

MCDONNELL DOUGLAS

CORPORATION

05081
03 JAN 1973

USAEC-256-009

United States Atomic Energy Commission
Washington, D. C. 20545

Attn: Isotopes Branch
Division of Materials Licensing

Subj: Marking Cs-137 Tagged Bucking Bars

Encl.: (1) MCAIR Memo No. 112C-730, dated 7 December 1972

Gentlemen:

Bucking bars used in the manufacture of aircraft at McDonnell Douglas Corporation, St. Louis, are "tagged" by means of Cs-137. This material, which is either sealed into or attached onto selected bars, provides one of several techniques for inspecting aircraft prior to delivery to the customer. Should a bucking bar inadvertently be left inside a structural member, its presence can be detected by simply surveying the structure with a sensitive scintillation counter during the final inspection operation.

Memo No. 112C-730, Enclosure (1), points out that, because of the large numbers of tagged bars now in use at McDonnell (nearly 35,000), compliance with those sections of our byproduct material license, which pertain specifically to bucking bars, has become so burdensome that the original advantage of the technique is seriously degraded. Experience gained over the past fifteen years shows that relaxation of those requirements pertaining to numerical identification and to tagging of bucking bars can be accomplished with no diminution in safety nor any lessening of accountability.

Present regulations require that: 1) each bar containing radioactive material be numbered serially and that a permanent record be kept of each tool, and, 2) that each tagged item display a decal, in magenta and yellow, bearing the legend:

"Contains Radioactive Material"
License No. 24-2261-3

It is these two requirements from which we seek relief.

Presently, each class of bucking bar is designated by a type number. Let us suppose that 50 type xxx bars are tagged with radioactive material. These are then issued to various workers, and, at some later date, are recalled. After recall, we may find that several, say three, bars are missing.


COPIES
SENT TO

9702270241 970106
PDR FOIA
NEITZEL 96-314 PDR

Regardless of which numbering system is used, the fact would remain that three bars were unrecoverable and neither a serial number nor a type number would contribute to their recovery.

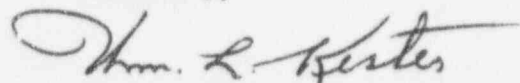
The second requirement, that of maintaining legible decals on steel bars that are subjected to harsh service such as bucking rivets is particularly time consuming. As pointed out in Enclosure (1), fifty percent of all discrepancies found during spot inspections are due to illegible radiation stickers.

In view of the above and pursuant to paragraph 30.11 of 10 CFR 30, "Specific Exemptions", we request that:

1. we be allowed to discontinue the use of serial numbers as a means of identifying bucking bars, and be permitted to use type numbers instead. Accountability would be accomplished by records showing the number of tagged bars:
 - 1.1) in stock (unissued in stock room),
 - 1.2) in use,
 - 1.3) awaiting repair, or
 - 1.4) awaiting disposal by prescribed procedures
 - a) damaged bars, or
 - b) style no longer in use,
2. the requirement for decals be modified to the extent that they be replaced by the stamped symbol  to be placed on each bar. If need be, the legend "Contains Radioactive Material" could also be stamped onto the bar; however, we would prefer to leave this off. Rather, personnel would be alerted by means of permanent notices on each of the employee bulletin boards located in areas where tagged bars are in use. This approach would serve as a permanent advisory to personnel, one that would be more meaningful and certainly more durable than the present marginally durable decals.

Should you wish further clarification of any of the above points, please do not hesitate to contact me.

Sincerely,



Wm. L. Kester, Chairman
Isotope Committee
(314) 232-5477

WLK:je

33360

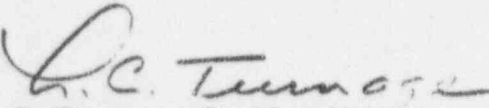
TC: W. L. Kester
CC: L. A. Brucker, T. Froeschner, A. F. Hartwig, J. H. Schulz, L. F. Vogler
SUBJECT: Radioactive Bucking Bars


1. The accountability and control of radioactive bucking bars in the manufacturing division is a growing problem under existing procedures.

1.1 Recent Quality Audits have shown that over 50% of the discrepancies found, were missing or illegible "Contains Radioactivity" decals. The total quantity of radioactive bucking bars has now reached 33,778. With this quantity of bars involved, it is clearly impractical to continue the decal method. An ideal situation would be to eliminate the identification, but as an alternate, we propose steel stamping each bar with the radioactivity symbol in one or more locations. The steel stamp would be permanent and for this reason should appeal more to the AEC in meeting the intent of their labeling requirements. In addition to steel stamping the symbol, the words "Contains Radioactivity" could also be steel stamped if the symbol alone is not considered sufficient.

1.2 Each bucking bar loaded with radioactive capsules since the beginning of the program is identified with a serial number. This serial number serves no useful purpose in our division's operations. The Tool Inspection log lists the tool identification of the bars, serial number, quantity of capsules placed in each bar and the date. The serial number would only be useful if it were necessary to find a specific bar and this has never been required. The tool number on each bar identifying the type would be sufficient for manufacturing division records of accountability. Therefore, we propose that the requirement for individual serial numbers be eliminated. The records of the quantity of radioactive capsules procured in conjunction with the record of capsules used by Tooling Inspection to load bars, less the quantity of capsules contained in scrapped bucking bars should be sufficient accountability. This would be no less accurate than the present method.

2. Please initiate the necessary action to request a waiver from the AEC to permit MCAIR to operate in the proposed manner outlined above.


L. C. Turnage, Section Manager
Equipment and Process Engineering
Dept. 112C, Bldg. 01, Sta. 24379

 canon/vh

33360

A. TYPE OF ACTION -

☐ NEW LICENSE☒ AMENDMENT TO
RENEW LICENSE☐ AMENDMENT
TO TERMINATE☐ VOID☐ CHANGE LICENSEE
NAME/ADDRESS☐ NEW LICENSE AND
NEW LICENSEE☐ OTHER AMENDMENT☐ CLERICAL CHANGE
NO AMENDMENT

B. INDICATIVE INFORMATION:

DOCKET NUMBER

030-05081

MAIL CONTROL NO.

38575

DATE REQUEST REC'D

06/20/73

INSTITUTION CODE

02261

PENDING PROG. CODE

ACTUAL PROG. CODE

03003690

SECONDARY PROGRAM CODES AS REQUIRED:

#1

#2

#3

#4

#5

NAME (LAST, FIRST, MIDDLE)

NAME (LAST, FIRST, MIDDLE)

NAME (LAST, FIRST, MIDDLE)

NAME (LAST, FIRST, MIDDLE)

NAME (LAST, FIRST, MIDDLE)

NAME (LAST, FIRST, MIDDLE)

ORGANIZATION NAME (ALPHABETIC SEQUENCE)

McDonnell Douglas Corporation

DEPARTMENT OR BUREAU

TYPE OF ORGANIZATION

U. S. GOVERNMENT AGENCY

EDUCATIONAL INSTITUTION

MEDICAL INSTITUTION

☒ INDUST

OTHER

BUILDING, STREET

P. O. Box 516

CITY

St. Louis

STATE

MO

ZIP CODE

63166

C. STATISTICAL INFORMATION:

LICENSE NUMBER

24-02261-03

DATE LICENSE ISSUED
OR ACTION COMPLETED

07-31-73

EXPIRATION DATE

7-31-78

USAGE OF MEDICAL BYPRODUCT:

☐ FOR HUMAN USE ONLY☐ FOR HUMAN AND NONHUMAN USE☐ FOR NONHUMAN USE ONLY

POSSESSION OF THE MATERIAL IS AUTHORIZED IN ONE OF THE FOLLOWING AREAS:

☒ SAME AS 'STATE'
IN ADDRESS☐ ALL STATES☐ ALL AGREEMENT STATES☐ ALL NON-AGREEMENT STATES

AND/OR IN THE STATE(S), TERRITORY(S), COUNTRY CHECKED BELOW:

ALABAMA -AL	GEORGIA -GA	MARYLAND -MD	NEW JERSEY -NJ	SOUTH CAROLINA -SC	WYOMING -WY
ALASKA -AK	HAWAII -HI	MASSACHUSETTS -MA	NEW MEXICO -NM	SOUTH DAKOTA -SD	
ARIZONA -AZ	IDAHO -ID	MICHIGAN -MI	NEW YORK -NY	TENNESSEE -TN	AMERICAN SAMOA -AS
ARKANSAS -AR	ILLINOIS -IL	MINNESOTA -MN	NORTH CAROLINA -NC	TEXAS -TX	CANAL ZONE -CZ
CALIFORNIA -CA	INDIANA -IN	MISSISSIPPI -MS	NORTH DAKOTA -ND	UTAH -UT	GUAM -GU
COLORADO -CO	IOWA -IA	MISSOURI -MO	OHIO -OH	VERMONT -VT	PUERTO RICO -PR
CONNECTICUT -CT	KANSAS -KS	MONTANA -MT	OKLAHOMA -OK	VIRGINIA -VA	VIRGIN ISLANDS -VI
DELAWARE -DE	KENTUCKY -KY	NEBRASKA -NB	OREGON -OR	WASHINGTON -WA	
WASHINGTON DC -DC	LOUISIANA -LA	NEVADA -NV	PENNSYLVANIA -PA	WEST VIRGINIA -WV	CANADA -CH
FLORIDA -FL	MAINE -ME	NEW HAMPSHIRE -NH	RHODE ISLAND -RI	WISCONSIN -WI	

D. POSSESSION LIMITS OF SOURCE AND SPECIAL NUCLEAR MATERIALS AND TRITIUM

TYPE OF MATERIAL	AMOUNT AUTHORIZED	UNIT OF MEASUREMENT			SEALED/UNSEALED CONFIGURATION	MAXIMUM ENRICHMENT
U235		<input type="checkbox"/> GRAMS	<input type="checkbox"/> KILOGRAMS		<input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED	
U233		<input type="checkbox"/> GRAMS	<input type="checkbox"/> KILOGRAMS		<input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED	'X' HERE IF FOR POWER REACTOR
PU		<input type="checkbox"/> GRAMS	<input type="checkbox"/> KILOGRAMS		<input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED	
URANIUM		<input type="checkbox"/> GRAMS	<input type="checkbox"/> KILOGRAMS		<input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED	
THORIUM		<input type="checkbox"/> GRAMS	<input type="checkbox"/> KILOGRAMS		<input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED	
TRITIUM		<input type="checkbox"/> MICRO-CURIES	<input type="checkbox"/> MILLI-CURIES	<input type="checkbox"/> CURIES		RIS CODE

E. FEE CATEGORIES:

EX	1A	1B	1C	2A	2B	3A	3B	3C	3D	3E
4A	5A									

A/420

MATERIALS DATA INPUT

REFERENCE COPY



DOCKET NUMBER 92-0001	MAIL CONTROL NO. 30575	DATE REQUEST REC'D 06/12/73	PROGRAM CODE (PRIMARY) 0360
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SECONDARY PROGRAM CODES:				
#1	#2	#3	#4	#5

FAC-CODE- 1-UNCLASS- 2-CLASS- 3-SECRET- 4-NO- 5-OTHER	NAME	NAME
	NAME	NAME
	NAME	NAME

ORGANIZATION NAME Douglas Corporation	TYPE OF ORGANIZATION	
DEPARTMENT OR BUREAU	U. S. GOVERNMENT AGENCY	EDUCATIONAL INSTITUTION
	MEDICAL INSTITUTION	INDUST
		OTHER

BUILDING, STREET P. O. Box 5436	CITY St. Louis	STATE MO	ZIP CODE 63166
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BYPRODUCT	CHEMICAL OR PHYSICAL FORM	POSSESSION LIMIT
1	<i>extend 7-31-78</i>	
4	<i>change 12 to remove D.L. Holt and N.A. Lamb, Add W.R. Burns</i>	
2	<i>delete 6H, 7H, 8H, 6J, 7J, 8J, 6K, 7K, 8K</i>	
3	<i>change 8AB from 200milthum to 300milthum all</i>	
5	<i>add 17 D Letter dated June 15, 1973</i>	

MAIL TO: <i>Kester</i>	DATE MAILED	REVIEWER <i>Rmch</i>	DATE COMPLETED <i>[Signature]</i>
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DOCKET NUMBER 033-01301		MAIL CONTROL NO. 33360	DATE REQUEST REC'D 01/06/73	PROGRAM CODE (PRIMARY)
SECONDARY PROGRAM CODES:				
#1	#2	#3	#4	#5
NAME		NAME		
NAME		NAME		
NAME		NAME		
ORGANIZATION NAME Boeing Corporation		NAME		
DEPARTMENT OR BUREAU				
BUILDING, STREET P. O. Box 312		TYPE OF ORGANIZATION		
ADDRESS		<input type="checkbox"/> U. S. GOVERNMENT AGENCY <input type="checkbox"/> MEDICAL INSTITUTION <input checked="" type="checkbox"/> EDUCATIONAL INSTITUTION <input type="checkbox"/> INDUSTRY <input type="checkbox"/> OTHER		
BYPRODUCT	CITY St. Louis	STATE MO	ZIP CODE 63166	
CHEMICAL OR PHYSICAL FORM		POSSESSION LIMIT		
<i>17c Letter January 3, 1973</i>				

MAIL TO:

Ketter

DATE MAILED

REVIEWER

EGR

DATE COMPLETED
1/16/73

LICENSE CONTROL FORM

18. APPLICANT McDonnell Douglas Corporation			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		06. AADT. 23		09. TASK NO. 22109		12. CONTROL NO. 22109	
21. STREET OR BUILDING P. O. Box 516			63. ASG TO REB		42. PURPOSE OF TASK IN FIELD 09* Amendment							
24. CITY OR POST OFFICE Saint Louis		27. STATE MO	30. ZIP 63166		33. DATE RECD YEAR MO DAY 71 05 07		36. DATE ISSUED YEAR MO DAY 71 05 18		39. EXPIRATION DATE YEAR MO DAY 73 7 71			
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER () APPLICATION DATED:					YEAR 71		MO. 5		DAY 7			

BYPRODUCT		CHEMICAL OR PHYSICAL FORM		POSS. LIMIT	
		<p>8M</p> <p><i>Not to exceed 125 milliwatts per component nor 12.5 curies total</i></p>			

MAIL TO: <i>Kester</i>	DATE MAILED: MAY 14 1971	REVIEWER: <i>R 511</i>	DATE COMPLETED: 5/13/71
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LICENSE CONTROL FORM

18. APPLICANT McDonnell Douglas Corporation			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		06. AMDT. 22		09. TASK NO. 21793		12. CONTROL NO. 21793	
21. STREET OR BUILDING P. O. Box 516			63. ASG TO REB		42. PURPOSE OF TASK IN FIELD 09* Amendment							
24. CITY OR POST OFFICE St. Louis		27. STATE MO		30. ZIP 63166		33. DATE REC'D YEAR MO DAY 71 04 19		36. DATE ISSUED YEAR MO DAY 71 04 27		39. EXPIRATION DATE YEAR MO DAY 73 7 31		
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER () APPLICATION DATED: 71 4 13										YEAR MO DAY		
BYPRODUCT <i>5. n.d. M. Hydrogen 3</i>			CHEMICAL OR PHYSICAL FORM <i>M. Hydrogen 3 M. luminous compass (GFE)</i>						POSS. LIMIT <i>M. Not beyond 100 microns for compass not 100 microns GFE</i>			
M. Storage and shipment.												
MAIL TO: <i>H. Estel</i>						DATE MAILED: APR 27 1971		REVIEWER: <i>RAB</i>		DATE COMPLETED: 4/26/71		

LICENSE CONTROL FORM

18. APPLICANT McLennan Douglas Corporation			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		04. AMDT. 21		09. TASK NO. 19840		12. CONTROL NO. 19840				
21. STREET OR BUILDING P. O. Box 516			03. ASG REB TO		42. PURPOSE OF TASK IN FIELD 09 Amendment										
24. CITY OR POST OFFICE St. Louis			27. STATE MO		30. ZIP 63166		33. DATE REC'D YEAR MO DAY 71 01 25			36. DATE ISSUED YEAR MO DAY 71 02 02			39. EXPIRATION DATE YEAR MO DAY 73 7 31		
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER (X) APPLICATION DATED: 71 1 21															
BYPRODUCT L. Californium 252			CHEMICAL OR PHYSICAL FORM L. Deposited source								POSS. LIMIT L. 0.1 MC				
<p>L. To be used in a sealed ionization chamber for purposes of calibration.</p>															
MAIL TO: Dr. William L Kester					DATE MAILED: FEB 02 1971		REVIEWER: hayfield			DATE COMPLETED: 1/27/71					

LICENSE CONTROL FORM

18. APPLICANT McDonnell Douglas Corporation			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		06. AMDT. 20		09. TASK NO. 19376		12. CONTROL NO. 19376	
21. STREET OR BUILDING P. O. Box 516			63. ASG TO XREB		42. PURPOSE OF TASK IN FIELD 09* Amendment							
24. CITY OR POST OFFICE St. Louis		27. STATE MO		30. ZIP 63166		33. DATE REC'D YEAR MO DAY 71 01 04		36. DATE ISSUED YEAR MO DAY 71 01 12		39. EXPIRATION DATE YEAR MO DAY 73 7 31		
57. FORM OF THE COMMUNICATION FROM APPLICANT						() LETTER (X) APPLICATION DATED:			YEAR MO DAY 70 12 22		45	
BYPRODUCT A. Any by product material between At. Nos. 3 and to 89, inclusive.		CHEMICAL OR PHYSICAL FORM								POSS. LIMIT		
MAIL TO: William L. Kester				DATE MAILED: JAN 16 1971		REVIEWER: Hayfield		DATE COMPLETED: 11/6/70				

LICENSE CONTROL FORM

18. APPLICANT McDonnell Douglas Corp.			01. PROG. CODE 614	03. LICENSE NO. 24-02261-03	06. AMDT. 20	09. TASK NO. 18512	12. CONTROL NO. 18512
21. STREET OR BUILDING P. O. Box 516			63. ASG TO REB	42. PURPOSE OF TASK IN FIELD 09* Amendment			
24. CITY OR POST OFFICE St. Louis	27. STATE MO	30. ZIP 63166	33. DATE REC'D YEAR MO DAY 70 11 04		36. DATE ISSUED YEAR MO DAY		39. EXPIRATION DATE YEAR MO DAY

57. FORM OF THE COMMUNICATION
FROM APPLICANT

() LETTER () APPLICATION DATED:

YEAR MO DAY

BYPRODUCT	CHEMICAL OR PHYSICAL FORM	POSS. LIMIT
<p><i>Void</i></p> <p><i>Superseded</i></p> <p><i>by</i></p> <p><i>19840</i></p> <p><i>[Signature]</i></p> <p><i>1/27/71</i></p>		

MAIL TO:	DATE MAILED:	REVIEWER:	DATE COMPLETED:
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LICENSE CONTROL FORM

18. APPLICANT <i>McDonnell Douglas Corporation</i> <i>McDonnell Company</i>			01. PROG. CODE 614	03. LICENSE NO. 24-02261-03	06. AMDT. 19	09. TASK NO. 05561	12. CONTROL NO. 05561
21. STREET OR BUILDING P.O. Box 516			04. ASG TO RRB	42. PURPOSE OF TASK IN FIELD "9" Amendment			
24. CITY OR POST OFFICE St. Louis	27. STATE MO	30. ZIP 63166	33. DATE REC'D YEAR MO DAY 68 09 25		36. DATE ISSUED YEAR MO DAY 68 10 01		39. EXPIRATION DATE YEAR MO DAY 72 7 31
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER () APPLICATION DATED: 68 9 20							

BYPRODUCT <i>Wadst.</i>	CHEMICAL OR PHYSICAL FORM <i>K Promethium 147 K sealed luminous source K 20 curies to 600 K. Testing of Apollo docking target</i>	POSS. LIMIT
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Items 1 and 2 to end

*McDonnell Douglas Corporation
P.O. Box 516*

St. Louis, Missouri 63166

MAIL TO: <i>Kaiser</i>	DATE MAILED: OCT 2 1968	REVIEWER: <i>[Signature]</i>	DATE COMPLETED: 10/1/68
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LICENSE CONTROL FORM

July revised

18. APPLICANT McDonnell Company			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		06. AMDT. 18		09. TASK NO. 03295		12. CONTROL NO. 03295				
21. STREET OR BUILDING P.O. Box 516			03. ASG TO REB		42. PURPOSE OF TASK IN FIELD 09* Amendment										
24. CITY OR POST OFFICE St. Louis		27. STATE MO		30. ZIP 63166		33. DATE REC'D YEAR MO DAY 68 06 13		36. DATE ISSUED YEAR MO DAY 68 07 01		39. EXPIRATION DATE YEAR MO DAY 73 7 31					
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER () APPLICATION DATED:										YEAR 68		MO. 6		DAY 10	

BYPRODUCT	CHEMICAL OR PHYSICAL FORM	POSS. LIMIT
<i>Any byproduct material between atomic No 3 and 83, inclusive</i>	<i>NO MAT activity</i>	<i>July 31, 1973</i>
<i>Americium 241</i>	<i>A any</i>	<i>A. Not to exceed 25 milliwatts per radioisotope</i>
<i>Americium 241</i>	<i>B irradiated parts and components</i>	<i>B 1 curie total</i>
<i>Chalc 60</i>	<i>C any</i>	<i>C 1 milliwatt</i>
<i>Cesium 137</i>	<i>D parts</i>	<i>D 20 milliwatts</i>
	<i>E sealed sources</i>	<i>E 200 milliwatts</i>
	<i>F sealed sources</i>	<i>F 250 milliwatts, not to exceed 8 microwatts per source</i>

<i>Hydrogen 3</i>	<i>G sealed sources for detector cells</i>	<i>G not to exceed 200 milliwatts per cell</i>
<i>Strontium 90</i>	<i>H parts for detector cells</i>	<i>H not to exceed 20 milliwatts per cell</i>
<i>Naibet 63</i>	<i>I parts for detector cells</i>	<i>I not to exceed 2 milliwatts per cell</i>
<i>Promethium 147</i>	<i>J sealed sources</i>	<i>J 3 sources not to exceed 1 curie per source</i>

A, B & C: R- and O- as defined in 10 CFR 20

D: Testing and calibration of carbon dioxide sensors

E: Instrument calibration

F: Tagging tracking bars and seat ejection safety pins for detection of the manufacturer

G, H, I: Gas chromatography units for sample analysis

MAIL TO: Kester	DATE MAILED: 2 1968	REVIEWER: RJB	DATE COMPLETED: 7/1/68
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Self-luminous markers

014 100-100000-100000 100-100000-100000

100-100000-100000

100-100000-100000

100-100000-100000

100-100000-100000

100-100000-100000

100-100000-100000

14

5

7 [6 names on renewal application]

11 include AC & AB, Roger III, the Queen

X Copy 15, Amendment 124

21 22

16 app October 6, 1958, ~~and~~ March 21, 1961, and related documents and amendments as follows:

A. "Safe Practice Procedure" submitted May 22, 1959.

B. Letter May 13, 1959.

and February 8, 1968

LICENSE CONTROL FORM

Amend.

18. APPLICANT McDonnell Company			01. PROG. CODE 614		03. LICENSE NO. 24-02261-03		06. AMDT. 17		09. TASK NO. 01974		12. CONTROL NO. 01974				
21. STREET OR BUILDING P.O. Box 516			03. ASG TO REB		42. PURPOSE OF TASK IN FIELD 09* Amendment										
24. CITY OR POST OFFICE St. Louis		27. STATE MO		30. ZIP 63166		33. DATE REC'D YEAR MO DAY 68 04 25			36. DATE ISSUED YEAR MO DAY 68 03 22			39. EXPIRATION DATE YEAR MO DAY 76 07 31			
57. FORM OF THE COMMUNICATION FROM APPLICANT () LETTER (X) APPLICATION DATED:										YEAR 68		MO. 04		DAY 19	
BYPRODUCT P. Pm 147			CHEMICAL OR PHYSICAL FORM P. Sealed source (3M model IE2J)								POSS. LIMIT P. 3 sources, not to exceed 1 curie per source				
9P. To be used as self-luminous markers															
MAIL TO: <i>Hester</i>				DATE MAILED: MAY 28 1968				REVIEWER: <i>Ryd</i>				DATE COMPLETED: 5/8/68			

U. S. ATOMIC ENERGY COMMISSION

Cover the: *****

MC-7048
(11-66)

LICENSE CONTROL FORM

amend.

18. APPLICANT McDonnell Company			01. PROG. CODE 614	03. LICENSE NO. 24-02261-03	06. AMDT. 16	09. TASK NO. 00306	12. CONTROL NO. 00306
21. STREET OR BUILDING P.O. Box 316			03. ASG TO REB	42. PURPOSE OF TASK IN FIELD 09* Amendment			
24. CITY OR POST OFFICE St. Louis	27. STATE MO	30. ZIP 63166	33. DATE REC'D YEAR MO DAY 68 02 09		36. DATE ISSUED YEAR MO DAY 68 03 04		39. EXPIRATION DATE YEAR MO DAY 7 8 1
57. FORM OF THE COMMUNICATION FROM APPLICANT			() LETTER () APPLICATION DATED:		YEAR 68	MO. 3	DAY 8

BYPRODUCT <i>as follows</i> <i>Items 6 J, 7 J, 8 J and 9 J to read</i> <i>Item 1 changed to read "McDonnell Company"</i> <i>J Census 137</i>	CHEMICAL OR PHYSICAL FORM <i>NO MAT</i> <i>J sealed sources (cotton; nuclear</i> <i>concentrations or Mallinckrodt)</i>	POSS. LIMIT <i>J. 250 milligrams,</i> <i>no single source to exceed</i> <i>8 micrograms</i>
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5. Tagging tools and ejection seat safety pins used in aircraft manufacture

MAIL TO: <i>Keser</i>	DATE MAILED: MAR 15 1968	REVIEWER: <i>nm</i>	DATE COMPLETED: 3/4/68
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LICENSE CONTROL FORM

APPLICANT McDonnell Company P. O. Box 516 St. Louis, Missouri 63166	LICENSE NUMBER 24-02261-03	Amnd. No. 15	EXPIRATION DATE July 31, 1968	CONTROL NUMBER 93609
DATE REC'D 04/13/67		DATE ISSUED APR 19 1967	PMUS 614	ASG REB 93609
() LETTER () APPLICATION DATED: _____				
BYPRODUCT <i>no follow</i> <i>Item 8J is increased to and</i> <i>8 J. 150 milliwatts, no single source to</i> <i>exceed 4 microcuries</i> <i>to add</i> <i>N Hydrogen 3.</i> <i>6 Nickel 63</i>	CHEMICAL OR PHYSICAL FORM <i>N foil in F&M model 2-3837</i> <i>detector cells</i> <i>8 seal source in F&M model 2-6195</i> <i>detector cells</i>			POSS. LIMIT <i>N Not to exceed</i> <i>200 milliwatts per cell</i> <i>8 Not to exceed</i> <i>2 milliwatts per cell</i>
<i>740: To be used with F&M Scientific Co. (Newlett-Packard)</i> <i>gas chromatography and equipment for sample</i> <i>analysis</i>				
MAIL TO: <i>Kate</i>	DATE MAILED: APR 19 1967		REVIEWER: <i>REB</i>	DATE COMPLETED: 4/19/67

No MAT LICENSE CONTROL FORM

APPLICANT McDonnell Aircraft Corporation St. Louis, Missouri 63166	LICENSE NUMBER 24-02261-03	Amnd. No. 14	EXPIRATION DATE July 68	CONTROL NUMBER 90980
	DATE REC'D 12/12/66	DATE ISSUED DEC 22 1966	PMUS 614	

() LETTER () APPLICATION DATED: _____

BYPRODUCT	CHEMICAL OR PHYSICAL FORM	POSS. LIMIT

In accordance with letter December 4, 1966, and Item 15 of License 24-2261-1 is amended as follows:

15. Notwithstanding and in lieu of the requirements of Section 20.203(f), 10CFR20, the licensee is authorized to label or stamp tagged bucking bars and tagged seat ejection pins with an uncolored Tandet radiation symbol and the legend "Contains Radioactive Material, REC License 24-2261-3."

MAIL TO: <i>Keller</i>	DATE MAILED: DEC 22 1966	REVIEWER: <i>RJM</i>	DATE COMPLETED: 12/22/66
----------------------------------	------------------------------------	--------------------------------	------------------------------------

Interv- app March 23/1966

LICENSE CONTROL FORM

4 app need (2) *[Signature]*

Applicant McDonnell Aircraft Corp. St. Louis, Missouri 63166	License No. 24-02261-03	Amend No. 13	Expiration Date July 31, 1968	Control No. 76018
	Date Received 03/28/66	Date Issued APR 8 1966	PMUS 614	ASG REB 76018

() Letter (X) Application Dated: March 23, 1966

BYPRODUCT	CHEMICAL OR PHYSICAL FORM	POSS. LIMIT
Any byproduct material with Atomic Nos 3 to 89, inclusive	A any	A Not to exceed 25 microcuries per radionuclide
B. Americium 241	D any	B. 10 microcuries
C. Americium 241	C sealed source	C.
D E M	<i>[Note: R was amended?]</i> <i>[Signature]</i>	

A, B, C, D - R + D as defined

E
↓
M } *[Signature]* *[Note: from license]*

11 *[Signature]*, *[Signature]* = E

12 *[Signature]* [part 31 becomes part 34, with new title]

13 A. (7) [from amend 12, added R.F. Raising + N.K. Flammery]

B. The only person authorized to read radiograph under this license

F.C. McCallister: "Radiographer" is defined in Paragraph 34.2(b), 10 CFR 34

Mail To: <i>Kester</i>	Date Mailed: APR 8 1966	Reviewer: <i>REB</i>	Date Completed: 4/8/66
---------------------------	----------------------------	-------------------------	---------------------------

14 (10) include A2 + A3, Region III

15 [copy condition 17]

16 [copy condition 18]

17 [copy condition 20]

18 [copy condition 19, including A through E]

LICENSE CONTROL FORM

Applicant McDonnell Aircraft Corp. St. Louis, Missouri 63166	License No. 24-02261-03	Amend No.	Expiration Date	Control No. 76018
	Date Received 03/28/66	Date Issued	PMOS 614	ASG REB 76018

() Letter () Application Dated: _____

<u>BYPRODUCT</u>	<u>CHEMICAL OR PHYSICAL FORM</u>	<u>POSS. LIMIT</u>

--	--	--	--

Mail To:	Date Mailed:	Reviewer:	Date Completed:
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JUL 1 1965		REFERENCE NO.	LICENSE NO.	AMENDMENT NO.
CONTROL NO.		FORM		POSSESSION LIMIT
A. Tadel:	A.			A.
B. X Hydrogen 3	B. X. Foil in Jewell-doh Model			B. X. Not to exceed 100 million per cell
C. Y Strontium 90	C. 28-750 or 28-751 detector cells			C. Y. Not to exceed 20 million per cell
D.	D. Y. Foil in Jewell-doh Model			D.
E.	E. 28-752 or 28-755 detector cells			E.
F.	F. X and Y. To be used with Jewell-doh C.			F.
G.	G. gas chromatography units for			G.
H.	H. sample analyzers.			H.

AUTHORIZED USE

I am of app June 25, 1965, License No 24-2261-3 as amended as follows.

To amend Condition 13A and add Condition 20 To read

13 A [Tadel N.A. Lambt]

20

(22)

DATE TO:

DATE MAILED

REVIEWER

DATE

JUL 2 1965

DATE RECEIVED	EXPIRATION DATE	ISSUE DATE	WEL REVIEWER
CONTROL NO. C4401	REFERENCE NO.	LICENSE NO. 24-2261-3	AMENDMENT NO. 11
ISOTOPE	FORM	POSSESSION LIMIT	
A.	A.	A.	
B. <i>Amend R</i>	B.	B.	
C.	C.	C.	
D. <i>See 241</i>	D. <i>foil manufactured by Radiation Research Corp. and contained in</i>	D. 20 mc; not	
E.	E. <i>Sim Research Corp. carbon dioxide</i>	E. 6 spaced / mc	
F.	F. <i>detector</i>	F. per detector.	
G.	G.	G.	
H.	H.	H.	

AUTHORIZED USE

C. same as present.

ALL 2519 E App. L. Due 9, 1964 and Letter d. Jan 5, 1965 from
W.L. Kasten.

MAIL TO:	DATE MAILED	WEL REVIEWER	1-11-65 DATE
U.L. Kasten	JAN 1, 1965	RM	1/11/65

DATE RECEIVED 1964	EXPIRATION DATE July 31, 1966	ISSUE DATE	REVIEWER BHC
CONTROL NO. 01070	REFERENCE NO.	LICENSE NO. 24-2261-3	AMENDMENT NO. 10 - Entry
ISOTOPE	FORM	POSSESSION LIMIT	
1. Thallium 204	A. Any	A. 20 mc	
2. Cs ¹³⁷	B. "	B.	
3. Co ⁶⁰	C.	C.	
4. S ³⁵	D.	D.	
5. Fe ⁵⁹	E.	E.	
6. Eu ⁶⁴	F.	F.	
7. Co ⁴⁵	G.	G.	
8. Zn ⁶⁵	H.	H. (over)	

AUTHORIZED USE

- N Instrument calibration; studies of radiation damage mechanisms, crystal lattice diffusion, solid state physics
- Surface damage studies.
- Radiation damage studies.

REMARKS: Letters, Phone Calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

Byrd mat. Insured as Subst. Q may also be used at Wallops Island, Virginia.

R " " " " R " " " Cape Kennedy, Florida

and Part 21, "Radiation Safety Requirements for Radiographic Operations".

A. William L. Kester, T.C. Link, F.C. McCallister, Jr., H.E. Winn, C.Z. Wolf or Joseph F. Froehneright

B. Byrd mat. Insured as Subst. Q may also. C.S. Sitter or R.G. Plummer.

C The only person authorized to act as radiographer under this license is F.C. McCallister. "Radiographer" is defined in Section 21.2 (a), 10 CFR 21.

Byrd End 17, Amend No. 3

A. (1)-(2) (omit D)

MAILED TO: W.L. Kester	DATE MAILED JUL 21 1964	REVIEWER BHC RCH	DATE 7/15/64 7/20/64
---------------------------	----------------------------	------------------------	----------------------------

Notwithstanding, and in ~~place~~ ^{view} of, the requirements of Sections 20.203(b)(1) and 20.203(b)(4), 10 CFR 20, bucking bars and spot ejection safety pins referenced in Item 9V shall be labeled with an uncolored standard radiation symbol and the legend "Contains Radioactive Material, AEC License No. 24-2261-3".

Byrd End 20, Amend No. 3

Byrd End 19, Amend No. 3

J. Gallium 72	Any	20 mc	
J. Arsenic 76	Any	20 mc	
K. Silver 111	Any	20 mc	
L. Cadmium 115	Any	20 mc	
M. Au ¹⁹⁸	Any	20 mc	
N. Am ²⁴¹	Plated sources (NUMEC)	5 sources of 10 <u>mc</u> each	
O. Promethium 147	Any	20 mc	
P. Any Sytt mat. between Atomic No. 30-82, inclusive	Irradiated metal and crystal samples	1 curie total	
Q. H ³	Sealed sources Tritium foil (Radiation Research Corp. Model TT-1)	400 mc	
R. H ³	Tritium foil (Radiation Research Corp. Model TT-1) contained in Lion Research Corp. carbon dioxide detector	240 curies; not to exceed 6 curies per detector unit	
S. In ¹⁹²	Sealed sources (Lathrop Specialties Co. Model Type 20)	5 sources not to exceed 2 curies each	
T. Co ⁶⁰	Sealed sources (Nuclear-Chicago Corp. Model RR-60)	2 sources not to exceed 1 curie each	
U. Co ⁶⁰	Sealed sources	200 mc	
V. Cs ¹³⁷	Sealed sources (Nuclear Consultants, Inc., custom sources)	100 mc; no single source to exceed 4 <u>mc</u>	
W. K ⁴⁰	Sealed sources (U.S. Radium Corp. Model LAB 484-1A)	8 sources of 150 mc each and 16 sources of 20 mc each	

- G. Ionization sources in DRC Equipment Corp. Model 0714 pressure gauge.
 R. Testing & calibration of detector units.
 S & T "Open-air" handling technique for industrial radiography.
 U. Instrument calibration.
 V. ~~Radioactive~~ Tagging of bucking bars and seat ejection safety pins for detection after manufacture.
 W. use in aircraft in-flight refueling equipment.

DATE RECEIVED	EXPIRATION DATE	ISSUE DATE	REVIEWER
30			Bue
CONTROL NO.	REFERENCE NO.	LICENSE NO.	AMENDMENT NO.
59581		24-2261-3	9
ISOTOPE	FORM	POSSESSION LIMIT	
A.	A.	A.	
B.	B.	B.	
C.	C.	C.	
D.	D.	D.	
E. ¹⁴⁷ Z. Pm	E. Any	E. Z. zone	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

AUTHORIZED USE

Z. Surface damage studies

REMARKS: letters, Phone calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

Card 14, Card 16 7

add Joseph F. Fraechtenigt

MAIL TO:	DATE MAILED	REVIEWER	DATE
L. L. Kuster	MAY 26 1964	to be R. G.	5/26/64 5/21/64

DATE RECEIVED FEB 3 1964	EXPIRATION DATE	ISSUE DATE	REVIEWER RSD
CONTROL NO. 57127	REFERENCE NO.	LICENSE NO. 24-2261-3(664)	AMENDMENT NO. 8
ISOTOPE	FORM	POSSESSION LIMIT	
A.	A.	A.	
B.	B.	B.	
C.	C.	C.	
D.	D.	D.	
E.	E.	E.	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

AUTHORIZED USE

In accordance with application dated January 28, 1964
 Substitution License No. 24-2261-3 is amended to read
 Section 23 as follows:

REMARKS: Letters, Phone Calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

23. Byproduct material described in Subsection 74 of this license
 may also be used at Cape Kennedy, Florida.

MAIL TO: Kester	DATE MAILED MAR 17 1964	REVIEWER RSD	DATE 3/17/64
--------------------	----------------------------	-----------------	-----------------

Excluded from...

per application dated Sept. 4, 1963

Date Received SEP 9 1963	Expiration Date July 31, 1964	Issue Date	Tech. Reviewer FED
Control No. 53848	Reference No.	License No. 24-2261-3	Amendment No. 7
Isotope	Form	Possession Limit	
To add:	A.	A.	
W. Strontium 90	B.	B.	
X. Strontium 90	W Strontium Foil (U.S. Radiation Corp. Model LAB 369)	C. W 20 mc	
Y. Hydrogen 3	DX Strontium Foil (U.S. Radiation Corp. Model LAB 369)	D. X 20 mc	
	E. Y - Triluted foil (Radiation Research Corp. Model T-1)	E. Y. 100 mc	
	F.	F.	
	G.	G.	
	H.	H.	

Authorized Use

W. To be used in Jarrell Ash Company Model 26-751 detector cell as a component of the Jarrell-Ash Company Model 26-700 Universal Gas Chromatograph

X. To be used in Jarrell-Ash Company Model 26-754 detector cell as a component of the Jarrell-Ash Company Model 26-700 Universal Gas Chromatograph

MARKS: Letters, Phone Calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

Y. To be used in Jarrell-Ash Company Model 26-755 detector cell as a component of the Jarrell-Ash Company Model 26-700 Universal Gas Chromatograph.

Condition 18 C is revised to read:
[Region III]

Conditions 21 and 22 are added to read:
21. Barber-Colman Color Conditions
22. [14] of W-1 Form

Conditions			
1. A B C	6.	11.	16.
2. A B C	7.	12.	17.
3. A B C D	8. A B C	13.	18.
4.	9. A.B.C.	14. A.B.C.	19.
5.	10.	15.	20.
			21.

Mail To: Kester	Date Mailed SEP 17 1963	Approved	Void
		Tech. Reviewer FED	Date 9/17/63
		Chief KEB	Date 9/17/63

ACKNOWLEDGED

reapp dated Aug 2, 1963

Date Received AUG 9 1963	Expiration Date	Issue Date	Tech. Reviewer JWK
Control No. 53281	Reference No.	License No. 24-2261-3	Amendment No. 6
Isotope A. <i>add</i> B. <i>V. Americium 241</i> C. D. E. F. G. H.	Form A. B. <i>V. Plated sources</i> C. <i>(NUMEC)</i> D. E. F. G. H.	Possession Limit A. B. <i>✓, 5 sources</i> C. <i>10 microcuries</i> D. <i>each. Total</i> E. <i>50 microcuries</i> F. G. H.	

Authorized Use

*V. Calibration of instruments + for measurement
of surface lattice defects in materials.*

REMARKS: Letters, Phone Calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

Conditions			
1. A B C	6.	11.	16.
2. A B C	7.	12.	17.
3. A B C D	8. A B C	13.	18.
4.	9. A B C	14. A B C	19.
5.	10.	15.	20.
			21.

Approve ☒ Void ☐

Tech. Reviewer *JWK* Date *8/20/63*

Chief *RWB* Date *8/21/63*

Mail To: *Kester*

Date Mailed

Date Received DEC 1932	Expiration Date	Issue Date	Tech. Reviewer RCS
Control No. 48200	Reference No.	License No. 24-2261-3 (664)	Amendment No. 5
Isotope	Form	Possession Limit	
U. Hydrogen 3	U. Tritiated Titanium foils (Radiation Research Corp. Model TT-1) as enclosed in Lion Research Corporation "Carbon Dioxide Detector."	U. 240 curies, not to exceed 6 curies per detector unit.	
A.	A.	A.	
B.	B.	B.	
C.	C.	C.	
D.	D.	D.	
E.	E.	E.	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

Authorized Use

In accordance with application dated December 5, 1952, as amended by letter dated February 11, 1963 and assigned by W. L. Kantor, License No. 24-2261-3 is amended to add the following:

U. Testing and calibration of Lion Research Corporation "Carbon

REMARKS: Letters, Phone calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

"Carbon Dioxide Detector"

Conditions			
1. A B C	6.	11.	16.
2. A B C	7.	12.	17.
3. A B C D	8. A B C	13.	18.
4. A B	9. A B C	14. A B C	19.
5.	10.	15.	20.
			21.

Mail to: Kantor	Date Mailed FEB 20 1963	Approve <input checked="" type="checkbox"/> Void <input type="checkbox"/>
		Tech. Reviewer Date RCS 2/18/63
		Chief Date

ACKNOWLEDGED

(12-61)

Date Received JUN 11 1962	Expiration Date	Issue Date	Tech. Reviewer WSC
Control No. 44023	Reference No.	License No. 24-2261-3 (864)	Amendment No. 4

Isotope	Form	Possession Limit
In response to app dated June 7, 1962 Lic # is amended as follows:		
Item 4 is amended to extend the expiration date from Sept 30, 1962 to July 31, 1969.		
The symbol below the license # is changed from (I 62) to (864).		
Items 6, 7, 49 are amended to add:		
6. K. Sulfur 35		E. 8. K. 20 mc
7. L. Iron 59		F. L. 20 mc
8. M. Copper 64		G. 20
9. N. Calcium 45		H. 20
10. O. Zinc 65		I. 20
11. P. Gallium 72		
12. Q. Arsenic 76		
13. R. Silver 111		
14. S. Cadmium 115		
15. T. Gold 198		
K-T: [Copy from 33]		

REMARKS: Letters, Phone calls, Visits, Exemptions, Etc. (Use reverse side if necessary)

add K-T

Change 12

14 add Wolf - not as radiographer

15. C? no Argon still

not Calcium 64 error - Co 45 and Cu 64

Gold 197 stable probably means 198

Conditions 12 and 14 are amended to read

12. use (41)

14.

Conditions			
1. A B C	6.	11.	16.
2. A B C	7.	12.	17.
3. A B C D	8. A B C	13.	18.
4. A B	9. A B C	14. A B C	19.
5.	10.	15.	20.
			21.

Mail to: att: W. L. Kinter	Date Mailed JUN 28 1962	Approve <input checked="" type="checkbox"/> Void <input type="checkbox"/>
		Tech. Reviewer WSC Date 6-22-62
		Chief R E B Date 6/18/62

Doc

21 Mar 1961

Date Received 2-22-61	Expiration Date 9/30/62	Issue Date	Technical Reviewer DRH
Control No. 33418	Reference No.	License No. 24-2261-3	Amendment No. 3 ent
Isotope	Form (162)	Possession Limit	
A. Same	A. Same	A. 8 sources of 150mc each	
B. A thru J	B. A thru J	B. 16 sources of 20 mc each	
		C. Total 2 curies	
		D.	
		E. Same except	
		F. - B -	
		G.	
		H.	

Authorized Use

A. Same
A thru J

SCHA Review: <input type="checkbox"/> Yes <input type="checkbox"/> No	Type User (Circle One) 1 2 3 4 5 6 7 Other	Conditions
REMARKS, letters, phone calls, visits, exemptions, etc. (Use reverse side if necessary)		1. A B C 12.
<p>Discussion with FEE and WHL, no leak test requirement for the 4mc Cesium sealed source has been included.</p>		2. A B (over) 13.
		3. A B C (over) 14. A B C
		4. A B 15.
		5. 16. over
		6. 17.
		7. 18.
		8. A B C 19.
		9. A B C 20.
		10. 21. 25
		11. (Use reverse side if necessary)
		Copy old Condition 21 (leave out word "disect") Copy old Condition 15
<input checked="" type="checkbox"/> Approve <input type="checkbox"/> Void		
Technical Reviewer DRH	Date 9-15-61	
Mail to: Kester	Date Mailed P 21 1961	Chief

② Except as hereinafter provided, --- and Part 31 ---
Notwithstanding, and in lieu of, the requirements ---
(Copy old condition 22

③ BPMs shall be used by or under the supervision
of William L. Kester, N.A. Lamb, T.C. Linck,
F.C. McCallister, H.E. Wynn or H.K. Weber. The
only person authorized to act as a radiographer
under this license is F.C. McCallister. "Radiologist"
is defined in title 10 ---

④ --- app'd dated 6 Oct 1958 and 21 Mar 1961 ---

A. (Same)

B. (Same)

C. Operating and emergency procedure entitled
"Radiographic Procedures (Indian 192)" and
dated 1 Aug 1961.

D. Letter dated 8 Sept 1961 from W.L. Kester.

Date Received SEP 2 - 1959	Expiration Date	Issue Date	Technical Reviewer A 27
Control No. 21147	Reference No.	License No. 24-7761-3	Amendment No. 2
Isotope	Form	Possession Limit	
A. H-3	A. J. Smith, source	A. H-3	
B.	B. (Radiation Safety Dept)	B.	
C.	C. Model No. 77-1)	C.	
D.	D.	D.	
E.	E.	E.	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

Authorized Use

A. J. Smith, source in ARC
Equipment Corporation, April 17, 1959
for maintaining procedures.

SCRA Review: <input type="checkbox"/> Yes <input type="checkbox"/> No REMARKS, letters, phone calls, visits, exemptions, etc. (Use reverse side if necessary)	Type User (Circle One) 1 2 3 4 5 6 7 Other	Conditions 1. A B C 12. 2. A B C 13. 3. A B C D 14. A B C 4. A B 15. 5. 16. 6. 17. 7. 18. 8. A B C 19. 9. A B C 20. 10. 21. 11.
(Use reverse side if necessary)		(Use reverse side if necessary)
Mail to: Kester		Date Mailed SEP 29 1959
Technical Reviewer A 27		Date 9/19/59
Chief RCB		Date 9/24/59

Date Rec. OCT 8 1958

Exp. Date

Issue Date

Tech. Rev. DAS

Control No.

13463

Ref. No.

License

No. 24-2261-3
(D61)

Amendment No. 1

Isotope

Form

Possession Limit

A. Cesium 137

A. sealed source (Nuclear Consultants, Inc.; custom)

B. Thymium 85

B. sealed sources (U.S. Radium Light sources, model LAB-484-1A)

C. B.M. having atomic no. from 3 to 82 inclusive

C. irradiated metal samples

D. Thallium 204

D. any

E. Cesium 137

E. any

F. Cobalt 60

F. any

G. Cobalt 60

G. sealed sources

H. Iridium 192

H. sealed sources (Isotope Specialties Co., Type 30)

I. Cobalt 60

I. sealed sources (M. Shaw Corp., model RR-60)

APPROVED

JUN 26 1959

Authorized Use

- A. For use in tagging of trucking bars and seat ejection safety pins to facilitate detection after manufacture.
- B. For use in aircraft in-flight refueling equipment
- C. Machine tool wear studies
- D, E, F, G: Calibration of instruments
- H, I: To be used by "pen-air" handling technique for industrial radiography.

Banding

Hester
Young
Harris
Jant
Lynch
Jagers

M. Allister
Winn
Wahr

SCHA Review

Yes ☐

No ☐

Type User (Circle One) 1 2 3 4 5 6 7 Other

Mail To:

Date Mailed

Remarks, letters, phone calls, visits, exemptions, etc.
(Use reverse side if necessary)

request for info 12/5/58 RRB
followup 2/10/59

Conditions

1. A B C
2. A B C
3. A B C D
4. A B
- 5.
- 6.
- 7.
8. A B C
9. A B C
- 10.
- 11.
12. over
- 13.
14. A B C
- 15.
16. (over)

Approve ☐

Void ☐

Tech. Rev. RRB

Date 6/15/59

Chief

Date

~~2. Product materials shall be used~~

(16) application dated October 16, 1958

A. "Safe Practice Procedures" submitted May 22, 1959

B. letter dated May 13, 1959 from W. L. Kester.

(17) 11

(19)

(20)

(12) Sealed sources described in items 6H, ^{6I, 7I, and} 7H, 8H and ^{8I} I above shall be
acquired from the supplier ~~~~~

Date Received MAY 22 1959	Expiration Date	Issue Date	Technical Reviewer
Control No. 18915	Reference No.	License No.	Amendment No.
Isotope	Form	Possession Limit	
A.	A.	A.	
B.	B.	B.	
C.	C.	C.	
D.	D.	D.	
E.	E.	E.	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

Authorized Use

A.

Combined with 13463

SCHA Review: <input type="checkbox"/> Yes <input type="checkbox"/> No		Type User (Circle One) 1 2 3 4 5 6 7 Other		Conditions 1. A B C 12. 2. A B C 13. 3. A B C D 14. A B C 4. A B 15. 5. 16. 6. 17. 7. 18. 8. A B C 19. 9. A B C 20. 10. 21. 11.	
REMARKS, letters, phone calls, visits, exemptions, etc. (Use reverse side if necessary)				(Use reverse side if necessary)	
<i>Combined with 13463</i>				<input type="checkbox"/> Approve <input checked="" type="checkbox"/> Void	
Technical Reviewer <i>RED</i>				Date	
Chief				Date	
Mail to:		Date Mailed			

MAR 19 1959

430, 1968

REB

Date Rec. Control No. 17216	Exp. Date Ref. No. 24-2261-1	Issue Date License No 24-2261-3 D61	Tech. Rev. Amendment No.
Isotope	Form	Possession Limit	
A. Co-137	A. sealed sources (Nuclear Consultants; custom)	A. 100 ma - maximum activity in a single source not to exceed 4 millicuries	
B. K-40	B. sealed sources	B. 8 sources of 150 ma each 16 sources of 20 ma each Total - 2 curies	
C.	C. U.S. Radium Light Sources model LAB-484-1A)	C.	
D.	D.	D.	
E.	E.	E.	
F.	F.	F.	
G.	G.	G.	
H.	H.	H.	

Authorized Use

- A. For use in the tagging of tracking bars used in aircraft manufacture.
- D. For use on aircraft in-flight refueling equipment.

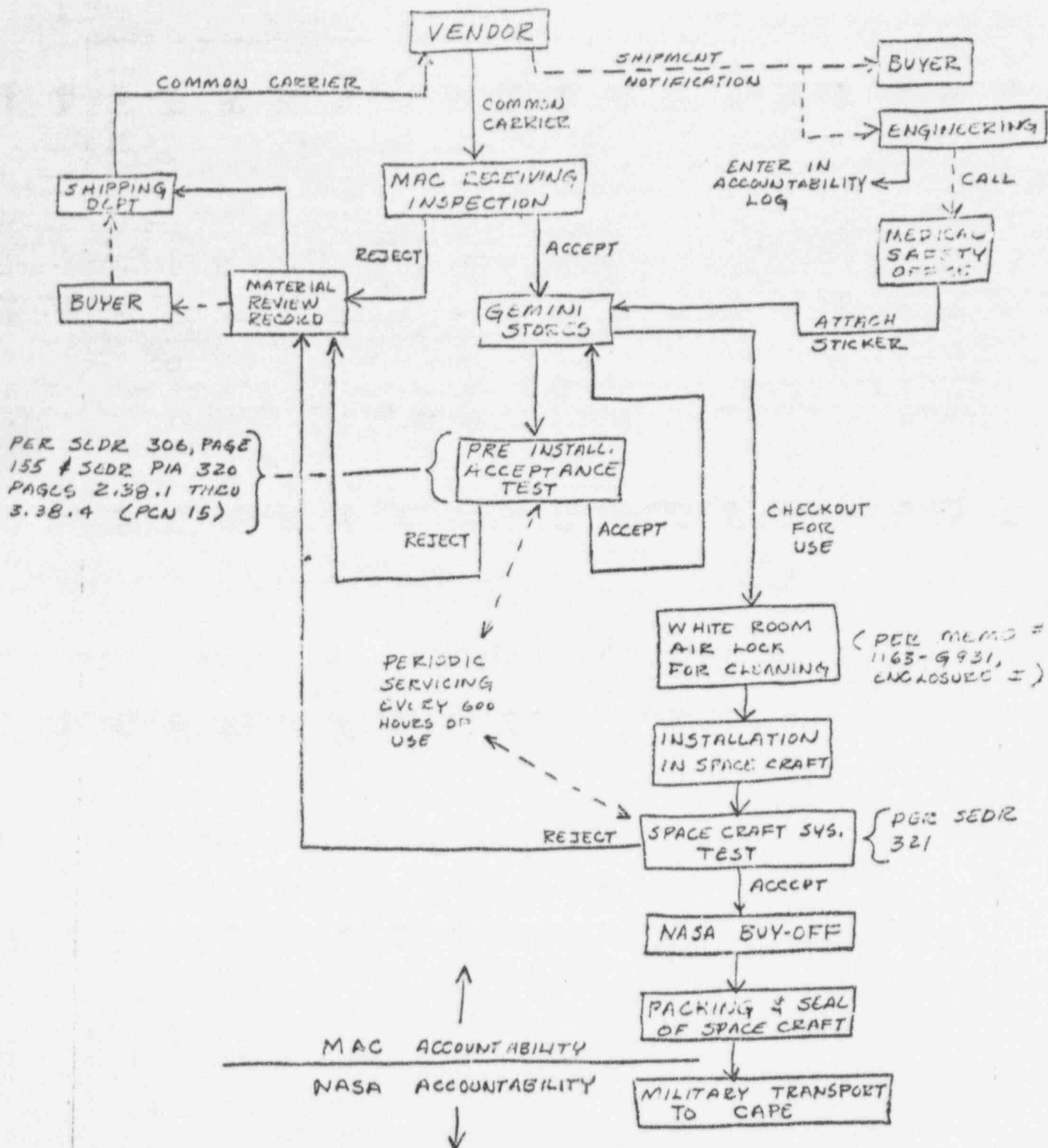
APPROVED

MAR 19 1959

Hester
Young
Harris
Foster

SCHA Review Yes <input type="checkbox"/> No <input type="checkbox"/>		Conditions	
Type User (Circle One) 1 2 3 4 5 6 7 Other		1. A B C	9. A B C
Mail To: Date Mailed APR 22 1959		2. A B C	10.
Remarks, letters, phone calls, visits, exemptions, etc. (Use reverse side if necessary)		3. A B C D	11.
		4. A B	12.
		5.	13.
		6.	14. A B C
		7.	15.
		8. A B C	16. (over)
		Approve <input checked="" type="checkbox"/> Void <input type="checkbox"/>	
		Tech. Rev. REB	Date 4/7/59
		Chief CMA	Date 4/17/59

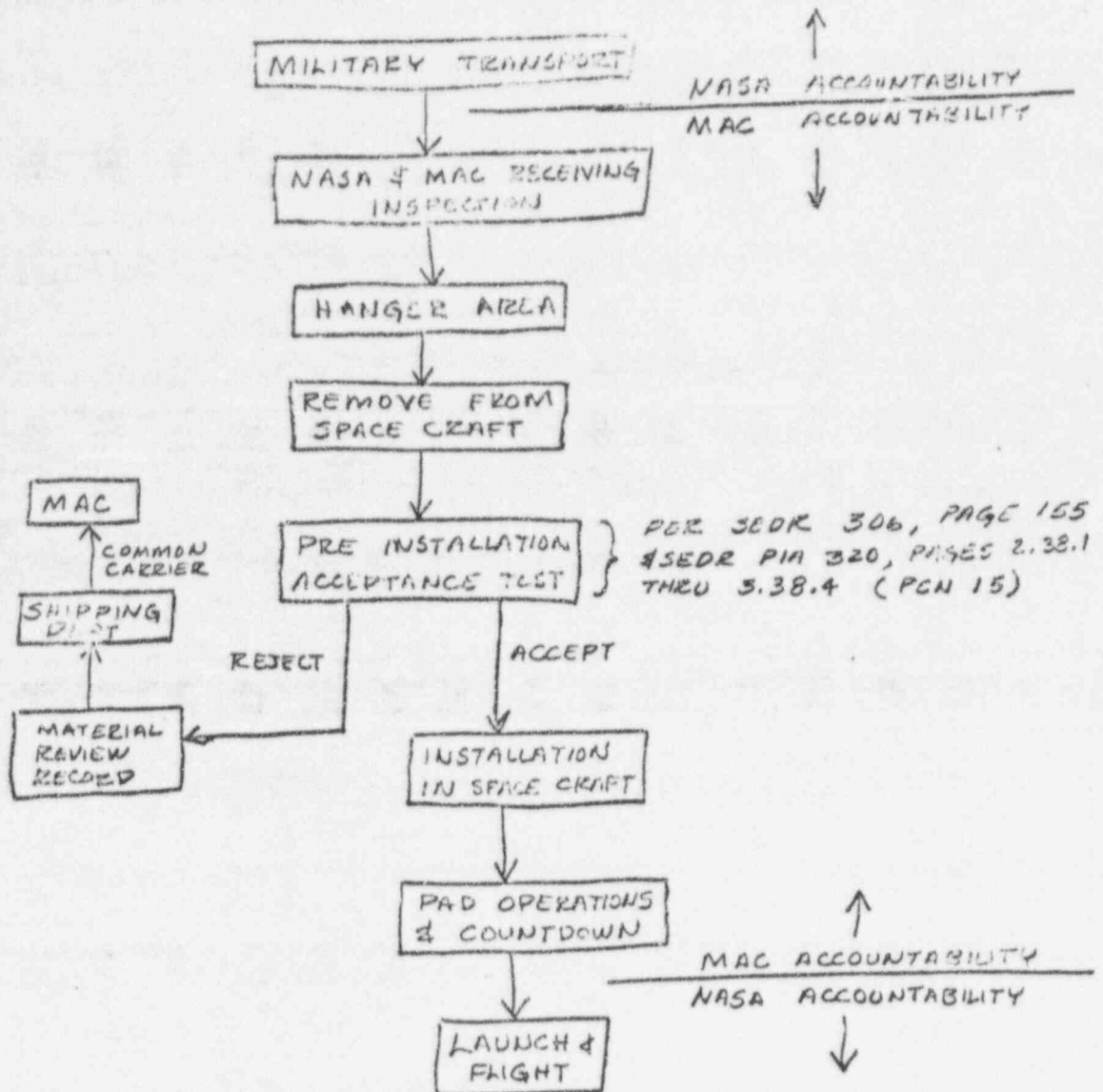
PCOL DETECTOR HANDLING AT MC



A/422

57127

PCO2 DETECTOR HANDLING AT APE



E SUMMARY

PAGE 155

PERIODIC MAINTENANCE						SPECIAL STORAGE & HANDLING REQUIREMENTS
STORED			INSTALLED			
TYPE OF MAINTENANCE	FREQ (MO)	REF DOC	TYPE OF MAINTENANCE	FREQ (MO)	REF DOC	
Initial calibration & PIA test to be per- formed at all tempera- tures.	3	SEDR 320				Store in original container.
Recycle PIA to be per- formed at room ambient only.						Handling for deli- cate electronic equipment required.
Calibrate & PIA test prior to installa- tion per SEDR 320. ^{at} as per (A.C. PCN) PIA test.	6	SEDR 320	Remove and recalibrate every 6 months or 1 month prior to launch.	6	SEDR 320	Handle in accor- dance with atomic energy commission by product license requirements. A.E.C. federal register chapter 1, title 10, part 30 contains radioactive materi- al. Prior to re- moval from S/C or storage, permission must be granted by Steve Cornish (MAC STL 2666) or Jim Cross (MAC STL 3278)
Replace Buna-N "O" rings. (AMS 3345) with "O" rings supplied in "O" ring replacement kit 24 months from date of manufacture.	24	SEDR 320	Replace filters after 600 hrs. operation or after 100 hrs. opera- tion just prior moving to pad. Recharge filters.	As Req'd.	SEDR 320	
			Operational system test with E.C.S. and PCM.	6	SEDR 321	
			NOTE Minimum opera- ting tempera- ture is 35°F.			
						<u>CAUTION</u> The filter charging material-ascarite, sodium-hydrate as- bestos compound is very corrosive and will burn skin, eyes and clothing. <u>ANTIDOTE</u> Eyes - Immediately flush with water or saturated boric acid for 15 min., obtain medical attention immediately. Skin or Clothing - Immediately flush with water for 15 min., then wash with vinegar or citric acid.
					NOTE	

UNIT TO BE MAINTAINED IN A GOX CLEAN CONDI-
TION. DO NOT IMMERSE IN ANY LIQ. OR SOLVENT

UNIT TO BE MAINTAINED IN A GOX CLEAN CONDI-
TION. DO NOT IMMERSE IN ANY LIQ. OR SOLVENT

SYSTEM INSTRUMENTATION

ITEM NAME & PART NUMBER		ACCESS & REMOVAL			REPAIR- ABLE AT				DESCRIPTION OF REPAIR POSSIBLE
		ITEM	TIME (HRS)	MAN PWR	VEND	STL	CAPE	NON REPAIR	
VCO Modules Including Mixers and Hard Line Amplis		F/A			X				Return VCO module to vendor for repair.
CO2 Partial Pressure Trans- ducer 52-85715-9 & 52-85715-13	Disable pyrotechnics.		1.0	2	X	X	X		St. Louis/Cape replace- ment of filters & re- charging of filters per SEDR 320 calibration which includes zero ad- just pot and gain adjust pot located behind en- graved cover (16 screws Filters are behind end plate with (7) screws.
	Open crew hatches.		0.1	2					
	Crew removal.		0.3	2					
	Remove left hand ejection seat.		3.3	3					
	Turn off primary O2 supply.		0.2	2					
	Disconnect electrical con- nector.								
	Remove transducer.		0.5	1					
	3 screws, 2-O2 connec- tions.								
Cap off ports on transducer and O2 supply.		0.5	2						

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SECTION II TEST PROCEDURES

2.38 CO₂ P.P. DETECTOR (52-83715-9) (52-88715-13)

SPECIAL NOTICE:

Contact Dr. W. L. Koster at Station 3875 for safety precautions before handling the first 52-83715-9 or 52-88715-13 CO₂ Partial Pressure Detector.

2.38.1 EQUIPMENT REQUIRED

<u>Quantity</u>	<u>Nomenclature</u>	<u>Ref. Para.</u>
1	CO ₂ Calibration Unit (52E440002-1)	1.2.35
1	Electronic Voltmeter (Ballantine Model 300)	1.2.76
1	Balance (Cenco X-3620)	1.2.65
1	Stop Watch (Minerva Model 140)	1.2.23
1	10,000 ohm Load Resistor (Daven 1250)	1.2.53
1	Multimeter (Simpson 260)	1.2.3
1	Load Resistor (3.3 \pm 5% megohm, 1/4 watt)	

2.38.2 ELECTRICAL POWER REQUIRED

115V, 60 cps.

2.38.3 TEST SET-UP

Note:

Test may be conducted in an open-lab type environment except steps (b), (c) and (d) which require a class $\frac{1}{6}$ or better white room

- (a) Ascertain that all test equipment is validated per Section I.
- (b) Remove the two filter cartridges from their protective packing and weigh them. Compare the weight to the weight noted on the ~~side of the cartridge~~ *by the vendor.*
- (c) Visually inspect the detector unit and the two filters and O-rings for obvious physical damage.

CADENCE!

This unit has a 32 micro inch finish on all pressure fittings. All mating fittings used in the testing of this part shall have an equal or superior finish.

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2.38.3 TEST SET-UP (Con't)

- (d) Remove the filter chamber cover plate. Insert the filter cartridges in their respective chambers, making sure that the O-rings are in place. Place the orifice pieces in place with O-rings against the filters. Replace the filter chamber cover plate and tighten all retaining screws. (Tighten to 8 in. lb.) If any binding of a cover plate screw is detected, remove the screw and grease the thread with G. E. G300 silicone lubricant, then retighten it to 8 inch pounds.
- (e) Weigh and record the weight of the entire detector unit.
- (f) Connect the detector unit to the test unit. Adjust the power supply to furnish 24.00 VDC for the -9 unit and +24.00 and -24.00 VDC for the -13 unit. Turn the vacuum pump on. Place the 3.3 megohm resistor across the voltage output of the detector.
- (g) Close valves 4, 5, and 6. Open valve 7. Adjust valves 8 and 9 to obtain readings of 264 mm on the absolute pressure gauge and 4 to 6 inches of water on the differential pressure gauge. Adjust valves 2 and 5 to obtain readings of 5 psig on the O₂ pressure gauge and 16.00 on the O₂ rotameter. Adjust valve 7 to obtain a reading of 7.35 on the output rotameter.
- (h) Readjust as necessary to maintain these readings:

O ₂ pressure gauge	5 psig
O ₂ rotameter	16.00
Absolute pressure gauge	264 mm
Diff. Pressure gauge	4 to 6 in. H ₂ O
Output rotameter	7.35

2.38.3 TEST SET-UP (Con't)

(h)

Use the digital voltmeter to measure the detector output voltage.

Note:

Maintain all set-up readings for 10 minutes before recording the output readings

- (1) Close valves 2 and 5. Adjust valves 1 and 4 to obtain the previous absolute pressure, differential pressure and output rotameter readings. Adjust valves 7, 8, and 9 if necessary to maintain these readings:

Absolute pressure gauge	264 mm
Diff. pressure gauge	4 to 6 in. H ₂ O
Output rotameter	7.35

Measure the detector output voltage.

- (j) The reading obtained in step (h) should be $0.00 \pm .50$ VDC. The reading obtained in step (i) should be $5.00 \pm .50$ VDC. If they are, go to paragraph 2.38.4. If they aren't, perform the Gain and Zero set procedure on pages 2-38.9 and 2-38.10.

2.38.4 CALIBRATION

- (a) (20 mm) Repeat paragraph 2.38.3 (1) and record the digital voltmeter and microammeter readings as the full scale calibration reference point.
- (b) (20 mm) Maintain the above test set-up for a period of 30 minutes and record the maximum and minimum voltages and currents occurring at the detector outputs. Close valves 1 and 4.

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2.38.4 CALIBRATION (Con't)

- (c) (0 mm) Repeat the set-up of paragraph 2.38.3 (h) and record the digital voltmeter and microammeter readings.
- (d) (5 mm) Using valves 3 and 6 to control the flow of CO₂ into the system as well as the previously used valves 2, 5, 7, 8, and 9, obtain the following set-up:

O ₂ pressure gauge	5 psig
CO ₂ pressure gauge	5 psig
O ₂ rotameter	16.00
CO ₂ rotameter	5.63
Absolute pressure gauge	264 mm
Diff. pressure gauge	4 to 6 in. H ₂ O
Output rotameter	7.35

Read and record the detector outputs.

- (e) (10 mm) Maintain all of the above set-up readings except the CO₂ rotameter reading. Adjust to obtain a CO₂ rotameter reading of 7.61. Read and Record the detector outputs.
- (f) (15 mm) Repeat the previous step with the following exception: Obtain a CO₂ rotameter reading of 9.30.
- (g) Increase the CO₂ flow rate to read 10.00 on the CO₂ rotameter for a period of two minutes. Decrease the flow rate to again read 9.30 on the CO₂ rotameter. Using the same set-up values used in steps (f), (e), (d), (c) and (a) to obtain 15, 10, 5, 0 and 20 mm again read and record the detector outputs.

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2.38.5

RESPONSE TIME

- (a) Again use the set-up of paragraph 2.83.3 (1) to obtain the 20 mm partial pressure condition. Record the detector voltage output.
- (b) Disconnect the pressure input at the detector allowing the detector to measure the CO₂ partial pressure of ambient air. Record the detector voltage output.
- (c) Again connect the pressure input to obtain the 20 mm condition of step (a). 30 seconds after the connection is made record the detector voltage output.

2.38.6

OUTPUT IMPEDANCE

- (a) With the detector set up to measure 20 mm of CO₂ partial pressure, remove the 3.3 megohm load and record the detector output voltage.
- (b) Load the output with the 10,000 ohm resistor and again measure the output voltage. Replace the 10,000 ohm resistor with the 3.3 megohm resistor.

2.38.7

OUTPUT NOISE

Place the electronic voltmeter across the detector voltage output and measure the RMS amplitude of the noise present.

2.38.8

TEMPERATURE CYCLE

Repeat steps (a), (c), (d), (e), and (f) of the 2.38.4 calibration with the detector unit in an environment of +35°F. and again in an environment of +200°F.

MEMORANDUM

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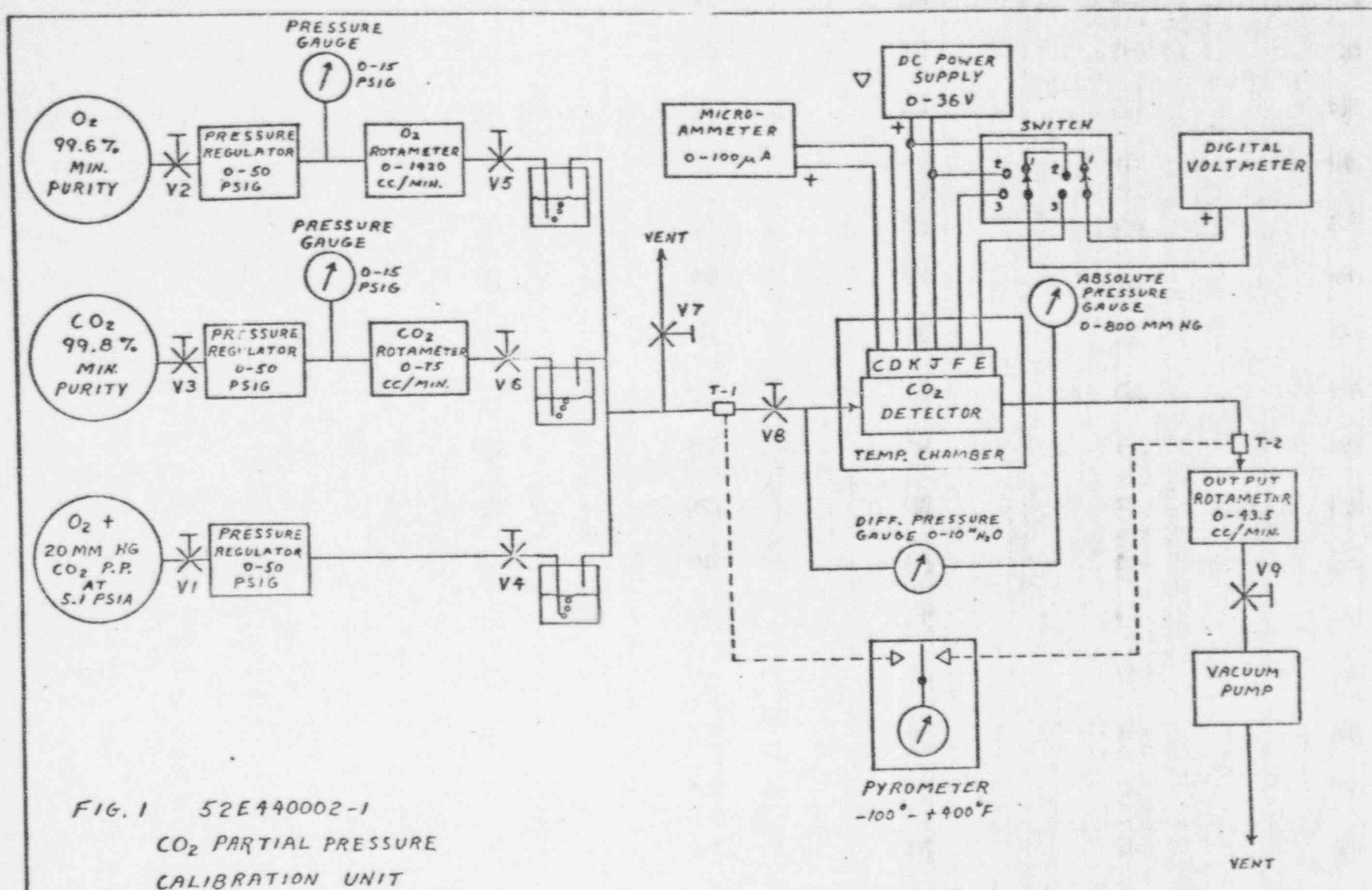
2.38.9

SHORTS

Verify that the spare pins A and B are open with respect to all other pins. Use the R X 10,000 scale of the Multimeter.

Note:

If any anodizing has been removed from the input or output pressure fittings, brush alodine the affected area per P.S. 13204.



▽ A ± 24 VDC POWER SUPPLY IS REQUIRED FOR 52-88715-13 UNITS. PIN H WILL BE USED FOR -24 VDC.

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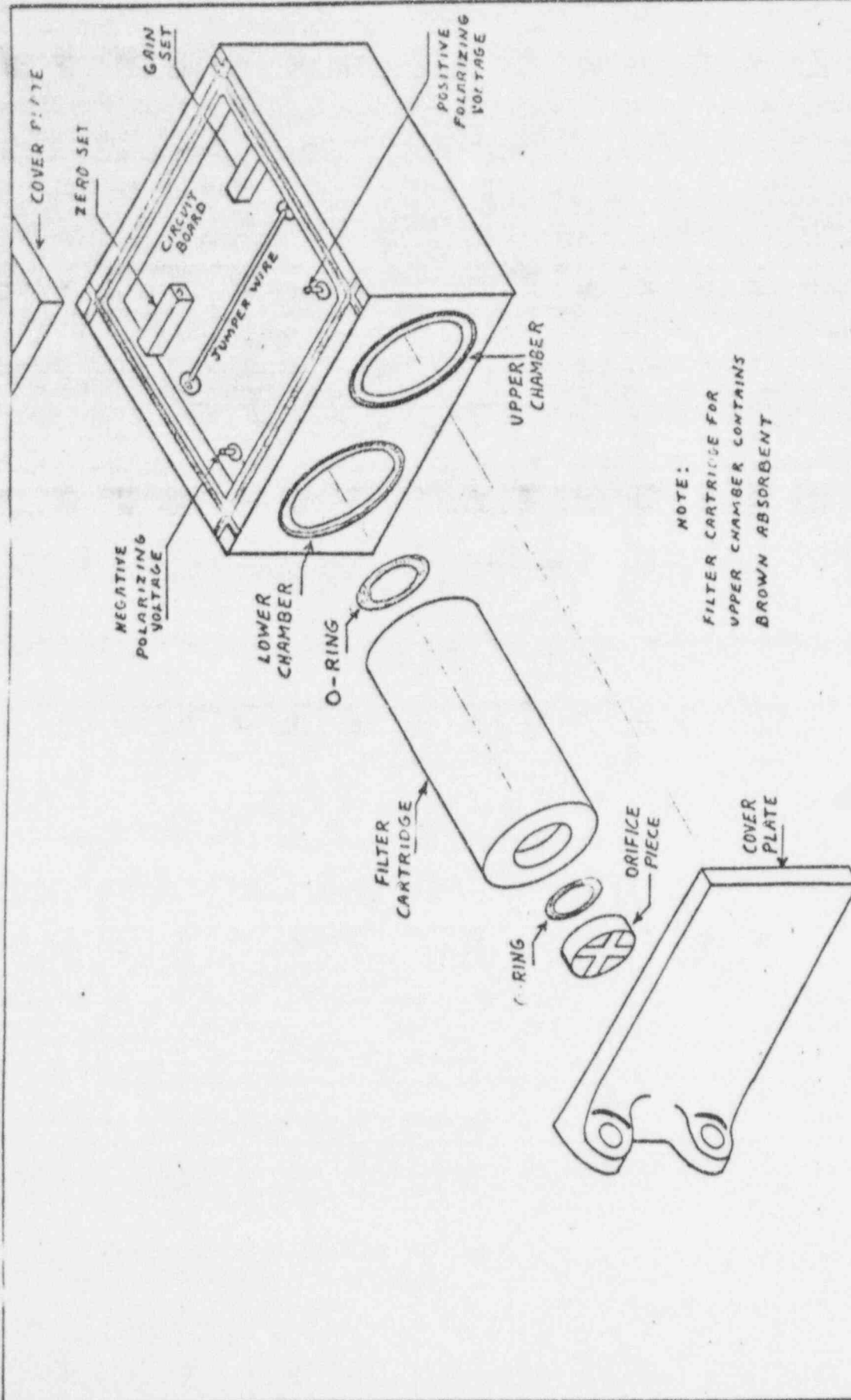


FIG. 2 52-68715-9 CO₂ P.P. DETECTOR
52-68715-13

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GAIN AND ZERO SET PROCEDURE

Note:

This procedure is required only if the zero and full scale outputs do not fall within their specified limits.

1. Remove the electronics compartment cover plate. With power off, turn the zero set potentiometer full CCW and turn the gain set potentiometer full CW.
2. Replace the electronics compartment cover plate. At this time it is necessary to replace only the four corner screws. Should the slightest binding of a cover plate screw be detected, do not attempt to tighten it. Remove the screw and grease the thread with G.E. G300 silicone lubricant, then retighten it to 8 inch pounds.
3. Use the set up of paragraph 2.38.3 (h) to obtain the "zero output" reading. Call this voltage output V_o .
4. Use the set up of paragraph 2.38.3 (i) to obtain the "full scale output" reading. Call this voltage output V_f .
5. If V_o is less than 0 VDC or greater than +3.0 VDC proper adjustment cannot be obtained. $\Delta V = V_f - V_o$ must be less than 5 VDC for proper adjustment to be obtained.
6. If V_o and ΔV are acceptable values, calculate the gain "G" with the following equation:

$$G = \frac{5}{\Delta V}$$

Refer to Fig. 3 and locate this "G" value on the vertical axis at the point it intersects the plot. Locate the number of turns from full CW this point corresponds to.

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GAIN AND ZERO SET PROCEDURE (Con't)

7. As the gain set potentiometer was in its full CW position when V_0 was obtained, the gain value used in this calculation is 1.0. Refer to Fig. 4 to find the output zero shift per shaft rotation corresponding to this gain value. At a gain of 1.0 the zero shift (V_s) is 0.3. Determine the clockwise turns to be made on the zero set potentiometer with the following equation.

$$\text{Turns} = \frac{V_0}{V_s} + 1.5$$

8. With power off and with valves V_4 , V_5 and V_6 turned off, again remove the electronics compartment cover plate to adjust the gain set and zero set potentiometers.
9. Adjust the potentiometers as determined in steps 6 and 7.
10. Replace the cover plate and again obtain the zero and full scale outputs as accomplished in steps 3 and 4.
11. Make additional potentiometer adjustments as necessary through repeated testing and use of the above procedure to obtain a "zero output" of $0.00 \pm .10$ VDC and a "full scale output" of $5.00 \pm .10$ VDC. Note that the gain value used to determine the zero set adjustment is the value calculated in the previous test.
12. After completion of adjustments, replace all cover plate screws observing the precautions stated in step 2.

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GAIN (VOLTS/AMP)

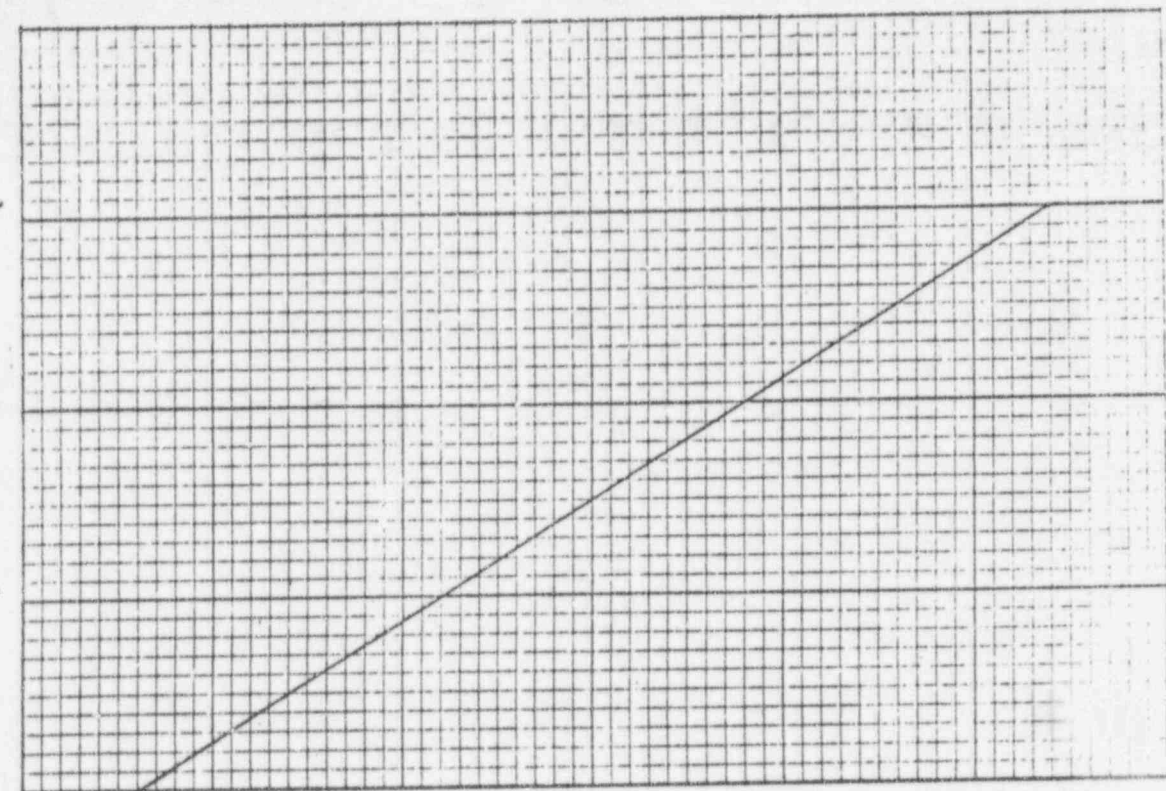
"G"
3.0

2.5

2.0

1.5

1.0



0
CW
(CLICK)

SHAFT ROTATION OF GAIN POT

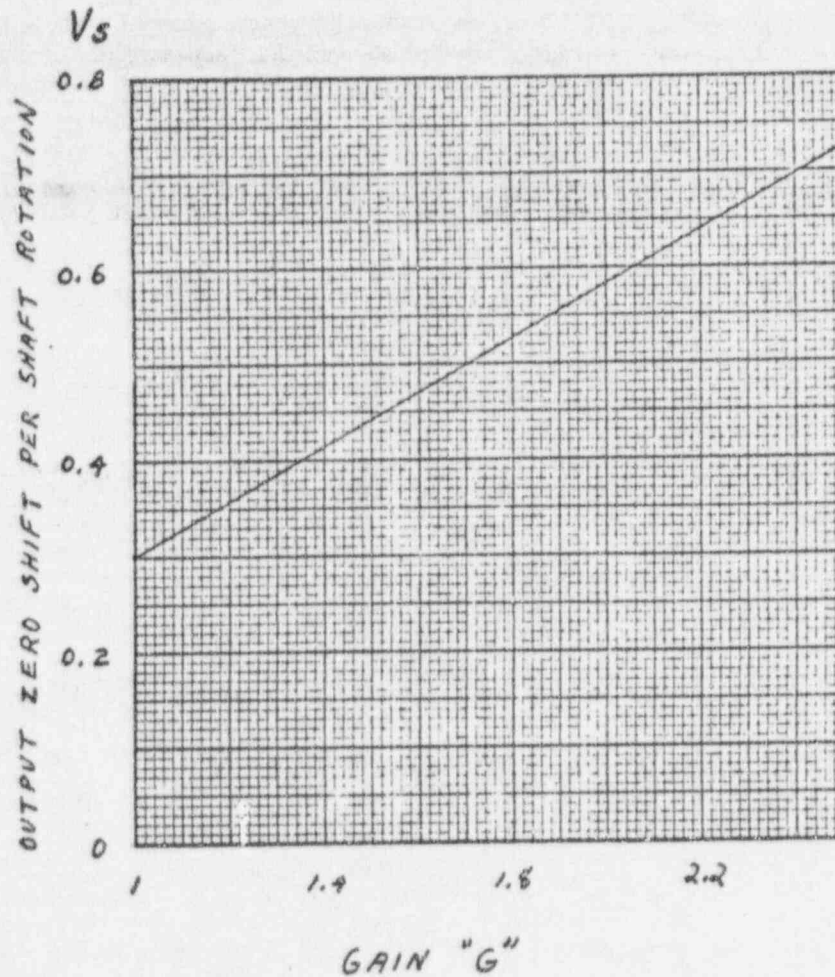
15
CCW
(CLICK)

FIG. 3 GAIN SET

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NOTE: FIRST 1.6 TURNS FROM EXTREME CW OR CCW (CLICK) POSITION DOES NOT RESULT IN OUTPUT CHANGE

FIG. 4 ZERO SET

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PCW28

CARTRIDGE FILLING PROCEDURE

1. Remove filter cap. Remove felt pad and retain. Discard contents of filter, retaining pad at bottom of cartridge.
2. Remove O rings from cartridge cap. Clean cartridge and cap with running water, scrubbing inside of cartridge with test tube brush and scouring powder ("Ajax"). Clean cartridge with alkaline cleaning solution (Turco Aviation) and dionized water. Dry with nitrogen stream at 5 psi. DO NOT USE TRICHLOROETHYLENE DEGREASING! Clean O rings by wiping with lint-free tissue soaked in ethyl alcohol. Brush felt pad with a clean tooth brush; if felt is stained or cannot be cleaned, replace.
3. Place one felt pad at bottom of CO₂ absorbing cartridge. Fill 3/4 inch of brown Ascarite. Tap lightly to level. Fill one grain layer of blue indicating Drierite. Fill remainder of cartridge with white Drierite. Replace cartridge cap O-rings. Place felt pad on top of cartridge and place cap over top of cartridge and tap cartridge, pushing cap down. If filter material is not firmly packed when cartridge cap is seated, remove cartridge cap and add Drierite until filter material is firmly packed when cap is seated.
4. Fill neutral cartridge as in 3. Use no Ascarite; begin filling with single grain layer of blue indicating Drierite.

Caution:

Ascarite CO₂ Absorber is corrosive and poisonous and will burn skin, eyes and clothing.

Antidote:

- (a) In the event of contact with skin or clothing, immediately flush the affected area with plenty of water for at least fifteen (15) minutes and then wash with vinegar or citrus fruit juices.
- (b) In event the eyes are affected, flush with plenty of water or a saturated Boric Acid solution for at least fifteen (15) minutes and get immediate medical attention.

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MODEL 133 P

TEST DATA SHEET

Sheet 1 of 4

Name: CO₂ P. P. Detector MAC P/N 52-88715-9, -13
VENDOR P/N _____
Mfgd. By: Lion Research Corp. MAC S/N _____

INSTRUCTIONS: This Test Data Sheet is to be used in conjunction with SEDR PIA 320 which gives the detailed test procedure. As the test is accomplished, results or observations will be entered on this sheet in the space provided. Upon completion, Test Data Sheet(s) will be forwarded to Project Gemini Inspection, Dept. 867, Bldg. 1, a copy will be kept with the component being tested, a copy will be forwarded to Dept. 289 calibration group and a copy will be retained in the PIA area files.

Was Specified Test Equipment Used? YES _____ NO _____

If No, specify equipment used _____

Test Equipment Validated _____ Ambient Temp. _____ °F.

<u>Para.</u>	<u>Test</u>	<u>Record</u>	<u>Limits</u>
2.38.3	(b) Cartridge Weight	Vendor Wt. MAC Wt.	
	Standard Filter	_____ g _____ g	Vendor Wt. + .005 x
	CO ₂ Filter	_____ g _____ g	(Vendor Wt.) Max.
2.38.3	(c) Visual Inspection	_____	No Defects
2.38.3	(e) Detector Weight	_____ g	1133 to 1225 gram
2.38.3	(h) 0 mm CO ₂ P.P.	_____ VDC	-.50 to +.50 VDC
2.38.3	(i) 20 mm CO ₂ P.P.	_____ VDC	4.50 to 5.50 VDC
2.38.4	Calibration		
	<u>Seq.</u> <u>No.</u>	<u>Co₂ P.P.</u> <u>Input</u>	<u>VDC</u> <u>Output</u>
			<u>Microamp</u> <u>Output</u>
(a) 1	20 mm	_____	_____
			4.50 to 5.50 VDC 90 to 110 microamp.

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Sheet 2 of 4

<u>Para.</u>	<u>Test</u>	<u>Record</u>	<u>Limits</u>
2.38.4	Calibration (Con't.)		
	Seq. No.	CO ₂ P.P Input	VDC Output Microamp Output
(b)	2(Max.)	20 mm	_____
	3(Min.)	20 mm	_____
(c)	4	0 mm	_____
(d)	5	5 mm	_____
(e)	6	10 mm	_____
(f)	7	15 mm	_____
(g)	8	15 mm	_____
	9	10 mm	_____
	10	5 mm	_____
	11	0 mm	_____
	12	20 mm	_____

4.50 to 5.50 VDC
90 to 110 microamp

4.50 to 5.50 VDC
90 to 110 microamp

-.50 to +.50 VDC
-10 to +10 microamp

.75 to 1.75 VDC
15 to 35 microamp

2.00 to 3.00 VDC
40 to 60 microamp

3.25 to 4.25 VDC
65 to 85 microamp

3.25 to 4.25 VDC
65 to 85 microamp

2.00 to 3.00 VDC
40 to 60 microamp

.75 to 1.75 VDC
15 to 35 microamp

-.50 to +.50 VDC
-10 to +10 microamp

4.50 to 5.50 VDC
90 to 110 microamp

2.38.5 Response Time

(a) 20 mm V(a) = _____ VDC

(b) Ambient Air V(b) = _____ VDC

(c) 20 mm at 30 sec. _____ VDC

$$\frac{2}{3} [V(a) - V(b)] + V(b) \text{ Min.}$$

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<u>Para.</u>	<u>Test</u>		<u>Record</u>		<u>Limits</u>
	<u>Seq.</u> <u>No.</u>	<u>CO₂ P.P.</u> <u>Input</u>	<u>VDC</u> <u>Output</u>	<u>Microamp</u> <u>Output</u>	
2.38.6	Output Impedance				
	(a)	No load	V(o) = _____	VDC	
	(b)	10K load	_____	VDC	$\frac{V(o)}{2}$ Min.
2.38.7	Output Noise		_____	MV RMS	15 Mv Max.
2.38.8	Temperature Cycle				
	+35°F.	13	20 mm	_____	4.50 to 5.50 VDC 90 to 110 microamp
		14	0 mm	_____	-.50 to +.50 VDC -10 to +10 microamp
		15	5 mm	_____	.75 to 1.75 VDC 15 to 35 microamp
		16	10 mm	_____	2.00 to 3.00 VDC 40 to 60 microamp
		17	15 mm	_____	3.25 to 4.25 VDC 65 to 85 microamp
	+200°F.	18	20 mm	_____	4.50 to 5.50 VDC 90 to 110 microamp
		19	0 mm	_____	-.50 to +.50 VDC -10 to +10 microamp
		20	5 mm	_____	.75 to 1.75 VDC 15 to 35 microamp
		21	10 mm	_____	2.00 to 3.00 VDC 40 to 60 microamp
		22	15 mm	_____	3.25 to 4.25 VDC 65 to 85 microamp

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Para.	Test	Record	Limits
2.38.9	Shorts		
	Pins A and B are open with respect		No pointer
	to all other pins?	YES _____ NO _____	deflection permitted

Comments:

The above test was performed using test procedure 52-88715-9, -13 dated _____

Accept _____ Reject _____ MRR _____

Test Performed By _____	Date _____	Quality Assurance Approval _____	Date _____
-------------------------	------------	-------------------------------------	------------

PURPOSE

To establish the procedure for procurement, and shipping of those Radioactive Isotopes, regulated by the Atomic Energy Commission as Byproduct Material, to ensure that their use by involved departments is adequately monitored.

DEPARTMENTS AFFECTED

Research Department
Safety and Medical
Receiving and Shipping Inspection
Process Control Laboratory

Fluid Mechanics Laboratory
Purchasing
Manufacturing Methods

PROCEDURE

PROCUREMENT

1.1 Requesting departments will forward requests to the Chairman of the Isotope Committee.

1.2 The Isotope Committee reviews the request and determines:

- (a) The need for the type of isotope ordered;
- (b) If such isotopes are available at this facility or whether an alternate type already on hand may be substituted;
- (c) Whether the personnel who are to handle the isotopes are adequately trained to handle radioactive material; and
- (d) Whether adequate facilities for handling and storage of the isotopes are available.

1.3 When all requirements are satisfied the Chairman of the Isotope Council completes a Purchase Request, MAC 283.

1.4 If prior AEC authorization does not exist, the Chairman of the Isotope Committee executes the AEC application for Byproduct Material License (AEC Form 313) and holds the Purchase Request pending necessary authorization to procure.

1.5 Upon receipt of the Byproduct Material License, or if AEC authorization already exists, the Chairman of the Isotope Committee forwards the Purchase Request and a copy of the authorizing license to the Purchasing Department.

1.6 The Buyer requests the Supplier to mark each shipment.

CAUTION

Radioactive Material

DO NOT OPEN

HANDLING

2.0 All departments physically handling Radioactive Isotopes must conform in every respect with Safe Practice Instructions and such other safety measures as may be developed.

13463

DUPLICATED

FOR DIV. OF INSP.

RADIOISOTOPES - PROCUREMENT AND SHIPPING (Continued):

SHIPPING

3.0 Shipment of Radioactive Isotopes may be made only after:

- (a) Review and approval by the Isotope Committee;
- (b) Determination that the intended recipient has authorization from the AEC for possession of such isotopes; and
- (c) Advising the AEC of destination, type of isotope, and reason for shipment.

3.1 The Source Custodian is responsible for assuring that Health Physics monitors all packaging and transmittal of Radioactive Isotopes and further assuring that the shipment is marked

CAUTION

Radioactive Material

DO NOT OPEN

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13463

PURPOSE

To establish the Health Physics regulations and detailed procedures for receiving, accounting, inspecting, issuing, and storing of radioactive sources.

ORGANIZATION COMPONENTS AFFECTED

All departments handling radioactive sources.

DEFINITIONS

Byproduct Material - any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

Contaminated Material - any material in or on which excessive loose radioactive isotopes have been detected.

Critical Configuration - any placement of special nuclear material which could result in a chain fission process.

Monitored - performed under Health Physics surveillance.

Overexposure - any personnel exposure to radiation in excess of established exposures including:

- (a) whole body - 100 mrem per 7 consecutive days
- (b) extremities - 500 mrem per 7 consecutive days.

Radioactive Materials - any material that emits radiation spontaneously.

Source Material - any material except special nuclear material which contains by weight one twentieth of one percent (0.05%) or more of (1) uranium, (2) thorium, or (3) any combination thereof.

Source - any radioactive material used or designed to be used primarily as a source of radiation except special nuclear material or low level radioactive alloys.

Special Nuclear Material - (1) plutonium, uranium 233, uranium enriched in the isotope 233 or the isotope 235, and any other material which the Atomic Energy Commission determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material.

RESPONSIBILITY

1. It shall be the responsibility of line supervision to enforce the established Health Physics procedures.

2. It shall be the responsibility of Health Physics to:

- (a) Advise line supervision in the handling of radioactive sources.

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RADIOACTIVE SOURCE CONTROL (Continued):

- (b) Monitor operations involving radioactive sources.
- (c) Exercise veto power over operations which involve sources and which do not adhere to Safe Practice Instructions.
- (d) Maintain detailed records on location, inspection, use, etc. for all radioactive sources.

GENERAL

This procedure applies to all radioactive sources regardless of the form in which they are received, i.e., whether encapsulated, in solution, powder, discs, etc.

PROCUREMENT

1.0 All radioactive material shall be procured and disposed of in accordance with Radioisotopes, Procurement.

RECEIVING AND STORAGE

2.0 Upon receipt and identification of the shipment as Radioactive Isotopes, the Receiving Department holds the shipment unopened in a secured area and immediately notifies the Source Custodian and the group or person to whom the shipment is to be delivered.

2.1 The Source Custodian:

- (a) Is responsible for having Health Physics monitor delivery of the shipment to the opening and inspection point.
- (b) Witnesses the initial material inspection and ensures that all necessary health precautions are observed.
- (c) Upon completion of delivery to final plant destination, sends a report to Receiving.

NEW SOURCE INSPECTION

3.0 Health Physics or Isotope Laboratory personnel will remove sources from shipping containers under monitored conditions in the Isotope Laboratory.

3.1 Health Physics will survey the primary source container. If loose contamination is detected, work will cease until the contaminant is identified.

- (a) If the contaminant is found to be other than the radioisotope of the source, the source shall not be issued or used until it has been completely decontaminated and a negative contamination survey obtained.
- (b) If the contaminant is found to be the same as the isotope of the source, it will be assumed the primary source is leaking until proven otherwise. The primary source container will be decontaminated until a negative contamination survey is obtained and will then be stored for several days. An additional survey will be made to determine whether the source should be issued or returned to the seller. If the source is usable, it shall be inspected frequently to insure that its use has not caused additional leakage.

RADIOACTIVE SOURCE CONTROL (Continued):

RECORDING OF RADIOACTIVE SOURCES

4.0 Health Physics shall log the source and complete a master file card containing the following data after the source inspection is finished:

- (a) isotope
- (b) half life
- (c) original activity calibration
- (d) present activity, calibration, date
- (e) distance from source to give 7.5 mrem/hr (measured)
- (f) purchase order number
- (g) form of isotope (liquid, powder, disc, etc.)
- (h) person responsible for the radioisotope
- (i) date issued
- (j) date returned
- (k) location used
- (l) location stored
- (m) date inspected
- (n) date next inspection due
- (o) remarks

SOURCE CUSTODIAN RESPONSIBILITY

5.0 The Source Custodian will restrict source use to authorized personnel. A signed statement from the concerned supervisor to the Health Physics Administrator will establish authorization. Each person will complete his authorization by reading and signing a copy of this SPI on file with the Source Custodian.

5.1 Before source use, the user will sign the master file card for the source, giving him non-transferable responsibility for the identification, storage, safe use, etc. of the source. Lending of sources is restricted as follows: borrower must be authorized to use borrowed source, responsibility for source remains with the lender.

5.2 The user will report immediately to Health Physics any personnel overexposure or likely overexposure, or any loss of, rupture of, or damage to a source.

5.3 The Source Custodian will issue a monthly report to the Isotope Council showing:

- (a) Type and curie quantity of radioactive isotopes (corrected for decay) on hand.
- (b) Type and curie quantity of radioactive isotopes on order.
- (c) Current location of material.

ROUTINE INSPECTION OF SOURCES

6.0 Routine inspection of all sources shall be performed by Health Physics. If possible, the user shall bring the source to the Isotope Laboratory for inspection. Sources that cannot be readily transported may be inspected by Health Physics in their normal location.

RADIOACTIVE SOURCE CONTROL (Continued):

6.1 All sources containing beta and/or gamma emitting radioisotopes shall be inspected every six months, or more frequently if deemed necessary.

6.2 All sources containing alpha emitting isotopes shall be inspected every three months, or more frequently if deemed necessary.

6.3 Health Physics will physically inventory sources each month and will report results to the Isotope Council.

SOURCE HANDLING

7.0 Sources (containing by-product material, special nuclear material or source material) authorized by an AEC license will be used, stored and otherwise handled in strict accordance with the provisions of the license.

7.1 Except as authorized by the AEC or the Department of Defense, no sources containing special nuclear material will be used, stored, or otherwise handled in such a manner that a critical configuration could be achieved.

7.2 Except as authorized by the AEC or the Department of Defense, no sources containing special nuclear or source material shall be exposed to neutron radiation.

7.3 Users will identify sources with signs, tags or other identifying media as specified by Health Physics to inform personnel of the presence of a source and of necessary data concerning the source.

7.4 Identification information will include the source identification number, isotope, gamma dose rate at 2", 7.5 mrem / hr distance.

7.5 Users will promptly identify the immediate area of all sources and will rope off all areas in which the dose rate exceeds 7.5 mrem/hr.

7.6 Radiation signs or tags will be removed from sources only as directed by Health Physics.

7.7 Users will notify Health Physics when any task or source movement might result in a personnel exposure rate greater than 7.5 mrem/hr.

7.8 The Source Custodian will be notified before any source is removed from the Isotope Laboratory. Health Physics will monitor such movement.

7.9 When a source is not actually in use, it will be properly stored. In no event will a source be left in any exposed location at any time when the responsible user or his properly authorized alternate is not in attendance.

7.10 The Source Custodian and the Chairman of the Isotope Committee will be notified immediately of loss of radioactive materials, damage to containers or suspected over-exposure to personnel.

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RADIOACTIVE SOURCE CONTROL (Continued):

7.11 A source is properly stored when all of the following conditions have been met:

- (a) it is secured against unauthorized removal;
- (b) it is properly identified;
- (c) it is so enclosed as to prevent anyone from being unknowingly exposed;
- (d) the spread of contamination from the source is unlikely;
- (e) a critical configuration is unlikely;
- (f) source and special nuclear material is not exposed to neutron radiation;
- (g) Health Physics approval has been obtained.

Permanent storage vaults are available in the Isotope Laboratory, Building 102.

7.12 After task completion, users will return sources to the Isotope Laboratory for storage. The Source Custodian will remove the user's name from the master file card.

PURPOSE

To define the duties of the Isotope Committee.

1.0 In accordance with regulations of the Atomic Energy Commission an Isotope Committee shall be formed.

1.1 The Isotope Committee will be composed of a group of persons appointed from the following departments:

- (a) Research
- (b) Safety and Medical
- (c) Receiving and Shipping Inspection
- (d) Process Control Laboratory
- (e) Fluid Mechanics Laboratory
- (f) Purchasing
- (g) Manufacture Methods

1.2 The chairman of the Isotope Committee shall:

- (a) Prepare such reports as may be required by the Atomic Energy Commission.
- (b) Insure that all records required by the Atomic Energy Commission are maintained.

1.3 The responsibilities of the Isotope Committee shall be to:

- (a) Review and approve in advance of purchase all requests for radioisotopes, irradiations, source material (except thorium containing alloys) and special nuclear material.
- (b) Periodically review records accounting for radioactive materials.
- (c) Coordinate corrective action taken whenever violations of safety regulations occur and recommend steps to improve the program.
- (d) Insure that Form AEC 313, "Application for Byproduct Material License", is executed on behalf of McDonnell Aircraft Corporation.

PURPOSE

To establish the maximum permissible dose from external sources of ionizing radiation.

ORGANIZATION COMPONENTS AFFECTED

All departments handling radioactive material or working near sources of radiation.

PROCEDURE

GENERAL

Because of the nature of work with radioactive material it is often impossible to completely eliminate personnel exposures hence levels of exposure to radiation have been established. These levels are the amount of radiation which may be received by an individual within a specified period of time with the expectation of no harmful results. They are called "maximum permissible levels" or MPL.

RADIOLOGICAL TERMINOLOGY

1.0 DOSE: That radiation delivered to a specified area or volume, or to the whole body. The dose may be specified in air, on the skin, or at some depth beneath the surface. No statement of dose is complete without specification of location.

1.1 ABSORBED DOSE: The absorbed dose of any ionizing radiation is the amount of energy imparted to matter by ionizing particles per unit mass of irradiated material at the place of interest. It is expressed in "rads".

1.2 RAD: The rad is the unit of absorbed dose. It equals 100 ergs per gram.

1.3 ROENTGEN: The roentgen is the quantity of x- or gamma radiation such that the associated corpuscular emission per 0.001293 grams of air produces, in dry air, ions carrying 1 electrostatic unit of quantity of electricity of either sign.

1.4 ROENTGEN EQUIVALENT PHYSICAL (REP): The amount of ionizing radiation which will result in the absorption in tissue of 93 ergs per gram.

1.5 ROENTGEN EQUIVALENT MAN (REM): That quantity of ionizing radiation which when absorbed by man produces an effect equivalent to the absorption by man of one roentgen of x- or gamma radiation. The REM is a measurement of damage caused in tissue. One REP of a type of radiation, delivering an equivalent amount of energy, could create more REMs of damage than would one REP of another type of radiation, as follows:

Gamma or x-rays	1 REP = 1 REM
Beta particles	1 REP = 1 REM
Fast neutrons or protons	1 REP = 10 REM
Slow neutrons	1 REP = 5 REM
Alpha particles	1 REP = 20 REM

1.6 CURIE: That quantity of radioactive material giving 3.7×10^{10} disintegrations per second.

1.7 DISINTEGRATIONS PER SECOND: The number of nuclear events per minute, characterized by the emission of energy and/or mass from the nucleus.

MAXIMUM PERMISSIBLE LEVELS OF EXPOSURE:

2.0 GENERAL: In the past the word "tolerance" has sometimes been used to denote permissible levels of radiation; however, to some people the word "tolerance" often denotes no damage whatsoever. For this reason it has been suggested that "maximum permissible level" be used in place of the word "tolerance". In most instances maximum permissible levels of exposure may be divided into three classifications.

2.1 "CIVILIAN" MPL: "Civilians" are those persons not primarily engaged in radiation or associated work, including persons under 18 years of age, pregnant women, population groups, persons outside the installation, and persons who are not being monitored by film badges. Civilians shall be limited to 1/10th the maximum permissible level for persons primarily engaged in radiation work.

2.2 "LABORATORY" MPL: "Laboratory" personnel are those persons who are primarily engaged in radiation work, including adult persons, working in a controlled area, who are being monitored with film badges. The MPL for total body exposure is 0.1 REM (100 m rem) integrated over a period of a week, (7 consecutive days), acquired in a single or accumulated dose. It is recommended that exposure levels of 0.06 REM (60 m rem) or less per 24 hour period for a 5 day work week be maintained for routine operations. MPLs for local external radiation (less than whole body) will be given by Health Physics for specific situations.

2.3 "EMERGENCY" MPL: Emergency MPL to radiation should be set at 5.0 rem for serious emergencies. This MPL would be for such personnel as fire fighters. In extreme emergencies, such as cases of danger to life, as high as 12.5 rem will be permitted. If the dose actually received in the performance of such emergency work does not exceed 25 rem, it shall be assumed that the radiation tolerance status of the person will not be affected. However, it shall be generally desirable to institute compensatory measures in such cases, especially when occupational conditions are such that the possibility of recurrence of over-exposure cannot be excluded.

2.4 WEEKLY DOSE FLUCTUATIONS: In cases in which it is necessary for a person to receive in one week (7 consecutive days) more than the MPL (300 m rem), the unit of time may be extended to 13 weeks, provided that the dose accumulated during a period of any 7 consecutive days does not exceed the appropriate permissible weekly dose by more than a factor of three and provided further that the total dose accumulated during a period of any 13 consecutive weeks does not exceed 10 times the permissible weekly dose ($0.3 \text{ rem} \times 10 = 3.0 \text{ rem}$). In regard to civilian exposures, in which the weekly rate is one-tenth the maximum permissible level for persons primarily engaged in radiation work, the total dose accumulated in a year is small and provided the weekly dose does not fluctuate by more than a factor of 3, averaging of the weekly dose over a period of one year is permissible.

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SAFE PRACTICE INSTRUCTIONS
TRANSPORTING ACTIVE MATERIALS

All precautions must be taken so that no person shall be over exposed to radiations from materials that are being transported. No transfer of radioactive material is to be made without the authorization of Health Physics.

If active material is to be shipped, whether from one active area within the plant to another or to destinations outside the plant, contact the Health Physics representative. He will give instructions as to the proper packaging in each instance, make arrangements for the necessary survey and make provisions for the actual transfer.

All assignments of active material are to be from person to person, and not from an individual to a location. It is essential that the receiver have an accurate knowledge of the activities involved and that he know the chemical composition of the material. The outer container should be carefully labelled to provide this information.

In general, all active material must be shielded so as to provide sufficient attenuation of the particular type of radiation involved. The package must be such that there can be no leakage of radioactive material under the conditions normally incident to transportation. Gamma or beta radiation must not exceed 200 mr/hr at the surface of the package; for neutrons, the maximum permissible radiation is 2 mrep/hr. at one meter. Alpha radiation may be expected to be entirely absorbed within the package. Solutions must always be transported in gasketed, tight, secondary containers, with sufficient chemically inert absorbent material to prevent the escape of any solution should breakage occur. Pyrophoric material must be placed in containers that are non-combustible.

All active solutions must be stored in secondary containers to prevent the spread of contamination in case of breakage. Label all active solutions as to content, activity, date and responsible personnel. Discard wastes immediately into the proper disposal containers.

Items which have been in active areas must be kept out of stockrooms. Tools and equipment which have been used in handling radioisotopes are regarded as contaminated until they are proved to be otherwise. Do not release them for non-active work nor permit them to be moved from the active work area without having them surveyed.

All transfers of active materials are to be made from person to person. Under no circumstance use the U.S. Mail or the Plant's mail service to ship active material. Health Physics must be consulted for all transfers of radioactive materials and equipment.

PURPOSE:

To define the duties of the Health Physics Section.

1.0 A Health Physics section, under the direction of the Radiological Safety Officer, will be administered by the Safety and Medical Department.

1.1 The responsibilities of the Health Physics Section will be:

- (a) To insure compliance with all Atomic Energy Commission regulations relating to protection against radiation.
- (b) To publish procedures for safe handling of radioactive materials.
- (c) To inform company personnel of the proper procedures for handling radioactive materials.
- (d) To provide adequate monitoring of all processes involving radioactive materials.
- (e) To provide for safe storage of radioactive materials.
- (f) To maintain personal dosimeter and health reports on all personnel working with or near radioactive materials.
- (g) To maintain records on all radioactive materials.

1.2 The Radiological Safety Officer will:

- (a) Supervise the operation of the Health Physics section.
- (b) Prepare reports of loss or damage of radioactive sources.
- (c) Prepare reports of over exposure to personnel.
- (d) Advise the Isotope Committee of the existence of potential radiological hazards.

1.3 There will be a Source Custodian who shall:

- (a) Maintain an inventory of all radioactive substances.
- (b) Restrict the use of radioactive materials to authorized persons.

CONTAMINATION LEVELS

PURPOSE

To establish maximum permissible levels for radioactive contamination.

ORGANIZATION COMPONENTS AFFECTED

All departments handling radioactive materials.

PROCEDURE

GENERAL

1.0 In order to detect the presence of loose transferable radioactive material, a smear is made of the surface in question. A smear test is made by wiping an area of approximately 150cm^2 with a disc of paper or other suitable material, then assaying the smear or wipe for radioactivity. The results of the assay are used to evaluate the hazard to those persons who may be working with the contaminated equipment or material.

MAXIMUM PERMISSIBLE LEVELS

2.0 Areas which have a level of beta-gamma activity below 200 d/m/150cm^2 and which have a level of alpha activity below 10 d/m/150cm^2 are considered clean and safe for use.

2.1 Areas which have a level of beta-gamma between 200 and 2000 d/m/150cm^2 or of alpha activity between 10 and 100 d/m/150cm^2 must be evaluated for possible hazard depending upon isotope present, work to be done, etc.

2.2 Areas with beta-gamma activity greater than 2000 d/m/150cm^2 or alpha activity greater than 100 d/m/150cm^2 are considered hazardous and will not be used.

PURPOSE

To establish the Health Physics regulations and procedures for handling radioactive waste disposal.

ORGANIZATION COMPONENTS AFFECTED

All departments handling radioactive materials.

PROCEDURE

GENERAL

1.0 Health Physics shall regulate the disposal of radioactive materials.

1.1 All liquid and solid waste which might be radioactive shall be held until examined by Health Physics.

1.2 Health Physics will determine the activity of waste water and if it is within permissible limits (10^{-7} microcuries per milliliter for unidentified isotopes), it will be allowed to flow into normal waste channels.

1.3 Solid waste shall be divided into combustible and non-combustible solids.

Delete → 1.4 Combustible liquids and solids will be burned under the supervision of Health Physics. The ashes will be combined with non-combustible solids.

1.5 Non-combustible solids will be placed in suitably marked containers for storage.

RADIOACTIVE WASTE CONTAINERS

2.0 The supervisor in each area containing radioactive material is responsible for seeing that properly marked containers are available for radioactive waste.

2.1 The containers should be clearly marked by lettering and radiation signs to indicate that they contain radioactive material.

2.2 Powders shall be placed in sealed bags.

2.3 Liquids shall be stored in glass or plastic bottles. These bottles will be placed in a leakproof metal container.

2.4 Separate containers should be provided for combustible and non-combustible materials.

2.5 Health Physics will survey containers on request of supervision in the area.

2.6 Health Physics shall be notified when the container becomes full and shall supervise the transfer of the material to a storage area.

Final disposal?

SAFE PRACTICE INSTRUCTIONS
PRECAUTIONS IN HANDLING RADIOACTIVE MATERIALS

ABSTRACTED FROM ARGONNE NATIONAL LABORATORY RADIATION SAFETY GUIDE

A. INTRODUCTION

1. Protection from External Radiation.

The best protection against external radiation is distance. One of the first things to do when working with radioactive material is to determine the level of activity involved. If it is necessary to remain near the radioactive materials erect a barrier, the nature and thickness of which should depend upon the type, energy and intensity of the radiation. Before starting construction consult personnel in the Radioisotope Laboratory regarding your choice of shielding materials. Tongs and remote handling devices are helpful in increasing the distance from the source, their use makes it possible to reduce the amount of shielding necessary.

External radiation dosage is also dependent upon time. Work with radioactive materials should be completed as quickly as possible. Before beginning an experiment, prepare a complete plan of action, strive for the most efficient operation and the lowest possible exposure. It is good practice to rehearse a dry run before proceeding with the actual experiment involving radioactive material.

2. Protection from Internal Radiation.

Radioactive materials must be kept out of the body to accomplish this, do not eat, drink, or smoke in the vicinity of radioactive materials. Do not allow laboratory items such as pipettes, glassware, tubing, etc., to touch the mouth. Wear proper respiratory equipment whenever there is a possible inhalation hazard.

Use dry-boxes to keep radioactive dusts to a minimum.

Wash hands thoroughly before eating, smoking, or leaving work. Extreme personal cleanliness is a necessity. Utilize the available counting facilities to check for contamination. Above all, use common sense, do not let familiarity breed contempt for the precaution necessary for safety.

Report any cuts or skin lesions at once to First Aid. If the cuts or skin lesions occur while working with radioactive materials, have the wounds surveyed by Health Physics personnel then report to First Aid for treatment. Under no circumstances should such a wound be self-treated, however, immediate action should be taken to remove possible contamination. Wash the wound under large volumes of water, spreading the edges of the cut to permit flushing action by running water. All wounds are to be reported to the First Aid as soon as emergency procedures have been taken.

It is emphasized that skin diseases and cuts received away from work, as well as those originating in the Laboratory, increase the probability of absorption of radioactive materials. Never work with high levels of activity if you have cuts or abrasions.

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3. General Housekeeping Methods.

Make every effort to keep working and storage areas clear, uncluttered, and free of contamination. Use stainless steel trays, uncracked glass plates, and/or other impervious materials to cover surfaces which may become contaminated. Kraft-backed paper or polyethylene sheet may be used, but must be discarded frequently to prevent loose active materials from dusting off of the surface. Cover exposed metallic surfaces of equipment with strippable paint, such as Pyroxotte. This will facilitate decontamination procedures.

Whenever possible, vessels containing active solutions should be kept in secondary containers. Chemically inert absorbent material may be used as a filler to prevent the spread of activity in case the prime container breaks.

4. Monitoring and Surveying.

All laboratories and work areas where radioisotopes are used are monitored routinely by Health Physics personnel to measure radiation levels and to detect and measure any contamination of floors, tables and other surfaces. Reports of surveys are either posted at the areas involved or sent to the appropriate personnel. In addition to the routine surveys, special surveys are sometimes necessary. These may be done either by the laboratory occupant or by Health Physics personnel. Seek instruction from Health Physics as to the proper use of the survey meters. When making surveys, try to establish what isotopes are involved. These are generally known from the operational history of the area, however, there may be cross-contamination from radioactive materials used in nearby areas. If there is any uncertainty, have the isotopes identified by assays. If contamination is found, start decontamination promptly. Carefully inspect shielding for contamination and for possible radiation leaks. Upon request, Health Physics will monitor your area and advise on decontamination problems.

5. Preventing Spread of Contamination.

Contamination usually presents a serious problem. If undetected or not properly removed, radioactive substances may enter the body, be taken home, be spread to non-active portions of the building, or spoil other precise experiments. Every effort must be made to detect contamination and prevent its dispersal. Wear protective laboratory coats or coveralls in locations where clothing may become radioactively contaminated. Do not wear the protective clothing outside the working area.

Neatness in the laboratory is a prime requisite for controlling contamination. Clean the work areas frequently and survey them for activity. As a matter of routine, make surveys at the conclusion of each series of experiments before releasing the area for other uses.

All work must be carried out on surfaces that are easily decontaminated. Cover the area of operations with stainless steel, glass trays, or other impervious material.

SAFE PRACTICE INSTRUCTION

EMERGENCY PROCEDURE

A. Spills

1. Warn other occupants of the room; hold your breath; leave the room. If you have time, while you hold your breath, you may minimize the spread of contamination by righting containers and spreading absorbent pads on liquids. Remember, however, your primary responsibility is the safety of yourself and others. Possible loss of material is secondary.

2. Close the door and ask someone to prevent entry until a proper hazard sign is posted. The room may be entered only with the knowledge of a Health Physics representative.

3. Wash and flush any radioactive material from your skin. Use the emergency shower if necessary.

4. Have someone contact First Aid and Health Physics.

5. Remove contaminated clothing and place in an active waste container.

6. Check your body for cuts and abrasions.

7. Be certain that your supervisor is notified of the incident.

8. Alert personnel in adjoining areas.

9. If no immediate medical attention is needed, wait for the Health Physics representative.

B. All cleaning-up operations are to be done with the approval of Health Physics.

RADIOACTIVE SOURCE - INVENTORY AND INSPECTION

The following procedure for inventory and inspection of radioactive sources will be put into effect. The cooperation of all departments concerned is requested.

SCHEDULE

1. All alpha sources to be inventoried between the first and fifth monthly. Smears to be taken at the same time on each third month.
2. All beta sources to be inventoried between the sixth and tenth monthly. Smears to be taken at the same time each sixth month.
3. All gamma sources to be inventoried between the eleventh and twentieth monthly. Smears to be taken at the same time each sixth month.
4. All neutron sources to be inventoried between the twenty-first and thirtieth monthly. Smears to be taken at the same time each three months.

GENERAL

1. Sources found to be in such physical condition as to preclude effective use will be marked as such on the inventory sheet and will be returned to the Radioisotope Laboratory where steps will be taken for final disposition.
2. Sources found to be contaminated to such a degree as to present a health hazard will be recalled to the Radioisotope Laboratory for decontamination and/or disposition.
3. Sources found in the custody of a person other than the one to whom they are assigned will be returned to the Radioisotope Laboratory until the records are amended.

4. All instances of improper storage, mishandling, physical abuse, etc., of sources will be recorded on an incident report. This report will be made out in four copies with distribution as follows:

- 1 copy - Medical and Safety (Health Physics)
- 1 copy - Isotope Committee (Chairman)
- 1 copy - Source incident file
- 1 copy - Supervisor concerned

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U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Page 1 of 1 Pages

Supplementary Sheet

License Number 24-02261-03

Amendment No. 24

McDonnell Douglas Corporation
P. O. Box 516
St. Louis, Missouri 63166

In accordance with letter dated January 3, 1973, License Number 24-02261-03 is amended to read:

Condition 17. is amended to read:

17. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated October 6, 1958, March 21, 1961, and February 8, 1968, and related documents and amendments as follows:

- A. "Safe Practice Procedures" submitted May 22, 1959.
- B. Letter dated May 13, 1959.
- C. Letter dated January 3, 1973.

JAN 17 1973

Date _____

REB

For the U. S. Atomic Energy Commission
Original Signed by
Robert E. Brinkman
by Materials Branch

Division of Materials Licensing
Washington, D. C. 20545

940/2/0293 1P

A1418

15 JUN 1973
USAEC-256-010

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Isotopes Branch
Division of Materials Licensing

Subject: Application for Renewal of Byproduct Material License

Encl: (1) Form AEC-313 (2 copies)
(2) Supplemental Sheets to Enclosure (1) (2 copies)
(3) Manufacturing Methods Procedure 50.01 (1 copy)
(4) Control Procedure 6.515 (1 copy)

1. Enclosed forms AEC-313 are submitted in application for renewal of byproduct material license #24-02261-03 issued to McDonnell Douglas Corporation.
2. Earlier applications contained copies of both the corporate procedures that govern our control of radioactive materials and of manufacturing methods detailing procedures for handling isotope-tagged bucking bars. Both of these documents have been re-issued in a refined form; accordingly, copies of the updated version are included for incorporation into your files of McDonnell Douglas correspondence.
3. Should you require any further information do not hesitate to contact us.

Very truly yours,

MCDONNELL DOUGLAS CORPORATION

W. L. Kester

W. L. Kester,
Chairman, Isotope Committee

CURTIS
SENT TO COMPLIANCE

MCDONNELL DOUGLAS



CORPORATION

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Form AEC-313 8-67 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION APPLICATION FOR BYPRODUCT MATERIAL LICENSE	Form approved Budget Bureau No. 38-0007						
<p>INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commission with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.</p>								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>1 (a) NAME AND STREET ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc. Include ZIP Code.)</p> <p>McDonnell Douglas Corporation P.O. Box 516 Lambert-St. Louis Airport St. Louis, Missouri 63166</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from 1 (a) Include ZIP Code.)</p> <p>Same as 1.(a)</p> </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> <p>2 DEPARTMENT TO USE BYPRODUCT MATERIAL</p> <p>Research, General Engineering, Manufacturing, Quality Control</p> </td> <td style="vertical-align: top; padding: 5px;"> <p>3 PREVIOUS LICENSE NUMBER(S) (If this is an application for renewal of a license, please indicate and give number.)</p> <p>24-02261-03 (Renewal)</p> </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> <p>4 INDIVIDUAL USER(S) (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)</p> <p>W. R. Binns, Scientist W. L. Kester, Section Manager T. C. Linck, Supervisor - Medical F. C. McAllister (Radiography), Engineer C. J. Wolf, Manager - Research</p> </td> <td style="vertical-align: top; padding: 5px;"> <p>5 RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)</p> <p>T. C. Linck</p> </td> </tr> </table>			<p>1 (a) NAME AND STREET ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc. Include ZIP Code.)</p> <p>McDonnell Douglas Corporation P.O. Box 516 Lambert-St. Louis Airport St. Louis, Missouri 63166</p>	<p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from 1 (a) Include ZIP Code.)</p> <p>Same as 1.(a)</p>	<p>2 DEPARTMENT TO USE BYPRODUCT MATERIAL</p> <p>Research, General Engineering, Manufacturing, Quality Control</p>	<p>3 PREVIOUS LICENSE NUMBER(S) (If this is an application for renewal of a license, please indicate and give number.)</p> <p>24-02261-03 (Renewal)</p>	<p>4 INDIVIDUAL USER(S) (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)</p> <p>W. R. Binns, Scientist W. L. Kester, Section Manager T. C. Linck, Supervisor - Medical F. C. McAllister (Radiography), Engineer C. J. Wolf, Manager - Research</p>	<p>5 RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)</p> <p>T. C. Linck</p>
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<p>7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for human use, supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)</p> <p>See Attachment</p>								

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(Continued on reverse side)

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)					
8 TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)	
a Principles and practices of radiation protection	Same as Original Application		Yes No	Yes No	
b Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No	
c Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No	
d Biological effects of radiation			Yes No	Yes No	
9 EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)					
ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE	
		Same as Original Application			
10 RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary)					
TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
Same as Original Application					
11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE					
Same as Original Application					
12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing, or name of supplier)					
Same as Original Application					
INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE					
13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No Same as Original Application					
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. Same as Original Application					
15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. Same as Original Application					
CERTIFICATE (This item must be completed by applicant)					
16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.					
McDonnell Douglas Corporation Applicant named in item 1					
Date <u>13 June 1973</u>			By: <u>William L. Kester</u> <u>Chairman, Isotope Committee</u> Title of certifying official		
WARNING. — 18 U. S. C., Section 1001, Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.					

McDonnell Douglas Corporation
P.O. Box 516
St. Louis, Missouri 63166

FORM AEC-313

6.(a)

- A. Any byproduct material with atomic numbers 3 to 89, inclusive.
- B. Any byproduct material with atomic numbers 3 to 83, inclusive.
- C. Americium 241
- D. Americium 241
- E. Cobalt 60
- F. Cesium 137
- G. Hydrogen 3
- H. Nickel 63
- I. Hydrogen 3
- J. Californium 252
- K. Hydrogen 3

6.(b)

- A. Any chemical form; 25 millicuries maximum each nuclide.
- B. Irradiated parts and components; 1 curie maximum.
- C. Any chemical form; 1 millicurie maximum.
- D. Sealed sources; foil manufactured by Radiation Research Corp., and contained in Lion Research Corp. carbon dioxide detectors; 20 millicuries, not to exceed 1 millicurie per detector.
- E. Sealed sources (wire), not to exceed 200 millicuries.
- F. Sealed sources, (custom, Mallinckrodt); 250 millicuries, no single source to exceed 8 microcuries.
- G. Foil in F & M Model 2-2837 detector cells; not to exceed 200 millicuries per cell.
- H. Sealed Source in F & M Model 2-1692 detector cells; not to exceed 2 millicuries per cell.
- I. Foil in Varian Aerograph Model 02-00014-00 Electron Capture Detector; not to exceed 300 millicuries per cell.
- J. Deposited Source, 0.1 microcurie maximum.
- K. Luminous paint in compasses. Not to exceed 125 millicuries per compass, nor 12.5 curies total.

Attachments
Page 1 of 2

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FORM AEC-313

- 7. A. Research & Development as described in Section 30.4 (q), 10 CFR 30.
- B. Research & Development as described in Section 30.4 (q), 10 CFR 30.
- C. Research & Development as described in Section 30.4 (q), 10 CFR 30.
- D. Testing and calibration of carbon dioxide detectors.
- E. Instrument Calibration.
- F. Tagging bucking bars for detection after manufacture.
- G & H. To be used in F & M Scientific Company gas chromatograph for sample detection.
- I. To be used in Varian Company gas chromatograph for sample detection.
- J. Calibration source inside sealed ionization chamber.
- K. Luminous paint in aircraft survival kit compasses. Government Furnished Equipment (US Air Force).

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MANUFACTURING METHODS PROCEDURE


INDUSTRIAL ENGINEERING DEPARTMENT

DATE ISSUED _____

PROCEDURE NUMBER 50.01

DATE REVISED _____

PAGE 1 OF 5

- A. TITLE: BUCKING BARS - CONTROL, HANDLING, INSTALLATION OF RADIOACTIVE CAPSULES, AND INSPECTION OF
- B. PURPOSE: To establish a procedure and fix responsibility for processing and control of bucking bars to contain radioactive sources suitable for detection and in compliance with the Atomic Energy Commission requirements.
- C. REFERENCE:
1. MCAIR CONTROL PROCEDURE NO. 6.515
 2. TOOL DESIGN T.P.I.M. NO. 30.151
 - NEW 3. TOOL DESIGN T.P.I.M. NO. 30.161
 - NEW 4. TOOL CRIBS-HANDLING OF RADIOACTIVE BUCKING BARS S.P. NO. 9.0595
 5. MANUFACTURING PROCUREMENT SPECIFICATION NO. 5
 - NEW 6. MCAIR A.E.C. LICENSE NO. 24-02261-03 FOR BY PRODUCT MATERIAL.
- D. FORMS:
1. PERISHABLE TOOL ORDER, MAC NO. 315
 2. TOOL REJECTION TAG, MAC NO. 407
 3. ASSEMBLY ORDER, MAC NO. 843
 4. PRODUCTION WORK ORDER, MAC NO. 1288
 5. RADIOACTIVE TOOL, CHARGE OUT CARD, MAC NO. 1372A
 6. TOOL INSPECTION BUCKING BAR LOG
- E. EQUIPMENT:
1. Shielded Carriers, Model L-7, NRD Instrument Company or equivalent.
 2. Steel Capsules containing 8 microcuries of Cesium 137 per MANUFACTURING PROCUREMENT SPECIFICATION NO. 5.
 3. No. 680, Size 3/32, D. C. Rod, Eutectic Low Temp. Welding Alloys, or equivalent.
 - REV 4. Radiation Symbol  steel stamp.
 - NEW 5. Shielded Monitoring Chamber. (MAC MADE)
 - REV 6. Victoreen, Model 490, Thyac II and III GM-Scintillation - Meter or equivalent.
 - REV 7. Victoreen, Model 489-50, Gamma Scintillation Probe or equivalent.
- F. REGULATIONS:
1. All Bucking Bars in use in MCAIR - St. Louis Manufacturing areas must contain a Radioactive Capsule(s) and be permanently identified with the radiation symbol steel stamp specified in T.P.I.M. 30.151 and S.P. 9.0595.
 2. Bucking bars containing Radioactive Capsule(s) are to be reworked by Tooling Department personnel only.
 3. Bucking bars shipped from MCAIR - St. Louis to any outside or remote facility shall not contain radioactive material. Such bars shall be identified by the symbol O.U., signifying "outside use" plainly etched on the bar as near as is practicable to the tool number. If such bars are brought back to MCAIR - St. Louis for use, they must be reactivated by normal procedure, at which time the O.U. shall be obliterated.
 4. Non-radioactive, O.U. bucking bars may be used in Experimental Shops at MCAIR - St. Louis provided that they are obtained from the Tool Crib Department in the same manner as the other O.U. bars and are identified in the same manner. These bars shall be stored in a locked cabinet under Experimental Department Control and shall not be the responsibility of the Tool Crib Department. These bars shall be out of the scope of the MFP unless and until returned to Tool Crib Department custody for installation of radioactive capsules and re-identification.

INDUSTRIAL ENGINEERING DEPARTMENT

MANUFACTURING METHODS PROCEDURE

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DATE ISSUED _____

PAGE 2 OF 5

DATE REVISED _____

- F. REGULATIONS:
- NEW 5. It is permissible to have Bucking Bars containing Radioactive Capsules in Tool Boxes, Drawers, Cabinets, etc. to meet departmental requirements.
 - NEW 6. Department 256, Materials Laboratories, is responsible for keeping Master Record on the total quantity of CSI37 at MCAIR.
 - NEW 7. Department 866, Tool Inspection, is responsible for keeping the record of number of capsules used.
 - NEW 8. Department 126, Tool Cribs Supervision, are responsible for providing Tooling Inspection with a list of Bucking Bars that are scrapped.

G. RESPONSIBILITY AND HANDLING:

- TOOL CRIES 1. All Bucking Bars containing Radioactive Capsule(s) are to be stored, handled and dispensed by Department 126 per S.P. No. 9.0595.
- PRODUCTION, QUALITY (REV) ASSURANCE 2. Maintain a constant surveillance to see that all altered or mutilated bucking bars are returned to the Tool Crib for processing to be reworked or scrapped. Assure that all Bucking Bars in use are in compliance as outlined in Paragraph F.1.
- 3. Notify a Liaison Planner when it is necessary to have a bucking bar altered or reworked to satisfy a salvage, repair, or production requirement.
 - a. Bucking bars reworked to satisfy a salvage or repair requirement shall be returned to the Tool Crib for disposition as soon as the immediate job is finished.
- 4. Loose radioactive capsules or bucking bars with missing capsules shall be delivered immediately to the Tool Crib. Assistant Foreman shall notify Safety and Medical Department, and the associated Inspection Department or Tooling Inspection so that an immediate search can be made if capsules are missing.
- QUALITY ASSURANCE 5. Upon notification by Production supervisory personnel, per Paragraph G.4, conduct a search for the missing capsule using a scintillation survey meter. Every effort shall be exerted to find the missing radioactive material. The TOOL REJECTION TAG shall note the fact that the radioactive capsule was, or was not, found.
- 6. Originate a TOOL REJECTION TAG for all bucking bars that are not acceptable.
- 7. Forward bucking bars to be scrapped to Tool Crib for disposition in accordance with Paragraph G.28.
- LIAISON PLANNING 8. Upon notification by Production Supervisory personnel that a bucking bar requires alteration or rework to satisfy a salvage, repair or production requirement, the Perishable Tools Group Liaison Planner shall determine if a standard available bucking bar can do the job. If not, notify Tooling personnel to rework that particular bucking bar conforming to T.P.I.M. 30.151.
 - a. Liaison Planner shall make disposition of all reworked bucking bars returned to Tool Cribs per Paragraph G.3.a.
- 9. For bucking bars reworked to satisfy a production requirement, the Liaison Planner shall issue a PERISHABLE TOOL ORDER to have a similar tool designed and a sufficient number fabricated for the required application. The reworked bucking bar shall be re-identified with an SPT number and called out on the affected PRODUCTION WORK ORDER or ASSEMBLY ORDER. The Tool Crib to which the bar is assigned shall be notified of the revision in the tool description.
- TOOL DESIGN 10. Establish size, quantity, and location of holes for Radioactive capsules on all Bucking Bar Drawings per the following basic requirements:
 - a. The holes for all Radioactive capsules in bucking bars, are to be in non-bucking surfaces and located so that the structural integrity of the bar is not impaired.
 - REV b. Radioactive capsules are to be located in a bucking bar in such a manner that no matter what position the Bucking Bar may be placed in relation to a scintillation counter probe, there must always be at least one (1) capsule that has less than 1-1/2 inches of metal shielding it from the probe.

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MANUFACTURING METHODS PROCEDURE

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PAGE 3 OF 5

G. RESPONSIBILITY AND HANDLING: (CONTINUED)

TOOL DESIGN
(Continued)

- c. When the shape or size of a bar prohibits compliance with Paragraph G.10.a, steel cylinder(s), in compliance with Reference T.P.I.M. 30.151 shall be welded to the bar to provide adequate structural material around capsule. Locate cylinder(s) to bar in a location that will not interfere with usage of the bar.
11. Holes in Bucking Bars and cylinders for installing radioactive capsules shall conform to the following:
- a. Depth of hole for capsule in bucking bars and cylinders shall be .060 inch minimum greater than capsule length specified in MANUFACTURING PROCUREMENT SPECIFICATIONS NO. 5 to allow for welding.
- b. Diameter of hole for capsule in bucking bars and cylinders shall be .009 inch greater than capsule diameter specified in MANUFACTURING PROCUREMENT SPECIFICATIONS NO. 5 to allow for variation in capsule diameter.
12. Capsules shall be sealed in the bar by ARC or HELI-ARC Welding, using EUTECTIC LOW TEMP. WELDING ALLOYS - #680 - Size 3/32 - D.C. rod, or equivalent. (Build-up of Weld above surface of bucking bar should be sufficient so that a smooth surface remains after excess weld is ground off).

TOOL SHOP
PERSONNEL

13. The radiation symbol shall be steel stamped on the weld surface.
14. Make or rework bucking bars according to Liaison Planner's instructions, Tool Design information, or PERISHABLE TOOL ORDER.
15. Drill holes for Bucking Bars and Cylinders as Specified by Tool Design.
- a. Make steel cylinders to Tool Design Specification.
- b. Weld cylinders to bar in location designated by Tool Design.
- c. Route Bucking Bars with planning attached to Tooling Inspection for loading of Radioactive capsules and welding.

TOOLING (REV)
INSPECTION

16. Place 8 Microcurie capsules in holes drilled in bar, inserting porcelain filled end first. Make sure capsules bottom out in holes. Enter the bucking bar identification number and number of capsules used in each bar in the Tool Inspection Bucking Bar Log.

NOTE

ALL CALLOUTS ON TD DRAWINGS, AND ALL OTHER DOCUMENTS, SPECIFYING 1, 2 AND 4 MICROCURIE CAPSULES ARE HEREBY SUPERSEDED PER THIS MMP REVISION TO SPECIFY 8 MICROCURIE CAPSULES FOR ALL FUTURE LOADING OF BUCKING BARS

TOOL SHOP
PERSONNEL

17. Seal capsules in bar immediately with arc weld per Paragraph G.12.

NOTE

OPERATIONS OUTLINED IN PARAGRAPH G.16, AND G.17, SHALL BE PERFORMED AS A CONTINUOUS OPERATION.

TOOLING
INSPECTION

18. Grind off excess weld metal on bucking bar surface.
19. Steel stamp the weld with the radiation symbol.
20. Route bucking bar to Tooling Inspection.
21. Conduct progressive inspection of bucking bars in the shielded monitoring chamber as they are processed.
22. Check bucking bar with scintillation survey meter for acceptable radiation level to satisfy the following requirements:

INDUSTRIAL ENGINEERING DEPARTMENT

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MANUFACTURING METHODS PROCEDURE

DATE ISSUED _____

DATE REVISED _____

G. RESPONSIBILITY AND HANDLING: (CONTINUED)

REV a. With the probe 30 inches from the bar and the bar positioned so that the largest amount of steel will shield the probe from the capsule(s), the average reading shall be .5 unit above the background radiation level on the X 10 scale of the instrument.

REV b. With the probe 12 inches from the center of the capsule and the bar positioned so that shielding is minimum, the average reading shall not exceed 2.4 units above background radiation level on the X 100 scale.

NOTE

THE NORMAL BACKGROUND RADIATION LEVEL IS ABOUT .5 UNIT
USING THE X 10 SCALE

23. Accept or reject bar per Quality Assurance Procedures.

24. Return accepted bucking bars to Department 126.

25. When a bar fails to meet specification, a TOOL REJECTION TAG shall be completed and attached to it.

REV 26. Bars that do not meet specifications, that can be reworked economically to meet specs, should be reworked and returned to acceptable status.

REV 27. Bars that do not meet specifications and cannot be reworked economically shall be tagged accordingly and returned to Tool Crib, Department 126.

TOOL CRIB (REV) 28. Store all bucking bars that are to be scrapped until a sufficient quantity is accumulated to warrant shipment to a Vendor authorized to dispose of radioactive material. All Bucking Bars shall be disposed of per AEC regulations, C.P. No. 6.515, and Safety & Medical Department regulations.

NEW 29. Forward listing of Bucking Bars scrapped to Tooling Inspection.

TOOLING (NEW)
INSPECTION 30. Clear BUCKING BAR LOG of bars scrapped. Report annually the number of microcuries of CS 137 material scrapped with Bucking Bars to Department 256 (Chairman of Isotope Committee).

DEPARTMENT
256 (NEW) 31. (Chairman Isotope Committee) adjust records on amount of CS 137 at MCAIR.

TOOL CRIBS,
LIAISON (NEW)
PLANNING 32. Review inactive bucking bars (T.D.'s, S.P.T.'s, Commercial) every twelve (12) months and dispose of excess bars as required.

PRODUCTION,
QUALITY
ASSURANCE 33. Maintain surveillance of bucking bars used in shop areas. Reject bars that are damaged or have missing capsules.

34. Route rejected bars to Tool Cribs for processing to Tool Inspection area as required.

TOOLING
INSPECTION
AND
MATERIALS
LABORATORIES
DEPARTMENT
256 35. Initiate procurement action as required, to purchase and maintain an adequate supply of CS 137, 8 microcurie capsules per MANUFACTURING PROCUREMENT SPECIFICATION NO. 5. The receiving of these capsules at MCAIR, shall be accomplished by authorized personnel only.

MANUFACTURING METHODS PROCEDURE

DATE ISSUED _____

DATE REVISED _____

INDUSTRIAL ENGINEERING DEPARTMENT

PROCEDURE NUMBER 50.01PAGE 5 OF 5G. RESPONSIBILITY AND HANDLING: (CONTINUED)

TOOLING
INSPECTION
AND
MATERIALS
LABORATORIES
DEPARTMENT
256

36. A supply of capsules, not to exceed 300, shall be maintained in the Tooling Inspection Department. These capsules shall be stored in AEC approved, locked, shielded Carriers and handled by authorized personnel only. All capsules in excess of those stored in the Tooling Inspection Department shall be stored in the radioactive material storage vault in Department 256, Building 102.
37. All Shielded Carriers and Storage Vaults shall be locked at all times, except when adding or removing capsules. Keys shall be controlled at all times by authorized personnel only.

WRGabriel:vh

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL L1
Supplementary Sheet

Page 1 of 1 Pages

License Number 24-02261-03

Amendment No. 23

McDonnell Douglas Corporation
P.O. Box 316
St. Louis, Missouri 63166

In accordance with application dated June 13, 1973, License Number 24-02261-03 is amended as follows:

The expiration date in Item 4 is changed to July 31, 1978.

Subitems H., J., and K. of Items 6., 7., 8., and 9. are deleted.

Subitem 8.G. is amended to read:

8.G. Not to exceed 380 millicuries per cell

Condition 12. is amended to read:

12. Byproduct material shall be used by, or under the supervision of, W. L. Kester, C. J. Wolf, T. C. Linck, W. C. McCallister, or W. E. Hines.

Condition 17. D. is added:

17. D. Letter dated June 15, 1973.

A1420

Date July 31, 1973

For the U. S. Atomic Energy Commission
Original Signed By
Robert E. Brinkman
Materials Branch

by _____
Directorate of Licensing
Washington, D. C. 20545

2701210101 TP