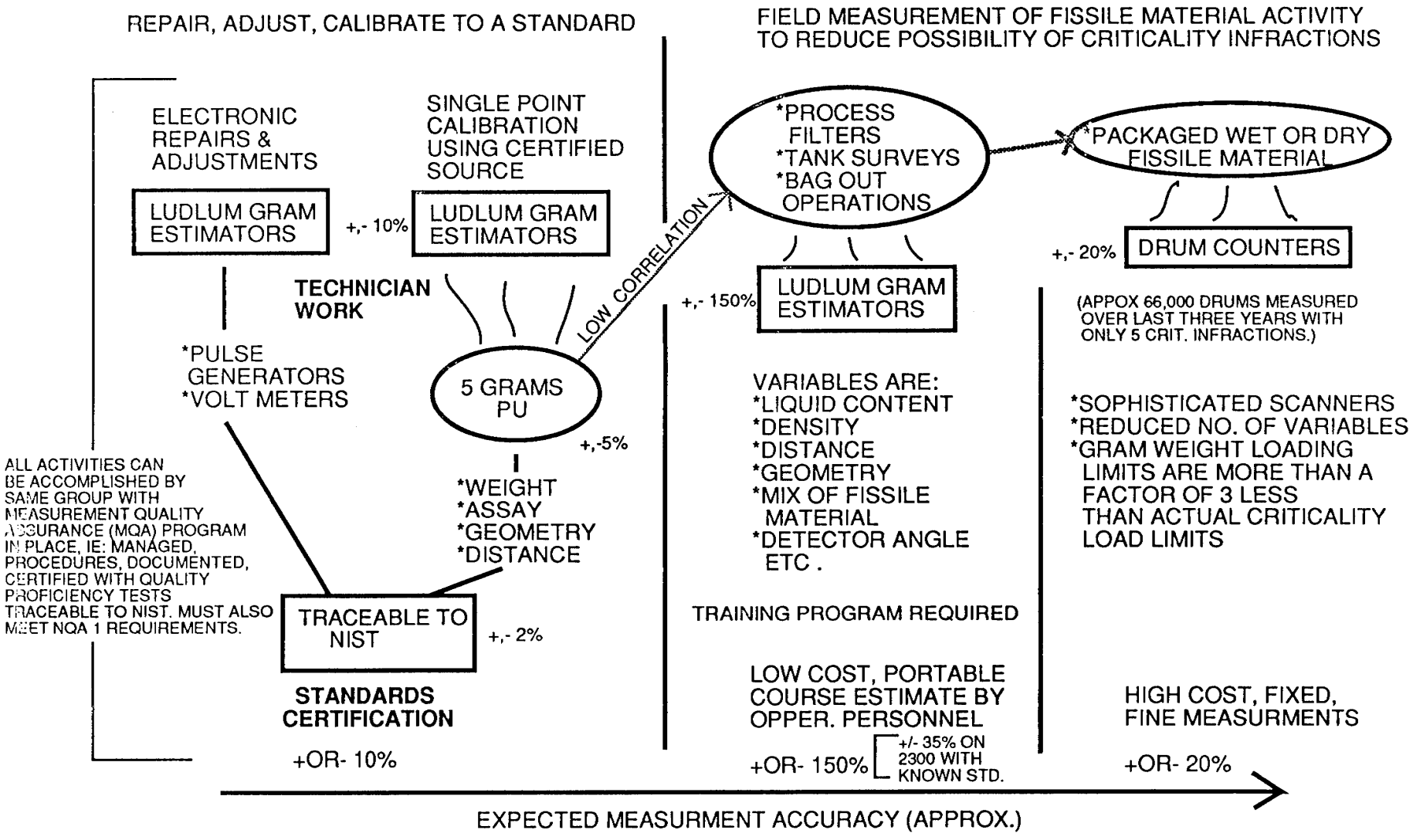
ATTACHMENT E

KNOWN GRAM ESTIMATOR APPLICATIONS

TYPE	APPLICATION	TOTAL NUMBER IN USE
LUDLUM MODEL 12	DRY BAGOUT OPERATIONS	UNKNOWN 250 WHERE?
LUDLUM MODEL 2220	TANK SURVEYS	UNKNOWN
LUDLUM MODEL 2300	WET FILTER BAGOUT	UNKNOWN

UOR RFP #88-9-771 INSUFFICIENT PROCEDURE FOR CALIBRATION
ATTACHMENT 'C'

GRAM ESTIMATORS ROLE IN THE RF CRITICALITY CONTROL PROGRAM



11-30-88

UOR 88-9-771--88-6

INVESTIGATION SUMMARY

* GRAM ESTIMATORS PLAY AN IMPORTANT ROLE IN RF CRITICALITY CONTROL PROGRAMS.

* GRAM ESTIMATORS CAN BE CALIBRATED TO A SINGLE POINT FISSILE SOURCE.

* THE ROLE, PROPER USE, AND LIMITATION OF GRAM ESTIMATORS IS SOMETIMES MISUNDERSTOOD.

* ROCKY FLATS PLANT NEEDS TO DETERMINE HOW MANY GRAM ESTIMATES ARE IN USE AND ARE THEY CORRECT FOR THE APPLICATION.

UOR 88-9-771--88-4

ATTACHMENT D

G. L. POTTER

EVENTS, CAUSE AND CORRECTIVE ACTION CORRELATION CHART

EVENT	CAUSE	CORRECTIVE ACTION
ROCKWELL AUDITORS QUESTIONED ADEQUACY OF CALIBRATION PROGRAM FOR A LUDLUM GRAM ESTIMATOR	NO GROUP HAS SOLE RESPONSIBILITY FOR CALIBRATION OF ALL LUDLUM GRAM ESTIMATORS ON PLANT SITE	DETERMINE HOW MANY AND WHAT MODEL LUDLUMS ARE USED FOR GRAM ESTIMATING ON PLANT SITE
SRG INVESTIGATIONS FURTHER DETERMINED THAT THERE IS NO ACCURATE INVENTORY OF LUDLUMS IN USE AND THEIR CALIBRATION STATUS		DEVELOP A MEASUREMENT QUALITY ASSURANCE [MQA] PROGRAM FOR ALL IDENTIFIED LUDLUM GRAM ESTIMATORS

GKelly will look into trading. Inst. Coord - Inst.

UCR 88-9-771--88-4

ATTACHMENT D [CONTINUED]

D. J. McGUIRE

EVENTS, CAUSE AND CORRECTIVE ACTION CORRELATION CHART

EVENT	CAUSE	CORRECTIVE ACTION
IIR 88-127, 771-33 DRUM EXCEDED 500 GRAMS RESULTING IN A CRITICALITY INFRACTION	LUDLUM MODEL 2300 WAS NOT AVAILABLE FOR FILTER BAG-OUTS AND A MODEL 12 WAS USED INSTEAD	DETERIME WHICH LUDLUM GRAM ESTIMATOR IS TECHNICALLY BEST FOR EACH GRAM MEASUREMENTS OPERATION

UOR 88-9-771--88-4

ATTACHMENT D [CONTINUED]

D. J. McGUIRE

EVENTS, CAUSE AND CORRECTIVE ACTION CORRELATION CHART

EVENT	CAUSE	CORRECTIVE ACTION
IIR 88-127, 771-33 DRUM EXCEDED 500 GRAMS RESULTING IN A CRITICALITY INFRACTION	LUDLUM MODEL 2300 WAS NOT AVAILABLE FOR FILTER BAG-OUTS AND A MODEL 12 WAS USED INSTEAD	DETERIME WHICH LUDLUM GRAM ESTIMATOR IS TECHNICALLY BEST FOR EACH GRAM MEASUREMENTS OPERATION

CORRES CONTROL
OUTGOING LTR NO

88 RF 3076

DIST	LTR	ENCL
SANCHINI, D J		
BADER, C P		
CAMPBELL, G W		
HOOD, R C		
KINZER, J E		
KIRBY, W A		
McNETT, J F		
MEYERS, G W		
ROECKER, J H		
SHANNON, W M		
SMITH, R E		
WEIDNER, C W		
WESTON, W F		
WOZNIAK, B D		
YOUNG, E R		
BETCHER, D H		
CARNIVAL, G J		
HARMAN, L K		
HEBERT, J L		
HOEY, J B		
HOFFMAN, R B		
KLAMANN, R L		
KRIEG, D M		
LIM, B W		
LOUDENBURG, G E		
NAIMON, E R		
NEWBY, R L		
TURNER, H L		
VELASQUEZ, R N		
CORRES CONTROL	x	x
cc ATTACHED LIST	X	X

CLASSIFICATION
UNCLASSIFIED X X
CONFIDENTIAL
SECRET

AUTH CLASSIFIER SIG
R. E. Kohler
10-11-88
DATE

IN REPLY TO LTR NO

EC #

RB APPROVALS
HICKEY MFH
RICHARDELLA

INITIALS

Rocky Flats Plant
Aerospace Operations
Rockwell International Corporation
P.O. Box 464
Golden, Colorado 80402-0464
(303) 966-7000
Contractor to U.S. Department of Energy

Rockwell International

October 14, 1988

88-RF-3076

Albert E. Whiteman
Area Manager
DOE, RFAO

Attn: R. D. Reed - Environment, Safety and Health

INITIAL UNUSUAL OCCURRENCE REPORT (UOR), #RFP 88-9--771 88-4: INSUFFICIENT PROCEDURES FOR CALIBRATION OF INSTRUMENT

Enclosed is the Initial Report for the subject UOR. This report was prepared in accordance with DOE Order 5000.3, "Unusual Occurrence Reporting System."

R. J. Erfurdt

R. J. Erfurdt, Director
Health, Safety & Environment

Orig. and 3 cc - A. E. Whiteman

Enc.

cc:
T. A. Lachman - DOE, RFAO

Initial UOR #88-9--771 88-4 88-RF-3076

Distribution

D. J. Sanchini
C. P. Bader
L. R. Bailey
S. Cordova
R. J. Erfurdt
K. J. Freiberg
R. E. Richardella
W. R. Richardson
C. E. Schnarr

UOR - RFP #88-9--771 88-4

INSUFFICIENT PROCEDURE FOR CALIBRATION

PREPARED UNDER DIRECTION

OF

SAFETY REVIEW GROUP

ORIGINATORS: L. R. Bailey

C. E. Schnarr

APPROVED BY: M. F. Hickey

COPY #

ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT

1. UOR - RFP 88-9--771 88-4

INSUFFICIENT PROCEDURE FOR CALIBRATION

2. STATUS & DATE:

INITIAL OCT 14 1988

3. DIVISION OR PROJECT:

DP-Rockwell International, AERO, Rocky Flats Plant
Support Operations (Plant Support, Maintenance Department)
Preventative Maintenance Operations.

4. FACILITY, SYSTEM, OR EQUIPMENT:

RI - Building 771 Maintenance
Preventive Maintenance Operations (PMO) Calibration Program
for Ludlum 2220 Counting Instruments

5. DATE OF OCCURRENCE:

September 1, 1988

6. TIME OF OCCURRENCE:

1100 Hours

7. SUBJECT OF OCCURRENCE:

The Calibration Procedure being used by maintenance for Ludlum model 2220 instruments was not approved. The certification and traceability of the source used was in question.

"REVIEWED FOR CLASSIFICATION"
By W. F. Barker

Date 10-11-88

8. APPARENT CAUSE: DESIGN____ MATERIAL____ PERSONNEL P

PROCEDURE S OTHER___

9. DESCRIPTION OF OCCURRENCE:

Ludlum 2220 gamma counting instruments are used to determine through surveys the amount of radioactive residue build-up in process tanks.

These instruments were placed on a periodic calibration PMO in April of 1988 at the request of the Tank Surveillance Organization, Tank Gamma Scan group. Maintenance wrote a calibration procedure and obtained the necessary approvals, however the procedure was placed in use in June without certification testing.

The Electrician Technician who worked with this procedure in late June found it would not work and formulated a workable calibration procedure based on Tank Survey Procedure 1075. This procedure was reviewed by Maintenance Engineers and the Analytical Nuclear Engineers and placed into interim use in July pending approval.

A Rockwell Technical Safety Appraisal (Mini-TSA) auditor noticed on September 1, that an unapproved procedure was in use to calibrate tank survey instruments, the certification of the source was unclear and also questioned the methodology used in determining tank survey results. These concerns were reported during mini-TSA appraisal and were included as a finding in the appraisal.

(Refer also to Attachment A - "Events and Causal Factors Chart")

10. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:

Calibration of Tank Surveillance instruments with a draft procedure.

11. IMMEDIATE EVALUATION:

Maintenance did not enforce the compliance to the requirement for use of an approved calibration procedure. The personnel directly involved did not understand the importance of following established and approved procedures.

The maintenance system for approval of calibration procedures is lacking in that there is no mandatory requirement for proving that a new calibration procedure has been tested.

The first procedure had not been tested prior to the approval and implementation. The technician found the deficiencies during the field work and wrote a new procedure for the calibration. This unapproved procedure was placed into service and was used.

The use of this instrument's capability and intended use were not fully understood or known by various organizations. Some believe the readings to be a precise measure of residue build up in process tanks. Others believe it to be a rough indicator of the quantity of material in a process tank.

The source used to calibrate Ludlum 2220 is certified by the Standard Lab.

Employees were not exposed to unsafe conditions and tracking of nuclear materials was not compromised.

12. IMMEDIATE ACTION TAKEN AND RESULTS:

Maintenance Management all work involving calibration of Tank Surveillance instrumentation in building 771 was stopped. The calibration procedure written by the Electrician Technician was approved within one week.

13. IS FURTHER EVALUATION REQUIRED:

YES X
NO ___

BEFORE FURTHER OPERATION: YES _____ NO X

BY: UOR Committee

WHAT:
Further investigate to determine more about this incident's possible affect on tank survey procedures and if necessary, develop additional corrective actions. Additional information needed and will be requested from:

1. T. R. Kawamoto, Standards Laboratory, by October 20, 1988.

   A position letter to L. R. Bailey (SRG), stating how the Ludlum 2220 sources are certified and explain the variables involved with acquiring reliable process tank residue gram levels using the Ludlum 2220 instrument.

2. J. D. McCarthy, Nuclear & Industrial Safety, by October 20, 1988.

   A position letter to L. R. Bailey (SRG), stating how the gram level data derived from tank surveys is used to monitor material accumulation.

3. D. J. McGuire, Process Instrument & Control, by October 20, 1988.

   A position letter to L. R. Bailey (SRG), stating the scientific basis for deriving tank residue gram levels using the Ludlum 2220 instrument.

14. FINAL EVALUATION AND LESSONS LEARNED:

To be supplied in final report.

15. CORRECTIVE ACTION:

ACTIONS TAKEN:

1. Maintenance put a tested and approved Ludlum 2220 calibration procedure in place September 6, 1988.

2. A letter was issued by Maintenance Management to all maintenance personnel reemphasizing adherance to PMO calibration procedures on September 15, 1988.

(Refer also to Attachment B Cause/Corrective Action Chart)

RECOMMENDATION:

1. To: K. J. Freiberg
Plant Support
Signature Date

When: October 15, 1988

What: Hold a training class for all maintenance supervision in reference following established and approved procedures.

2. To: K. J. Freiberg
Plant Support
Signature Date

When: October 20, 1988

What: Add statement to Maintenance Policy 5.1 requiring certification testing of PMO procedures before management approval.

16. PROGRAMMATIC IMPACT:

Tank surveys in building 771 were not affected.

Actions taken by management during investigation required significant manpower resources.

17. IMPACT CODES AND STANDARDS:

It is reported by the Standards Lab that there is no standard for radioactive sources traceable to the National Bureau Standards.

18. SIMILAR REPORT NUMBERS:

No other similar Rocky Flats UOR's were found. Searching for other similar DOE UOR's is not currently possible because there is no automated UOR database within the DOE complex.

19. SIGNATURES:

Chairperson — 10-11-88 Date
L. R. Bailey
Safety Review Group

Cognizant Supervisor — 10/11/88 Date
K. J. Freiberg, Manager
Plant Support

C. P. Bader, Director — 10/12/88 Date
Support Operations

Committee Members:

C. E. Schnarr — 10-11-88 Date
Safety Review Group

S. Cordova — 10-14-88 Date
Union Safety Representative

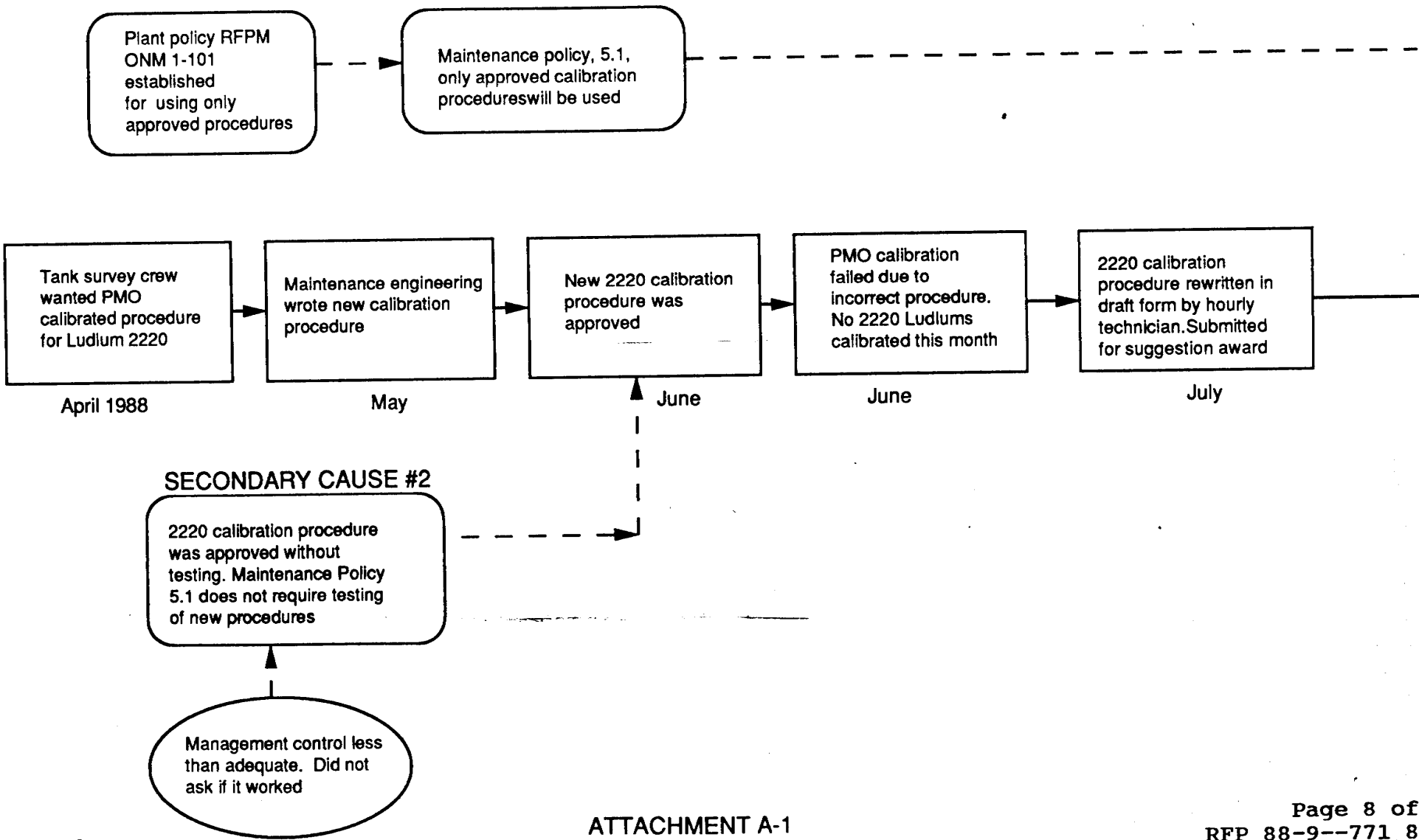
Reviewer:

D. O. Kissel — 10-11-88 Date
Safety Review Group

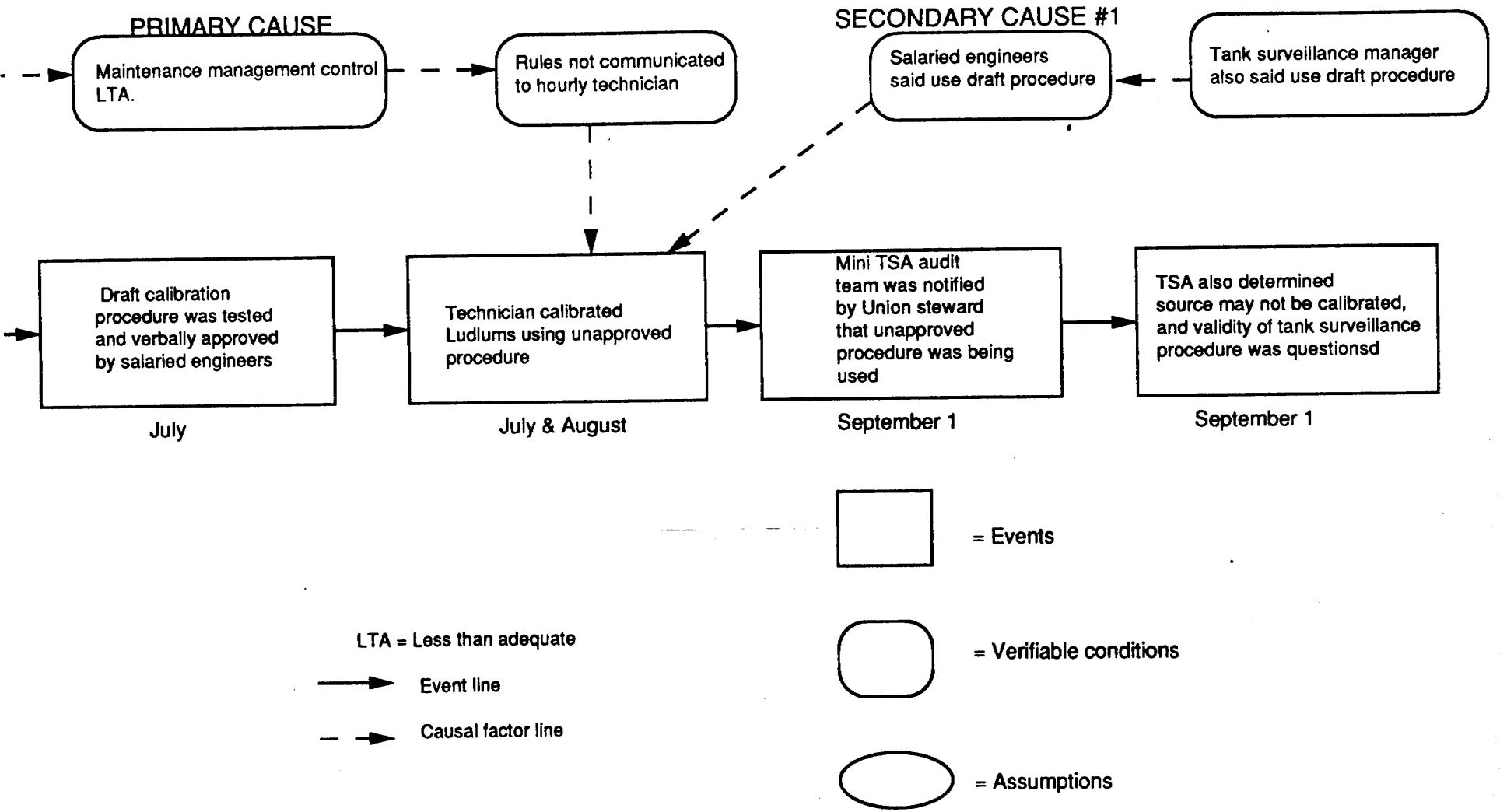
Approved:

M. F. Hickey, Manager — 10/11/88 Date
Safety Review Group

UOR 88-9-771 88-4 EVENTS AND CAUSAL FACTORS DIAGRAM - INITIAL REPORT



ATTACHMENT A-1


PRIMARY CAUSE
Maintenance management control LTA.
Rules not communicated to hourly technician
SECONDARY CAUSE #1
Salaried engineers said use draft procedure
Tank surveillance manager also said use draft procedure
Draft calibration procedure was tested and verbally approved by salaried engineers
July
Technician calibrated Ludlums using unapproved procedure
July & August
Mini TSA audit team was notified by Union steward that unapproved procedure was being used
September 1
TSA also determined source may not be calibrated, and validity of tank surveillance procedure was questionsd
September 1
= Events
= Verifiable conditions
= Assumptions
LTA = Less than adequate
Event line
Causal factor line

ATTACHMENT B

INITIAL REPORT

CAUSAL FACTORS AND CORRECTIVE ACTION CORRELATION CHART

CAUSAL FACTORS	CORRECTIVE ACTION
Ludlum 2220 calibration procedure was approved without test verification.	Add statement to Maintenance Policy 5.0 requiring certification testing of PMO procedures before management approval.
Maintenance policy requiring maintenance to use only approved PMO calibration procedures was not adequately communicated to maintenance personnel.	Letter was issued to all maintenance personnel re-emphasizing adherance to rules and procedures. A training class will be held for all maintenance supervision reinforcing the requirement that all policies must be followed including using only approved PMO procedures.