November 3, 1994

MEMORANDUM TO: Susan Greene, License Reviewer
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch

FROM: John W. Lubinski, Mechanical Engineer
Sealed Source Safety Section
Source Containment and
Devices Branch

SUBJECT: SSD TECHNICAL ASSISTANCE REQUEST:
INNOVATIVE WEAPONRY, INC. (IWI)
CONTROL NO. - 021537
LICENSE NO. - 30-23697-01E

Please find attached your SSD technical assistance request dated September 15, 1993. We are returning the request to you based on the September 23, 1994, letter to IWI which denied their request for license renewal. If the status of IWI's license changes and it becomes necessary to process the amendment request, please resubmit the technical assistance request.

If you have any questions, please contact me at 415-7868 or Mr. Steven Baggett at 415-7273.

Attachment: As stated

cc: SKimberley, LFDCB

Distribution:
SSSS Staff NMSS r/f SCDB r/f IMNS Central Files
SSSS r/f Assign No. 93-56 Reg. File NR365101

DOCUMENT NAME: C:\FILES\SSDS\IWI.TAR
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OFFICE	SCDB	N							
NAME	JLubinski/jl								
DATE	11/01/94								

OFFICIAL RECORD COPY

9501090106 941113
PDR RC *
SSD PDR

* U.S. GOVERNMENT PRINTING OFFICE: 1993-554-917

NRC FORM 567 (9-93)

U. S. NUCLEAR REGULATORY COMMISSION

REQUEST FOR A SEALED SOURCE OR DEVICE EVALUATION

INSTRUCTIONS: Send this request AND a copy of all related letters/applications and drawings to: The Sealed Source Safety Section, ATTN: Chief, OWFN Mail Stop 6 H3. Change the License Tracking System milestone to 19 and assign to reviewer code I-5.
NOTE: Retain a copy of this request with the application and background files.

REQUESTER: Susan Greene

REGION/LOCATION: [ ] I [ ] II [ ] III [ ] IV [ ] V [X] HQ [ ] LFDCB

TELEPHONE NUMBER: ~~504-2686~~ 415-7843

DATE: 09/15/93

APPLICANT'S NAME: Innovative Weaponry, Inc. (IWI)

MAIL CONTROL NUMBER(S): 021537

LETTER/APPLICATION DATE: 06/01/93

LICENSE NUMBER(S): 30-23697-01E

TYPE OF ACTION REQUESTED (Check as appropriate)

[ ] SOURCE REVIEW
[X] DEVICE REVIEW
[ ] CUSTOM REVIEW
[X] AMENDMENT OF REGISTRATION SHEET NUMBER(S): NR-365-D-101-E

COMMENTS: control 021537

Please coordinate deficiency letter with me; I have additional items to include.

mainly Due to OE / OI issue

FOR SSSS USE ONLY

REVIEWER	MODEL NUMBERS	NUMBER ASSIGNED
[redacted]	HM2 - HP3	0- 5-0
DATE RECEIVED: 9/14/93	DATE ASSIGNED: 9/17/93	DATE TO FEES: 9/16/93

TYPE OF ACTION (Indicate the number of each type)

[X] COMMERCIAL DISTRIBUTION (FORMAL)

SOURCE (9C)	DEVICE (9A)	SOURCE (9D)	DEVICE (9B)
[ ] NEW [ ] AMENDMENT	[ ] NEW [X] AMENDMENT	[ ] NEW [ ] AMENDMENT	[ ] NEW [ ] AMENDMENT

[ ] USE BY A SINGLE APPLICANT (CUSTOM)

[ ] NO SAFETY EVALUATION REQUIRED
NO FEES REQUIRED

[ ] LICENSING ACTION REQUIRED IF KNOWN [ ] YES [ ] NO

[ ] OTHER (Specify)

	TOTAL NUMBER OF REVIEW HOURS
	NUMBER OF DEFICIENCY LETTERS
	NUMBER OF DEFICIENCY CALLS

NOTES: Determine IF a safety eval needed
IFso 9BCD will send to Fees
yes 9/16/93

FOR BILLING PURPOSES ONLY

[ ] NAME CHANGE [ ] ADDRESS CHANGE [ ] NEW REGISTRATION – ADD TO BILLING [ ] PRODUCT INACTIVE – REMOVE FROM BILLING

FOR FEE USE ONLY

TYPE OF FEE: AMD

FEE CATEGORY: [X] 9A [ ] 9B [ ] 9C [ ] 9D

AMOUNT RECEIVED: #1,300

CHECK NUMBER: 6009T

[ ] NATANN UPDATED AS REQUIRED

DATE OF CHECK: 8/8/94

LOG: Aug. 94 ISSUED

[ ] NATSYS UPDATED AS REQUIRED

APPROVED BY: [signature]

DATE RETURN: 8/15/94

DATE

* U.S. GOVERNMENT PRINTING OFFICE: 1993-354-917

NRC FORM 557 (9-93)

U. S. NUCLEAR REGULATORY COMMISSION

REQUEST FOR A SEALED SOURCE OR DEVICE EVALUATION

INSTRUCTIONS: Send this request AND a copy of all related letters/applications and drawings to: The Sealed Source Safety Section, ATTN: Chief, OWFN Mail Stop 6 H3. Change the License Tracking System milestone to 19 and assign to reviewer code I-5.
NOTE: Retain a copy of this request with the application and background files.

REQUESTER	REGION/LOCATION:
Susan Greene	☐ I ☐ II ☐ III ☐ IV ☐ V ☒ HQ ☐ LFDCB
TELEPHONE NUMBER: ~~504-2686~~ 415-7843 / DATE: 09/15/93	TYPE OF ACTION REQUESTED (Check as appropriate)
APPLICANT'S NAME: Innovative Weaponry, Inc. (IWI)	☐ SOURCE REVIEW ☒ AMENDMENT OF REGISTRATION SHEET NUMBER(S)
MAIL CONTROL NUMBER(S): 021537	☒ DEVICE REVIEW
LETTER/APPLICATION DATE: 06/01/93 / LICENSE NUMBER(S): 30-23697-01E	☐ CUSTOM REVIEW NR-365-D-101-E

COMMENTS: control 021537

Please coordinate deficiency letter with me; I have additional items to include.

A & mainly Due to OE / OI issue

FOR SSSS USE ONLY

REVIEWER	MODEL NUMBERS	NUMBER ASSIGNED
[redacted]	HMD - HPD	9- 54
DATE RECEIVED: 9/14/93	DATE ASSIGNED: 9/17/93	DATE TO FEES: 12/6/93

TYPE OF ACTION (Indicate the number of each type)

☒ COMMERCIAL DISTRIBUTION (FORMAL) ☐ USE BY A SINGLE APPLICANT (CUSTOM)

SOURCE (9C)	DEVICE (9A)	SOURCE (9D)	DEVICE (9B)
☐ NEW ☐ AMENDMENT	☐ NEW ☒ AMENDMENT	☐ NEW ☐ AMENDMENT	☐ NEW ☐ AMENDMENT

☐ NO SAFETY EVALUATION REQUIRED NO FEES REQUIRED ☐ LICENSING ACTION REQUIRED IF KNOWN ☐ YES ☐ NO

☐ OTHER (Specify)

	TOTAL NUMBER OF REVIEW HOURS	NOTES: Determine if a security visit is needed. If so 9BCD call send to Fees. yes 12/6/93
	NUMBER OF DEFICIENCY LETTERS	
	NUMBER OF DEFICIENCY CALLS	

FOR BILLING PURPOSES ONLY

☐ NAME CHANGE ☐ ADDRESS CHANGE ☐ NEW REGISTRATION – ADD TO BILLING ☐ PRODUCT INACTIVE – REMOVE FROM BILLING

FOR FEE USE ONLY

TYPE OF FEE: AMD	FEE CATEGORY: ☒ 9A ☐ 9B ☐ 9C ☐ 9D
AMOUNT RECEIVED: #1,300	CHECK NUMBER: 6009T / ☐ MATANN UPDATED AS REQUIRED
DATE OF CHECK: 8/8/94	LOG: Aug. 94 1550 / ☐ MATSYS UPDATED AS REQUIRED
APPROVED BY: [redacted]	DATE RETURN: 8/15/94 / DATE

writing, under oath or affirmation, to the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555. The notice shall include the name and address of the entity, current licenses (if any), and identification of the position that you intend to fill. You are not required to respond to this Demand for Information except as specifically provided in the Demand. However, in accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and your response, if one is filed in the future, pursuant to this Demand, will be placed in the NRC Public Document Room.

Questions concerning this Notice of Denial of License Application and Demand for Information should be addressed to John E. Glenn of this office at the above address.

Sincerely,

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Docket No. 030-30266
License No. 30-23697-01E

Enclosures:
1. Synopsis - OI Investigation
   dtd April 15, 1994
2. Synopsis - OI Investigation
   dtd August 9, 1994

Distribution: w/o encls

SGreene	JPiccone	JEGlenn	EWBrach	CPaperiello
NMSS Dir. R/F	IMNS Central File		NMSS r/f	NRC File Center
License File	JGoldberg, OGC		STreby, OGC	GCant, OE
RBangert, OSP	VVCleave, OI/RIV		MMcLean, RIV	LKasner, RIV
SBaggett, SCDB	JLubinski, SCDB		SKimberly, LFDCB	RBaer, SCDB
LWilliamson, OI/RIV	JLieberman, OE		PSantiago, OE	RO'Connell, IMOB
JAFitzgerald, OI				

G:\DENIAL.SLG *SEE PREVIOUS CONCURRENCE

OFC	IMAB	IMAB*	IMAB*	OGC*	OGC*	OI*	DD/IMNS
NAME	SGreene	JPiccone	JEGlenn	JGoldberg	STreby	JAFitzgerald	EWBrach
DATE	09/21/94	09/13/94	09/13/94	09/14/94	09/16/94	09/19/94	09/21/94

OFC	D/IMNS	DD/NMSS	D/NMSS	*OE		
NAME	CPaperiello	GArlotto	RBernero	JLieberman		
DATE	09/21/94	09/21/94	09/23/94	09/19/94		

C=COPY E=COVER/ENCLOSURE N=NO COPY OFFICIAL RECORD COPY g:\denial.slg

September 23, 1994

Innovative Weaponry, Inc.
ATTN: Mr. Barry Mowry
337 Eubank NE
Albuquerque, New Mexico 87123

SUBJECT: (1) NOTICE OF DENIAL OF LICENSE APPLICATION
(2) DEMAND FOR INFORMATION

Dear Mr. Mowry:

This refers to your application dated June 1, 1993, requesting renewal of License No. 30-23697-01E, authorizing the distribution of luminous gunsights, or weapons containing luminous gunsights, as specified in Condition 10 of the license, to persons exempt from the requirements for a license pursuant to Section 30.19, 10 CFR Part 30. The Nuclear Regulatory Commission staff has denied the renewal application, as described below.

NOTICE OF DENIAL OF RENEWAL APPLICATION

Until November 1991, the Innovative Weaponry, Inc., (IWI) license authorized the distribution of Trijicon inserts installed into permanently mounted sights and Trijicon sights mounted onto weapons to persons exempt from licensing and regulatory requirements. The inserts were to be installed and the weapons labelled in accordance with instructions provided by Armson (manufacturer of Trijicon sights).

An inspection of IWI conducted by NRC on August 5, 1991, found that IWI was distributing sights manufactured by IWI instead of the authorized Trijicon sights. A Confirmatory Action Letter (CAL) was issued to IWI on August 7, 1991, confirming that IWI would cease distributing the unauthorized sights and file a request for an amendment of its NRC license for the new gunsights. IWI was also issued a Notice of Violation on September 16, 1991, for distributing gunsights not authorized under NRC License No. 30-23697-01E. IWI's license was amended for the new sights on November 29, 1991.

IWI's current distribution license limits the activity in each luminous gunsight to 30 millicuries per tritium source, not to exceed a total of 90 millicuries (3 tritium sources) per individual weapon. IWI is authorized for three models of tritium inserts ("night sights") as dot or bar night sight configurations. License Condition 10 restricts the specific models and applications of these tritium night sights as follows: certain night sights mounted by IWI in permanently fixed gunsights; certain night sights installed in removable gunsights manufactured by IWI to be sold either separately as kits or mounted onto specific weapons; or certain night sights installed into gunsights manufactured by the original equipment manufacturer to be sold separately as kits or mounted onto specific weapons. License Condition 14 authorizes the permanent labelling of all gunsights with the isotope and the manufacturer's logo, and specifies the location of the label or mark for permanently mounted and removable gunsights.

CERTIFIED MAIL - RETURNED RECEIPT REQUESTED

The NRC staff conducted an unannounced inspection of IWI activities on February 3, 1993. The inspection determined that IWI was distributing gunsights not authorized by its license, a repeat violation, since it also occurred in 1991. Specifically, IWI was found to have distributed gunsights that had not been evaluated by NRC to determine if the devices meet the safety criteria established to allow exempt distribution. The inspection also found that gunsights were being distributed either unmarked or improperly labelled. By CAL dated February 11, 1993, IWI committed to recall the unauthorized gunsights and cease further distribution of the unauthorized gunsights. As a result of findings during this inspection, an investigation was conducted by NRC's Office of Investigations (OI) to determine whether the distribution of unauthorized and unmarked or improperly labelled gunsights was in deliberate violation of license conditions. The investigation concluded that, as president of IWI, you deliberately violated the conditions of IWI's NRC license by selling certain unmounted night sights. It also concluded that IWI distributed unmarked or improperly labelled gunsights not authorized by IWI's license; however, the evidence did not substantiate that these sales were deliberate violations of NRC regulations or license conditions. Enclosure 1 provides the synopsis of the investigation.

On June 18, 1993, the NRC issued an Order Modifying License [Effective Immediately] to IWI as a result of apparent unauthorized distribution of certain night sights as identified during the February 1993 inspection. The Order required IWI to cease distribution of the unauthorized sights and to recall from its customers all sights identified in the February 11, 1993, CAL, as well as any other gunsights distributed in a manner not in compliance with IWI's license. During a conference call with Mr. Gerald Bloomfield, IWI's attorney, and yourself on December 15, 1993, the NRC discussed the provisions of License No. 30-23697-01E and clarified that the NRC license limits IWI's distribution activities to the specific sights and configurations listed in Condition 10 of the license. This conversation was documented in NRC's January 7, 1994, letter to you. In a letter dated March 18, 1994, Mr. Bloomfield stated that you understood the conditions of IWI's NRC license and that IWI was in full compliance with its license.

The NRC's Region IV OI staff performed an unannounced site visit of IWI, as part of their investigation, on July 11, 1994, to ascertain if IWI was complying with the NRC Order. This supplemental investigation determined that IWI was continuing to distribute unmounted sights not authorized by the NRC license; however, OI concluded that there was insufficient evidence that these actions were in deliberate violation of the NRC Order. Enclosure 2 is a copy of the synopsis for this part of the OI investigation.

The NRC's regulations in Section 30.34(c) of 10 CFR Part 30 require that "each person licensed by the Commission pursuant to the regulations in this part and parts 31 through 36 and 39 shall confine his possession and use of the byproduct material to the locations and purposes authorized in the license." License No. 30-23697-01E is specific as to the models and configurations of sights authorized for exempt distribution and the requirements for marking or

labelling the sights or weapons. On several occasions, NRC has discussed with IWI the provisions of the license and compliance with these provisions with IWI professing full compliance with its license. In spite of NRC's efforts and contrary to the provisions of the license, IWI has repeatedly distributed unauthorized gunsights, night sights not properly mounted, and unmarked and/or improperly marked gunsights. Therefore, due to IWI's repeated distribution of unauthorized, unmarked, and/or improperly marked gunsights, the NRC does not have the necessary reasonable assurance that IWI would comply, in the future, with all Commission requirements, including license conditions. Thus, NRC cannot conclude that IWI would confine its possession and use of the byproduct material to the purposes authorized in the license. Accordingly, your license application is hereby denied pursuant to Section 2.103 of 10 CFR Part 2.

As provided in Section 2.103 of 10 CFR Part 2, you have the right to request a hearing concerning this denial. If you wish to request a hearing, submit your request within 20 days from the date of this letter to the Secretary of the Commission, ATTN: Chief, Docketing and Service Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555, with copies to the Director, Office of Nuclear Material Safety and Safeguards, and the Assistant General Counsel for Hearings & Enforcement at the same address and to the Regional Administrator, Region IV, Harris Tower & Pavilion, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011-8064. The request should reference this letter and Docket No. 030-30266.

If a hearing is requested, the Commission will issue an Order designating the time and place of such a hearing. In the event a hearing is held, the issue to be considered at such hearing shall be whether the facts regarding the repeated distribution of unauthorized and improperly labelled sights and the OI finding of deliberate violation of license conditions are an adequate basis for denial of the license application filed by Innovative Weaponry, Inc.

DEMAND FOR INFORMATION

As president of IWI, you were directly involved in, and responsible for, the violations discussed above. Your involvement in many aspects of the day-to-day operations of the company, your lack of oversight of the performance of licensed activities, and the deliberate violation of license conditions raise serious questions as to your ability and willingness to ensure compliance with Commission requirements should you become involved in NRC-licensed activities in the future. If, in the future, you intend to become involved in NRC-licensed activities in a management capacity, such as an owner or officer of an entity that has an NRC license or applies for an NRC license, the Commission will review the matter to be confident that there is competent management and sufficient oversight to ensure the protection of the public health and safety and compliance with all Commission requirements. Therefore, 20 days prior to your assumption of duties in a licensed entity, or your obtaining voting control of a licensed entity, or upon your initiation of an NRC license application, you are required, pursuant to Sections 161c, 161o, 182, and 186 of the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR 2.204 and 30.34(e)(4), to provide notice in

SYNOPSIS

This investigation was initiated to determine if Innovative Weaponry, Inc. (IWI), was deliberately violating its Nuclear Regulatory Commission (NRC) license conditions by distributing unmarked and/or unauthorized luminous gunsights containing tritium. An inspection conducted by the NRC in August 1991 had resulted in issuance of a Notice of Violation stating that IWI was distributing night sights that were not authorized under IWI's NRC license.

An allegation was received by the NRC in August 1992 that IWI was distributing gunsights containing tritium without the required labeling or markings to a distributor in Oregon. IWI's license granted IWI the authority to sell night sights permanently fixed on weapons, and in nine instances, night sights that were not mounted on weapons. All night sights were required to be permanently stamped with "P-T," IWI's logo, and "H3," the symbol for tritium. Interviews and documentation review revealed that unmarked gunsights, gunsights that were marked using a paint label, and unauthorized unmounted loose night sight sets had been sold by IWI.

Based on the evidence developed during this investigation, it is concluded that the president of IWI deliberately violated the conditions of his NRC license by selling certain night sights unmounted. Based on the evidence developed during this investigation, it is also concluded that the president of IWI sold unmarked night sights and night sights marked with a paint label which was not authorized under IWI's license. However, the evidence developed did not substantiate that these sales were deliberate violations of NRC regulations.

SYNOPSIS

The Nuclear Regulatory Commission (NRC) Office of Investigations (OI) conducted an investigation in 1993 into Innovative Weaponry, Inc.'s (IWI) distribution of unauthorized and/or unmarked luminous gunsights following receipt of an allegation that IWI was distributing night sights that were not authorized by its NRC license. The investigation concluded that the president of IWI deliberately violated the conditions of his NRC license by selling certain unmounted night sights.

In June 1993, the NRC issued an Order Modifying License [effective immediately] to IWI as a result of apparent unauthorized distribution of certain night sights. The order required IWI to not distribute and to recall from its customers all gunsights previously identified in a Confirmatory Action Letter and any other gunsights distributed in a manner not in compliance with IWI's license.

On July 11, 1994, the NRC conducted an inspection/investigation of IWI to ascertain if IWI was complying with the NRC Order. This supplemental investigation determined that IWI was continuing to sell unmounted night sights that were not authorized by the NRC license. Based on the testimonial and documentary evidence, it is concluded that the president of IWI failed to adequately explain condition 10 of his NRC license to his employees who subsequently continued to ship unauthorized night sights. In addition, he failed to provide adequate oversight to ensure unauthorized night sights would not be sold by IWI. There is insufficient evidence to conclude that the president of IWI took these actions in deliberate violation of the NRC Order.

FORD 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9110160067 DOC.DATE: 91/10/16 NOTARIZED: NO DOCKET #
FACIL: 03030266
AUTH.NAME AUTHOR AFFILIATION
MOWRY,B. Innovative Weaponry, Inc.
RECIP.NAME RECIPIENT AFFILIATION
Region 4 (Post 820201)

SUBJECT: Responds to NRC ltr re violations noted in insp 30-30266/91-01.Protests violations & presents evidence supporting denial.

DISTRIBUTION CODE: IE07D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 6
TITLE: Environ & Radiological (30,40,70 DKT)-Insp Rept/Notice of Viol Respon

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	LA	1	1	PM	1	1
INTERNAL:	AEOD/DSP/NAS	1	1	NMSS/IMAB 6H3	1	1
	NMSS/IMOB 6H3	1	1	NMSS/SGDB 4E4	1	1
	NMSS/SGTB 4E4	1	1	NRR/DLPQ/LPEB10	1	1
	NUDOCS-ABSTRACT	1	1	OE DIR	1	1
	RGN.IV.FILE 01	1	1			
EXTERNAL:	LPDR	0	0	NRC PDR	1	1

Steve B — FYI
P.S. JLC FYI

TOTAL NUMBER OF COPIES REQUIRED: LTTR ~~12~~ 9 ENCL ~~12~~ 9

RIDS/FORD 1 DOCUMENT

IWI INNOVATIVE WEAPONRY INC.

P•T. NIGHT SIGHT
Mowry Custom Handguns
Specialty Shotgun Systems

RECEIVED
OCT - 4 1991
REGION IV

REPLY TO A NOTICE OF VIOLATION

Reference to: License No.-3023697-01E

Docket No.-030-30266/91-01

U.S. Nuclear Regulatory Commission
Attn: Regional Administrator
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76012

Gentlemen:

This is in reply to "Notice of Violation" dated September 16,1991 against our company. The violation is not clear in that (1) our license is issued for distribution of Hydrogen 3 (Tritium) (Refer to license line #6) in sealed sources produced by Saunders-Roe Development, Limited, England or M.B. Microtec, Switzerland (Refer to license line # 7). At the time of application, Armson, Inc. Farmington Hills, MI (Brand Name

9110160067 911016
REG4 LIC30
30-23697-01E PDR

IE-07
1/1

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

"Trijicon") was the only known supplier for these sealed sources. Since Armson, Inc. is not a manufacturer of sealed sources, only a distributor, the name Trijicon is only their trade name for sealed sources manufactured by the companies so listed. Since we use only sealed sources manufactured by Saunders-Roe Developments LTD (because of their Superior quality) I do not feel we are in violation. The Federal Government cannot restrict purchase of a licensed product to a particular distributor. If sc restricted, the NRC would be in violation of Federal Law concerning monopoly and free trade.

You will also note that IWI made application for amendment on April 17, 1991 (see attachment #1) to eliminate the name Trijicon and to include iron sight of our own manufacture. When we originally applied for our license in 1987, we were told once application was made, we could precede with distribution. This was according to Steven Baggett, Health Physicist, NRC, Washington, DC. When application for amendment was made, we were lead to believe the same procedure applied. It wasn't until August 5, 1991 that we were informed and by Selvan Rajendran, Health Physicist, NRC, that this was not true. With a conference call between Steven Baggett, Selvan Rajendran and myself on August 5, 1991, Mr. Baggett apologized for misleading me in this matter. On August 7, 1991 we received an official letter from your office ordering us to cease distribution activities. We have given every

effort (see Attachment #2) to receive our amended license with no response from the NRC. I feel we are being treated unjustly in this matter, and any efforts from you and your staff will be greatly appreciated. Thank You.

Sincerely,

Barry Mowry

Barry Mowry - President

IWI INNOVATIVE WEAPONRY INC.

ATTACHMENT (1)

P•T. NIGHT SIGHT
Mowry Custom Handguns
Specialty Shotgun Systems

U.S. Nuclear Regulatory Comm.
Commercial Section
Division Of Industrial Safety
Washington, D.C. 20555
Attn: Susan L. Green

Greetings:

4/17/91

In an endeavor to enlarge our scope of production and meet the current needs of government and law enforcement, concerning self luminous sighting aids, we are requesting amendment to our current material license #30-23697-01E. Please find to follow our requests:

Authorized use: Pursuant to 10 CFR Section 32.22 the licensee is requesting authorization to distribute sealed light sources in gunsights to persons exempt from the requirements for a license as defined by 10 CFR 30.19. Maximum activity 30 millicuries per source and 90 millicuries per weapon.

Conditions:

(1) Sealed light sources installed into iron sights manufactured by Innovative Weaponry Inc.

(2) Sealed light sources installed into iron sights manufactured by major firearms manufacturers.

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(3) Sealed light sources installed into archery sight pins.

(4) To be used for research and development as defined in 10 CFR 30.4(q).

Please find enclosed $280.00 for amendment fee.

Please contact me for any additional information needed to implement this amendment.

Thank you for your help and prompt attention.

Sincerely,

Jim Hall
Vice President

INNOVATIVE WEAPONRY INC.

P•T. NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

A brief chronological description of events pertaining to Innovative Weaponry Inc. request to NRC for admendment to current license No. 30-23697-01.

April 17, 1991: Request for admendment sent by mail to: U.S. Nuclear Regulatory Comm. Commerical Section Division of Industrial Safety, Wash. D.C. Attn: Susan Green. Phone: (301) 492-0686

August 5, 1991: NRC Selvan Rajendran Paid I.W.I. a visit.

August 7, 1991: Letter from NRC - Cease Distribution Activities. Distribution was terminated, employees were furloughed until furthur notice.

August 8, 1991: Per request - written demonstrations for changes were applied for. Faxed to NRC

August 23, 1991: Additional Information (16 Items) were requested by NRC.

August 26, 1991: I.W.I reply to Request dated 8-23-91 Attention Sealed Source Review Board.

August 30, 1991: Call to NRC Susan Green **PLEASE EXPEDITE** received our packet. Acknowledged that case was in front of sealed source review board.

September 3, 1991: Call to NRC Susan Green. Sealed Sources Review Board was in possession of our case.

Please Note: This is a **Urgent Request** that this matter be **EXPEDITED.** Thank You! For your efforts in advance.

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Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

IWI INNOVATIVE WEAPONRY INC.

P.T. NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

November 7, 1991

Nuclear Regulatory Commission
Washington D.C. 20555

ATTN: John Lubinski,
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Dear Mr. Lubinski

Enclosed are the drawings as requested per our phone conversation November 7, 1991
Again, Thank You.

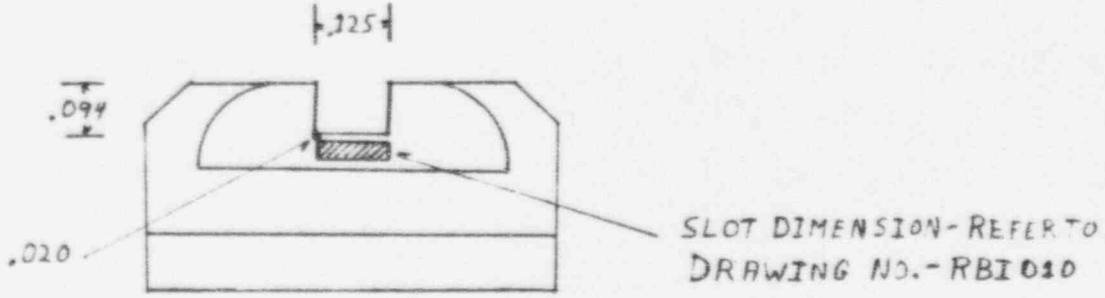
Sincerely,

Barry Mowry President

~~9208050302~~ 4pp.

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

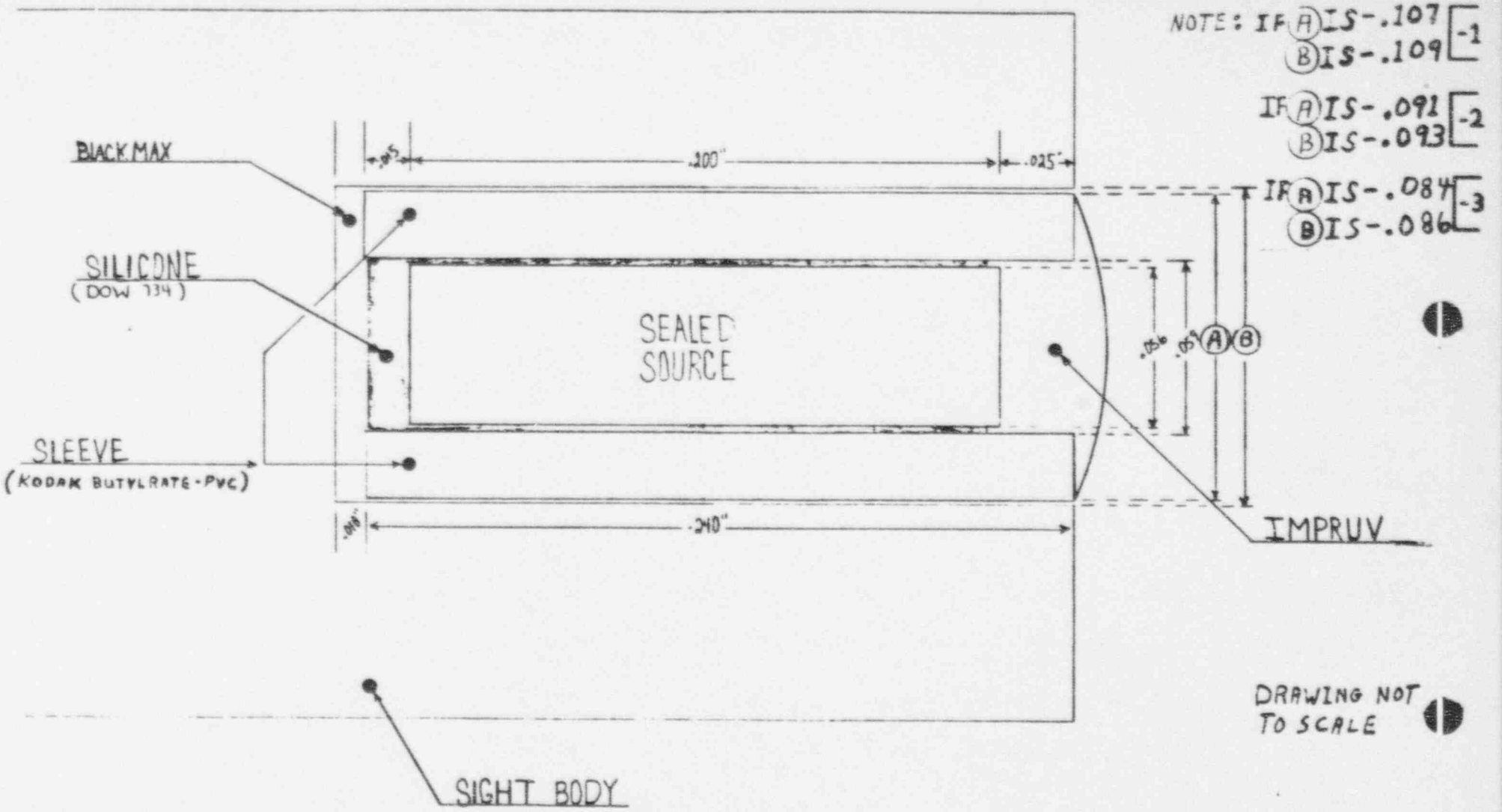
[DRAWING NOT TO SCALE]



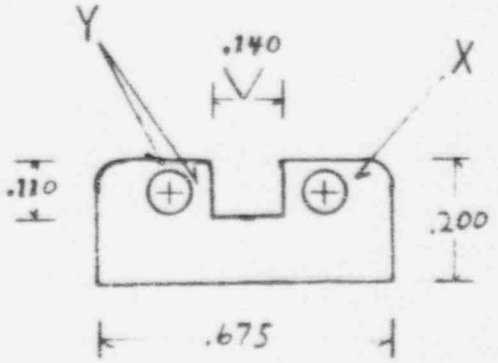
SUPPLEMENT TO:
DRAWING NO. - SWR040

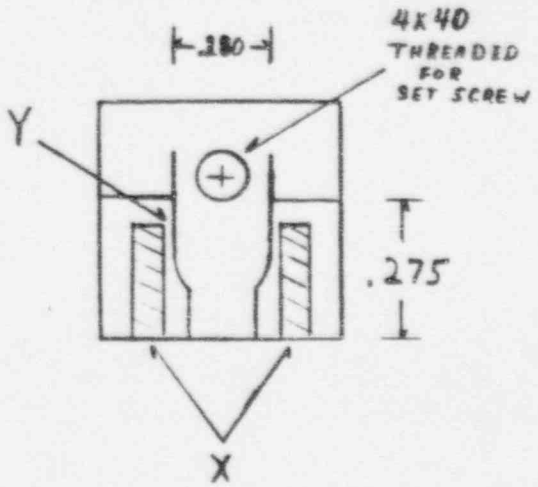
ALL SPECIFICATIONS, DIMENSIONS, AND TOLERANCES ARE SAME UNLESS OTHERWISE STATED.

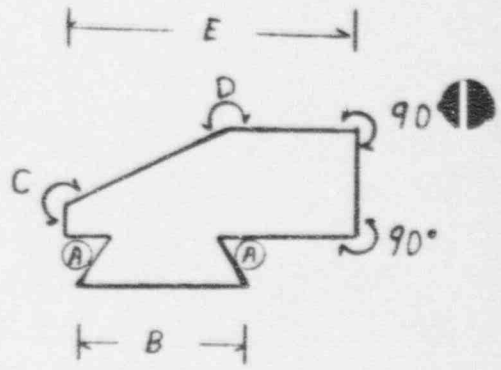
DRAWING NO: SWR041	REAR SIGHT	
PROPERTY OF: INNOVATIVE WEAPONRY INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA		FOR: 'BAR' NIGHT SIGHT



DRAWING NO: SIC123	SEALED SOURCE INSERT	SEALED SOURCE MANUFACTURER: SAUNDERS-ROE DEVELOPMENTS, LIMITED
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .0005 MINIMUM STEEL WALL THICKNESS: .018±	FOR: 'DOT' NIGHT SIGHT







X: HOLE DIMENSION - REFER TO DRAWING NO. - SIC123 OR RDI111

Y: DIMENSION DEPENDS ON HOLE DIAMETER. MINIMUM ALLOWED - .018 ± .0005

DRAWING NOT TO SCALE

DIMENSION - A, B, C, D, E,

NOTE: THESE LENGTHS AND ANGLES VARY TO CONFORM TO EACH MODEL OF HANDGUN

DRAWING NO.- HRS001	REAR SIGHT	MATERIAL: 4130 STEEL	CODES REFER TO NOTATIONS
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK NE. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .001 UNLESS OTHERWISE STATED MINIMUM STEEL WALL THICKNESS: .018 ±	FINISH: - BEADBLAST SURFACE - BLACK OXIDE	FOR: '2-DOT' NIGHT SIGHT

IWI INNOVATIVE WEAPONRY INC.

P-T. NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

November 6, 1991

Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: John Lubinski
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Dear John Lubinski,

Enclosed is an addition to our response to 10CFR32, part 32.32.and 32.24. Also enclosed are our sight installation instructions. If you have any questions please call me at (505) 296-4645. Thank You.

Sincerely,

Barry Mowry- President

~~9207050300~~ 11pp

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

Response compliance to 10 CFR32.

Part 32.23 and 32.24

The following sample calculations for estimated radiation dose commitments cover normal and extreme conditions.

1. Normal Conditions

A. Use

During normal use of a weapon containing our tritium night sight system, no radiation dose commitment is anticipated. The external radiation dose rate at 25 cm is estimated to be less than 0.001 mrem/hr. Since the tritium gas is sealed in a borosilicate glass source and remains intact within the sight on the weapon, no inhalation or ingestion of radioactive material is expected in normal use.

B. Handling, Transporting and storage.

Scintillation test on the sights indicated a leakage rate no greater than 1 E-5 uCi/sight in 24 hours. Assuming that 8000 sight set containing three tritium sources each and 2000 single sights containing one source each are stored in a 14 Ft x 10 ft room in a 65,00 sq ft warehouse with an air exchange rate of 1 air change per hour, the calculated equilibrium concentration of tritium is as follows:

$$C = \frac{I}{\lambda V}$$

where: **I= rate of influx of H-3 gas**
V= volume of the room
λ = air exchange rate
c= equilibrium H-3 gas concentration

I= 26,000 sources x 1 E-5 uCi/source- 24 hr=1.1 E-2 uCi/hr
V= 1400 cubic ft x 2.83 E4 cc/cubic foot= 3.96 E7 cc

$$C = \frac{1.1\text{ E-2 uCi/hr}}{1\text{ a ch/hr x3.96 E7 cc}} = 2.7\text{ E-10 uCi/cc}$$

C= 2.7 E-7 mCi/cubic meter

The concentration limit set in 10CFR20 Appendix B, Table II, Column 1 for H-3 in air is 2 E-7 uCi/ml. The calculated equilibrium concentration in the storage area is less than 1% of the 10CFR20 concentration limit for a controlled area. The annual dose commitment to a warehouse worker, working in the area for 1 hour/day, 250 days/year is a follows:

Assume:

All H-3 gas is converted to tritiated water
Total rate of absorption of tritiated water into body fluids (mCi/minute) from inhalation and skin absorption is 3 E-2 C where C is the concentration of tritiated water in air in mCi/cubic meter (ICRP 30)
Committed dose equivalent per unit intake of

tritiated water is 1.7E-11 Sv/Eq (6.3 E-2 rem/mCi)
Annual committed dose:
H= 2.7 E-7 mCi/cubic meter x 3 E-2 mCi-cubic meter/mCi-minte x60 minute/hour x 250 hr/yr x 6.3 E-2 rem/mCi = 7.7 E-6 rem/year
H=0.008 mrem/year.

All other situation during normal handling, storage, and transportation involve smaller quantities of Tritium (H3) and/or shorter exposure times thus would result in negligible dose commitment.

C. Disposal

Since the gunsights are relatively expensive items and are warranted for there useful life, it is unlikely to be inadvertently removed from the firearm and disposed of. The disposal of a sight intact with a firearm to normal trash is unlikely. With our warranty, if a sight becomes defective, it will be returned to IWI for replacement. Therefore, improper or carless disposal of the sights is unlikely to cause any significant radiation dose.

2. Extreme Conditions

A. Use

The most extreme hazard during the use of a weapon with the tritium night sight system installed would be the rupturing of the closest source (rear sight) to the user, causing the instantaneous release of the gas during firing.

Scenario: Assume

Rear sight contain a total of 60 mCi of H-3 gas. Rear sight is 15cm from the user's face. Breathing zone can be represented by a cone with apex at the source and base, a 10cm diameter circle at the user face. All H-3 is converted to tritiated water instantly. (Effective half life for tritiated water= 12 days)

Total absorption of inhaled tritium in body fluids
Mass of soft tissue= 63,000 g (ICRP 30)
Fraction of gas released in the direction of the breathing zone:

$$F = \frac{\pi r \times r}{4\pi R \times R}$$

where r = radius of the base of the cone

R= distance from source to nose

$$F = \frac{3.14 \times 5 \times 5 \text{ sq cm}}{4 \times 3.14 \times 15 \times 15 \text{ sq cm}} = 0.03$$

Maximum estimated dose commitment to user assuming all H-3 gas is converted to tritiated water

H= 60 mCi x 0.03 x6.3 E-2 rem/mCi = 115 mrem

For such an accidental instantaneous release, most of the gas would remain as elemental H-3. The dose commitment from H-3 gas would be approximately 1000 times less. The total estimated dose commitment would be 2% of the calculated value since up to 2% of the gas originally in the glass capsule could be in the form of tritiated water (see Manufacturer's specs.)

B.

Handling Transportation and Storage

The most extreme hazard situation in this category would involve the rupturing of a quantity of sources due to a massive fire or explosion in the storage area.
(refer to No. 1-B for dimensions and quantity)

Scenario: Assume:

50% of the sources ruptured Immediate dispersion of the gas within the storage area Conversion of all H-3 gas to tritiated water. Total rate of absorption of tritiated water into body fluids (mCi/minute) from inhalation and skin absorption is 3 E-2 C where C is the concentration of tritiated water in air in mCi/cubic meter (ICRP 30)

$$C = \frac{780 \text{ Ci} \times 0.50}{3.96 \text{ E7 cc}} = 9.6 \text{ E-6 Ci /cc} = 9.6 \text{ E3 mCi/ cubic meter}$$

Dose commitment:

H= 9.6E3 mCi/cubic meter x 3 E-2 mCi- cubic meter/mCi-min x6.3 E-2 rem/mCi
H=18.0 rem/minute
Dose commitment to occupant remaining in enclosed area for 1 minute =18.0 rem
Dose commitment to Emergency personnel remaining in enclosed area without respiratory protection for 2 minutes for purpose of rescue =36 rem
This calculation greatly overestimates the true dose commitments in this situation. Air currents would disperse the gas very rapidly in the case of a fire, particularly one such severity as to rupture 50% of the sources instantaneously. In addition, only a small fraction of the H-3 gas is likely to be converted to tritiated water before venting to the outside.

A more reasonable estimate of the dose commitment would be obtained using the maximum fraction of tritiated water in the source, 0.02. If this value is used the dose commitments become 36 mrem for the occupant and 72 mrem for the Emergency Personnel. However, even under the extreme conditions the dose commitments would be within the values in Table 32.24.

C.

Ingestion or Inhalation of the entire tritium (H3) content (17mCi) of our maximum source.
(H=30 mCi x 6.3 E-2 rem/mCi = 1.9 rem)
In order to achieve this scenario, on individual would have to remove the source from the sight without rupturing it, then swallow it and have it rupture within the

digestive tract. The want for and individual to perform this scenario is highly improbable. We feel the act of achieving is virtually impossible.

INSTRUCTIONS FOR INSTALLATION: GLOCK STEEL

Installation should be performed by a competent gunsmith.

[The Glock push tool is not necessary for installation]

Front Sight: Use punch to tap out existing front sight. Insert new sight into sight hole. Tap in place. Apply permanent Locktite #271 to Phillips screw and snug securely in place.

Rear Sight: Using a brass drift, tap out existing sight. Use brass drift to install new sight. Tap into place. Secure rear sight set hex head screw with permanent Locktite #271.

I.W.I is not responsible for damage resulting from improper installation.

INSTRUCTIONS FOR INSTALLATION: SIG SAUER ULTIMATE COMBAT

Installation should be performed by a competent gunsmith.

Front Sight: Use brass drift to remove existing front sight from dovetail. Tap out, left to right. Use brass drift to install new front sight. Tap in place, right to left.

Rear Sight: Use brass drift to remove existing rear sight from dovetail. Tap out, left to right. Use brass drift to install new rear sight. Tap in place, right to left. Secure rear sight set hex head screw with permanent Locktite #271.

I.W.I. is not responsible for damage resulting from improper installation.

INSTRUCTIONS FOR INSTALLATION: COLT 1911/2000

Installation should be performed by a competent gunsmith.

Front Sight: Remove existing front sight. Stake on new front sight.

Rear Sight: Use brass drift to remove existing rear sight from dovetail. Tap out, left to right. Use brass drift to install new rear sight. Tap in place, right to left. Secure rear sight set hex head screw with permanent Locktite #271.

I.W.I. is not responsible for damage resulting from improper installation.

INSTRUCTIONS FOR INSTALLATION: SMITH & WESSON

Installation should be performed by a competent gunsmith.

Front Sight: Use brass drift to remove existing front sight from dovetail. Tap out, left to right. Use brass drift to install new front sight. Tap in place, right to left.

Rear Sight: Use brass drift to remove existing rear sight from dovetail. Tap out, left to right. Use brass drift to install new rear sight. Tap in place, right to left. Secure rear sight set hex head screw with permanent Locktite #271.

I.W.I. is not responsible for damage resulting from improper installation.

IWI INNOVATIVE WEAPONRY INC.

P•T. NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

November 4, 1991

Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN Susan Greene and John Lubinski
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Dear Ms Greene And Mr Lubinski,

As per my conversion with Mr John Lubinski I am requesting the following changes be made to our letter of application for amendment, dated October 24, 1991.

Request #(1)- that in reply -#1(A) the words "and special classified military arms" be stricken from the response.

Request #(2)- that the last part of reply #4 now reads: on permanently fixed sights, either the sights (If Possible) or the frame of the weapon, as close as possible without interference to the sight area, will be stamped. The stamping will be visible on an exposed area.

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

9210805029 10pp

Request#(3)- The acceptance of the revised QA/QC Manual (enclosed). The wording in section 4 part 3,5,6, and 10 have been revised with more descriptive requirements.

Also enclosed is our description of permanently fixed sights, and a list of weapons which fall into this category. Drawings of the sights I.W.I. manufactures and /or distributes are also enclosed. If you have any questions, please call me at (505) 296-4645. Thank you for your prompt response.

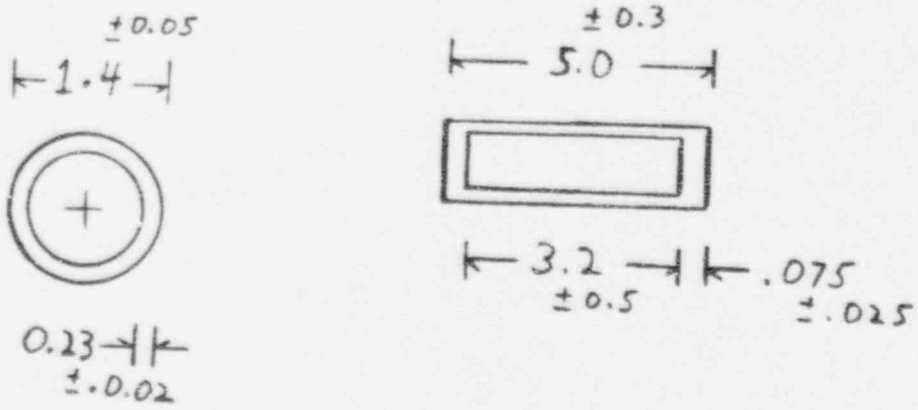
Sincerely,

Barry Mowry

Barry Mowry-President

These attached drawing (BLS 251, BLS 252)
replace Saunders- Roe Beta Light Drawings.

[DRAWING NOT TO SCALE]



PART NO.-252050G0150A
COLOR-GREEN
TRITIUM CONTENT-.009ci
FILLING PRESSURE-25P
BRIGHTNESS-150UL

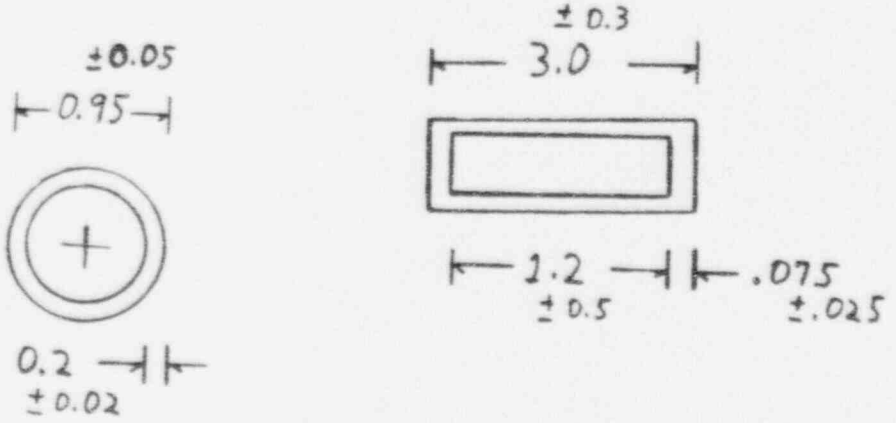
PART NO.-252050G0200A
COLOR-GREEN
TRITIUM CONTENT-.012ci
FILLING PRESSURE-50P
BRIGHTNESS-200UL

PART NO:252050Y0150A
COLOR-YELLOW
TRITIUM CONTENT-.010ci
FILLING PRESSURE-32P
BRIGHTNESS-150UL

PART NO.-252050T0100A
COLOR-ORANGE
TRITIUM CONTENT-.009ci
FILLING PRESSURE-50P
BRIGHTNESS-100UL

DRAWING NO: BLS252	BETALIGHT	MANUFACTURED BY: SAUNDERS-ROE DEVELOPMENTS, LTD.
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	DIMENSIONS AND TOLERANCES IN: MILLIMETERS (MM)	FOR: P-T NIGHT SIGHT

[DRAWING NOT TO SCALE]

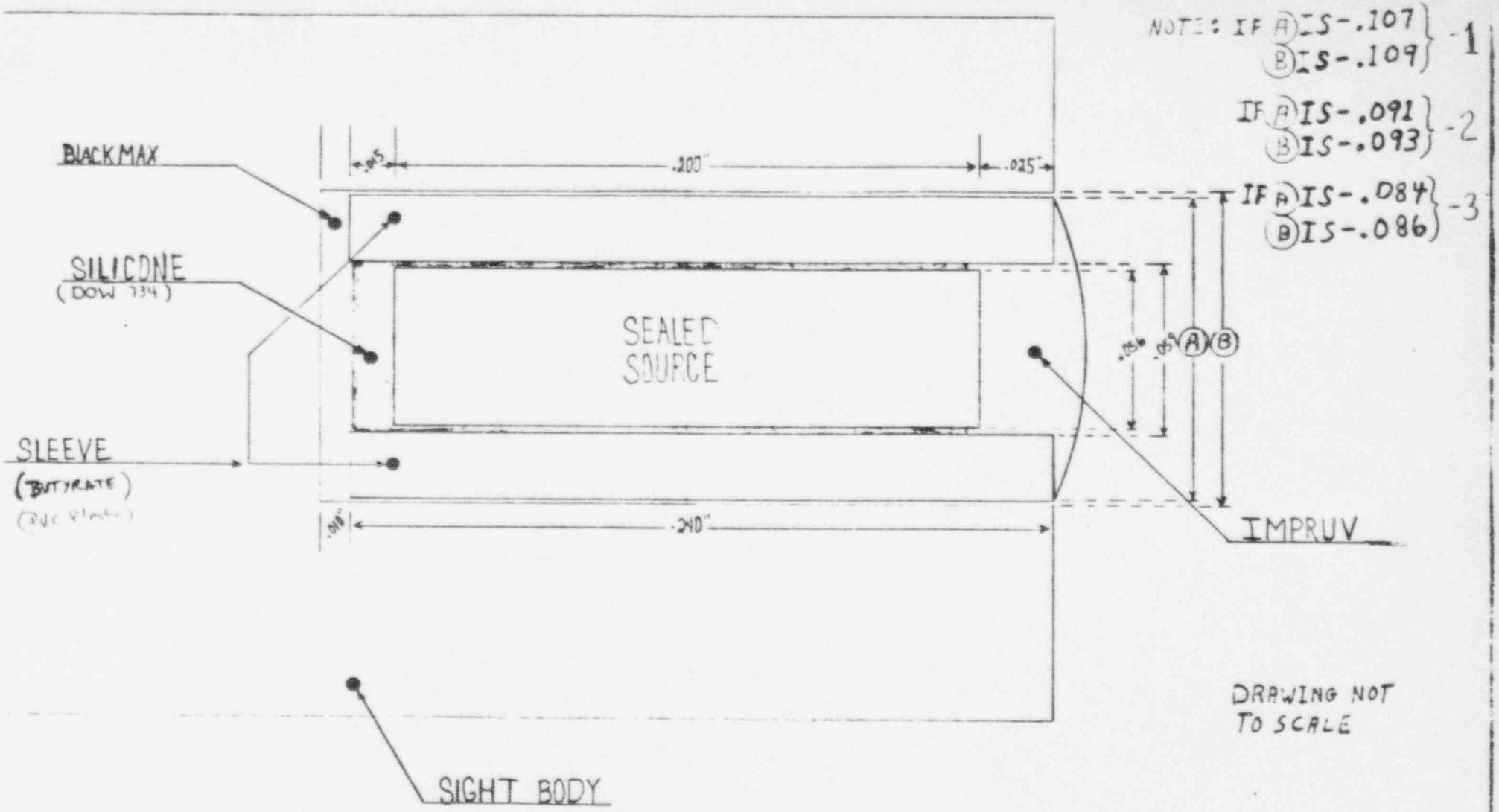


PART NO.- 251030Y0040A
COLOR - YELLOW
TRITIUM CONTENT - .002 Ci
FILLING PRESSURE - 50P
BRIGHTNESS - 40uL

PART NO.- 251030G0100A
COLOR - GREEN
TRITIUM CONTENT - .007 Ci
FILLING PRESSURE - 50P
BRIGHTNESS - 100 uL

DRAWING NO: BLS251	BETALIGHT	MANUFACTURED BY: SAUNDERS-ROE DEVELOPMENTS, LTD.
PROPERTY OF: INNOVATIVE WEAPONRY INC. 337 EUBANK NE. ALBUQUERQUE, N.M. 87123 USA	DIMENSIONS AND TOLERANCES IN: MILLIMETERS (MM)	FOR: P-T NIGHT SIGHT

These attached drawing (#SIC123)
Has been revised. Please replace this in your
drawing file.



DRAWING NO: SIC123	SEALED SOURCE INSERT	SEALED SOURCE MANUFACTURER: SAUNDERS-ROE DEVELOPMENTS, LIMITED
PROPERTY OF: NOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .0005 MINIMUM STEEL WALL THICKNESS: .018±	FOR: 'DOT' NIGHT SIGHT

Permanent, Fixed, Non-detachable Sights designated as original Equipment: A Description and criteria as follows:

(A) A sight manufactured as part of the barrel and or frame of the weapon. An integral part constituting an essential of a whole necessary to completeness.

(B) Sights which are attached to weapon by ways of: Fixed dovetails, stake-on keyways notched with one or more roll pins cross locking the sights to the weapon. Attachments of this nature can only be removed by the means of competent and professional gunsmithing procedures, techniques and specialized removal implements and equipment.

(C) Sights which are attached with rivets.

(D) Sights which are attached by means of a threaded locking device, which may only be removed by a sequential process of technique and expertise.

Note: Criteria of permanent sights **does not** included those which could removed by a simple means, done, made or used by the hand.

Weapons incorporating permanent, fixed, or non-detachable sights as included in their description:

Weapon, manufacturer & model designation number to follow:

Smith & Wesson Fixed and adjustable sighted revolvers:

Model No: [J Frame] 31, 34, 36, 37, 38, 40, 42, 49, 60, 63, 640, 642, 649 [K Frame] 10, 13, 15, 17, 19, 64, 65, 66 [L Frame] 581, 681, 586, 686, [N Frame] 25, 27, 29, 57, 629, 681, 657.

Smith & Wesson Semi-Automatic pistols:

Model No: 39, 41, 59, 422, 459, 439, 469, 645.

Colt Fixed and adjustable sighted relvolvers:

Model Name: Python, King Cobra, Anaconda, Trooper, Peacemaker, Agent, Detective Special, Cobra, Lawman.

Charter Arms Fixed and adjustable sighted revolvers:

Model Name: Bulldog Tracker, Pathfinder, Bulldog, Bulldog Pug, Police Bulldog, Off-Duty, Undercover.

Taurus Fixed and adjustable sighted revolvers:

Model No: 65, 66, 73, 76, 80, 82, 83, 85, 85CH, 86, 94, 96, 669, 689.

Taurus Semi-Automatic Pistols:

Model No: PT22, PT25, PT58, PT92, PT92C, PT99, PT100.

Weapons incorporating permanent, fixed, or non-detachable sights as included in their description:

Weapon, manufacturer & model designation number to follow:

Smith & Wesson Fixed and adjustable sighted revolvers:
Model No: [J Frame] 31, 34, 36, 37, 38, 40, 42, 49, 60, 63, 640, 642, 649 [K Frame] 10, 13, 15, 17, 19, 64, 65, 66 [L Frame] 581, 681, 586, 686, [N Frame] 25, 27, 29, 57, 629, 681, 657.
Smith & Wesson Semi-Automatic pistols:
Model No: 39, 41, 59, 422, 459, 439, 469, 645.

Colt Fixed and adjustable sighted relvolvers:
Model Name: Python, King Cobra, Anaconda, Trooper, Peacemaker, Agent, Detective Special, Cobra, Lawman.

Charter Arms Fixed and adjustable sighted revolvers:
Model Name: Bulldog Tracker, Pathfinder, Bulldog, Bulldog Pug, Police Bulldog, Off-Duty, Undercover.

Taurus Fixed and adjustable sighted revolvers:
Model No: 65, 66, 73, 76, 80, 82, 83, 85, 85CH, 86, 94, 96, 669, 689.
Taurus Semi-Automatic Pistols:
Model No: PT22, PT25, PT58, PT92, PT92C, PT99, PT100.

Ruger Fixed and adjustable sighted revolvers:

Model Name: Blackhawk, Redhawk, Super Blackhawk, Super Redhawk, Super Single Six, Security Six, GP-100, SP-101,

Ruger Semi-Automatic Pistols:

Model No: P-89, P-90.

Beretta Semi-Automatic fixed sighted pistols:

Model No: 84, 85, 86, 87, 92F, 92FC.

Walther Fixed Semi-Automatic sighted pistols:

Model No: PP, P5, PPK, PPK/S, TPH, P-38, P-88.

Remington Shotgun Rifle Sights:

Model No: 870RS, 100RS.

Benelli Shotgun Sights:

Model No: Super 90, 121.

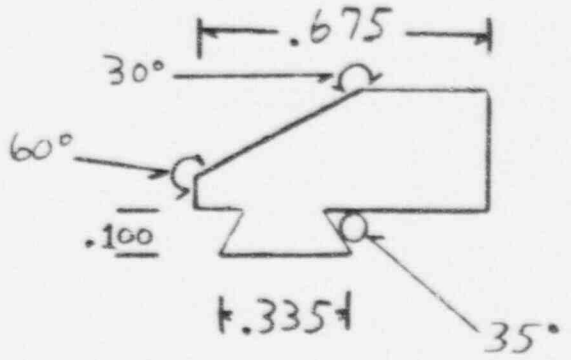
Heckler & Koch Rifle:

Model No: 91, 93, MP-5, SP-89.

Colt Rifle:

Model No: AR-15, M16.

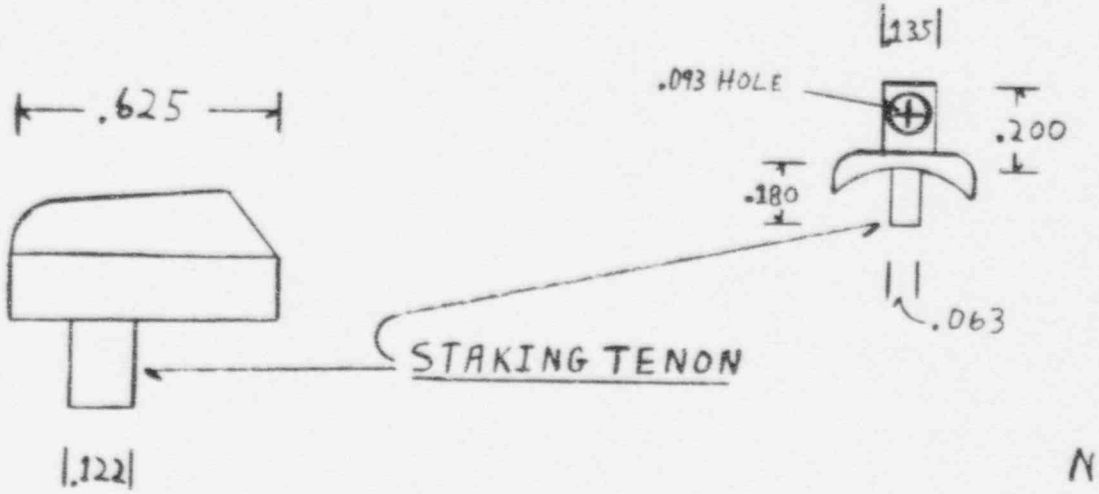
[DRAWING NOT TO SCALE]



NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING NO.- -HRS001 + HRS002

DRAWING NO: CGR030	REAR SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	FINISH: - BEAD BLAST SURFACE - BLACK OXIDE	FOR: COLT PISTOL MODELS - GOV'T. 1911-A1, COMMANDER, OFFICER MODEL

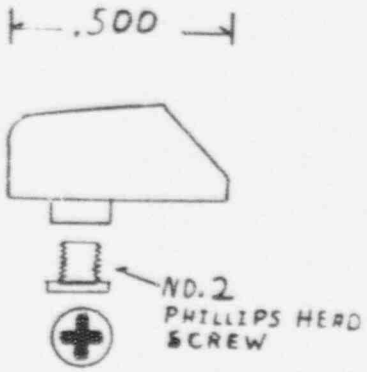
[DRAWING NOT TO SCALE]

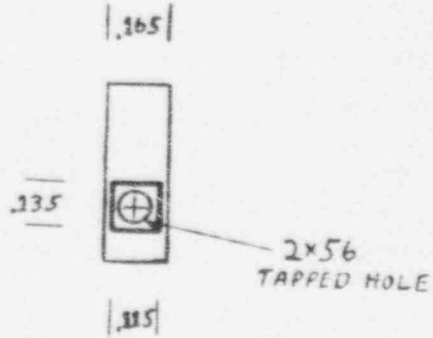


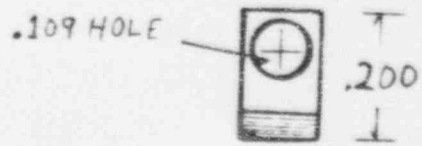
NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING NO. - HFS100

DRAWING NO: CGF003	FRONT SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK NE. ALBUQUERQUE, N.M. 87123 USA	FINISH: - BEADBLAST SURFACE - BLACK OXIDE	FOR: COLT PISTOL MODELS - GOV'T. 1911-A1, COMMANDER, OFFICER MODEL

[DRAWING NOT TO SCALE]



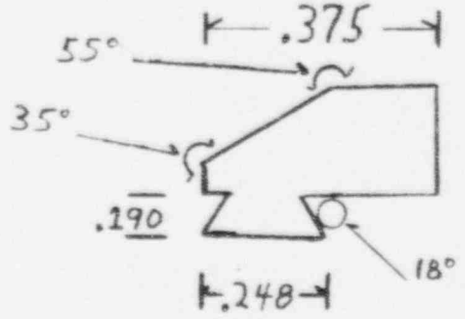




NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING NO.- HFS100

DRAWING NO: GKF001	FRONT SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK NE ALBUQUERQUE, N.M. 87123 USA	FINISH: -BEADBLAST SURFACE -BLACK OXIDE	FOR: GLOCK PISTOL MODELS-17, 19, 20, 21, 22, 23

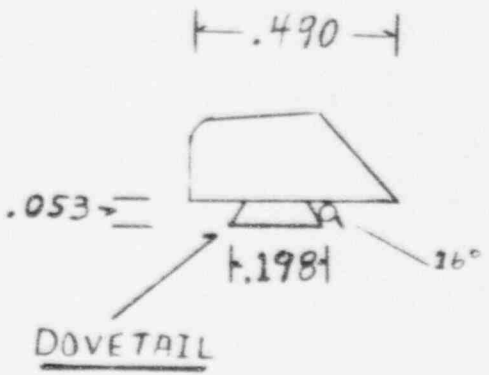
[DRAWING NOT TO SCALE]

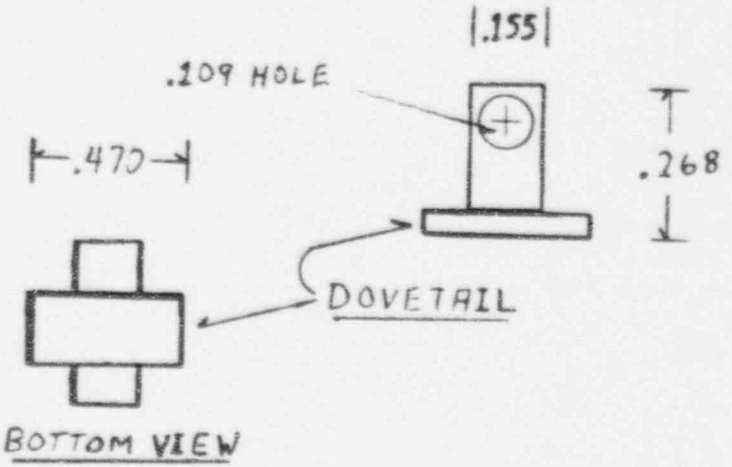


NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING No- -HRS001 & HRS002

DRAWING NO: GKR010	REAR SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 U.S.A.	FINISH: - BEAD BLAST SURFACE - BLACK OXIDE	FOR: GLOCK PISTOL MODELS - 17, 19, 20, 21, 22, 23

[DRAWING NOT TO SCALE]

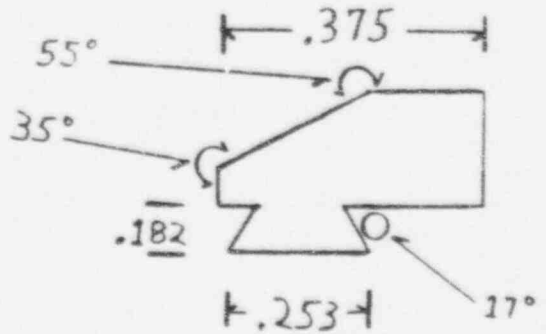




NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING NO.- HFS100

DRAWING NO: SSF002	FRONT SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	FINISH: - BEAD BLAST SURFACE - BLACK OXIDE	FOR: SIG-SAUER PISTOL MODELS - P220, P226, P228, P229

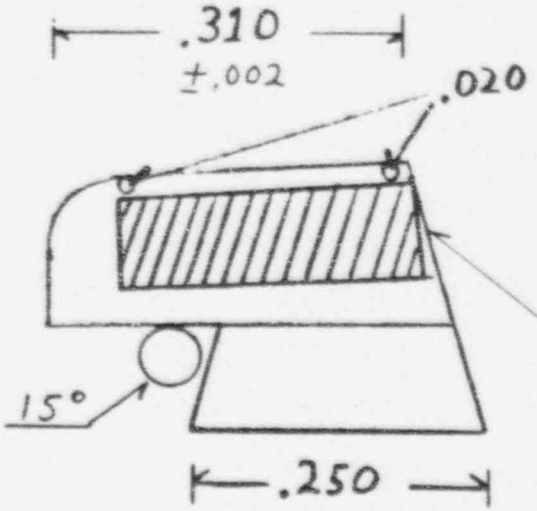
[DRAWING NOT TO SCALE]

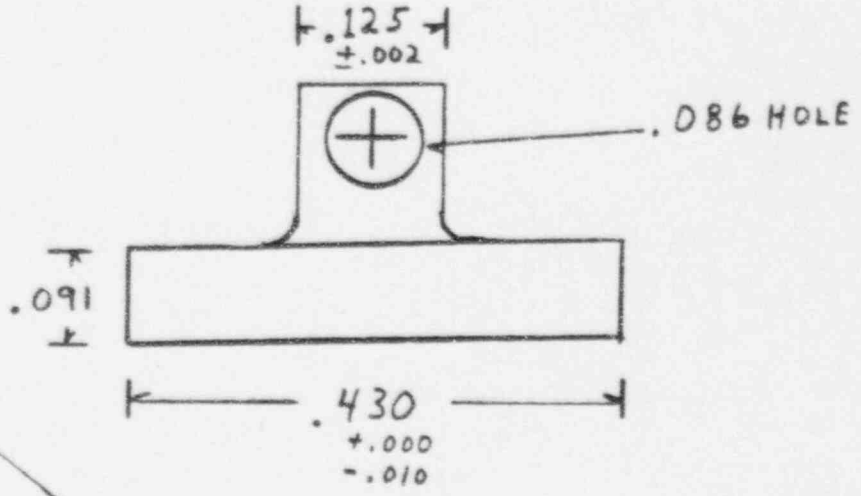


NOTE: FOR ALL OTHER TOLERANCES, DIMENSIONS, AND SPECIFICATIONS, REFER TO DRAWING NO.- -HRS001 + HRS002

DRAWING NO: SSR020	REAR SIGHT	MATERIAL: 4130 STEEL
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	FINISH: - BEAD BLAST SURFACE - BLACK OXIDE	FOR: SIG-SAUER PISTOL MODELS - P220, P226, P228, P229

[DRAWING NOT TO SCALE]

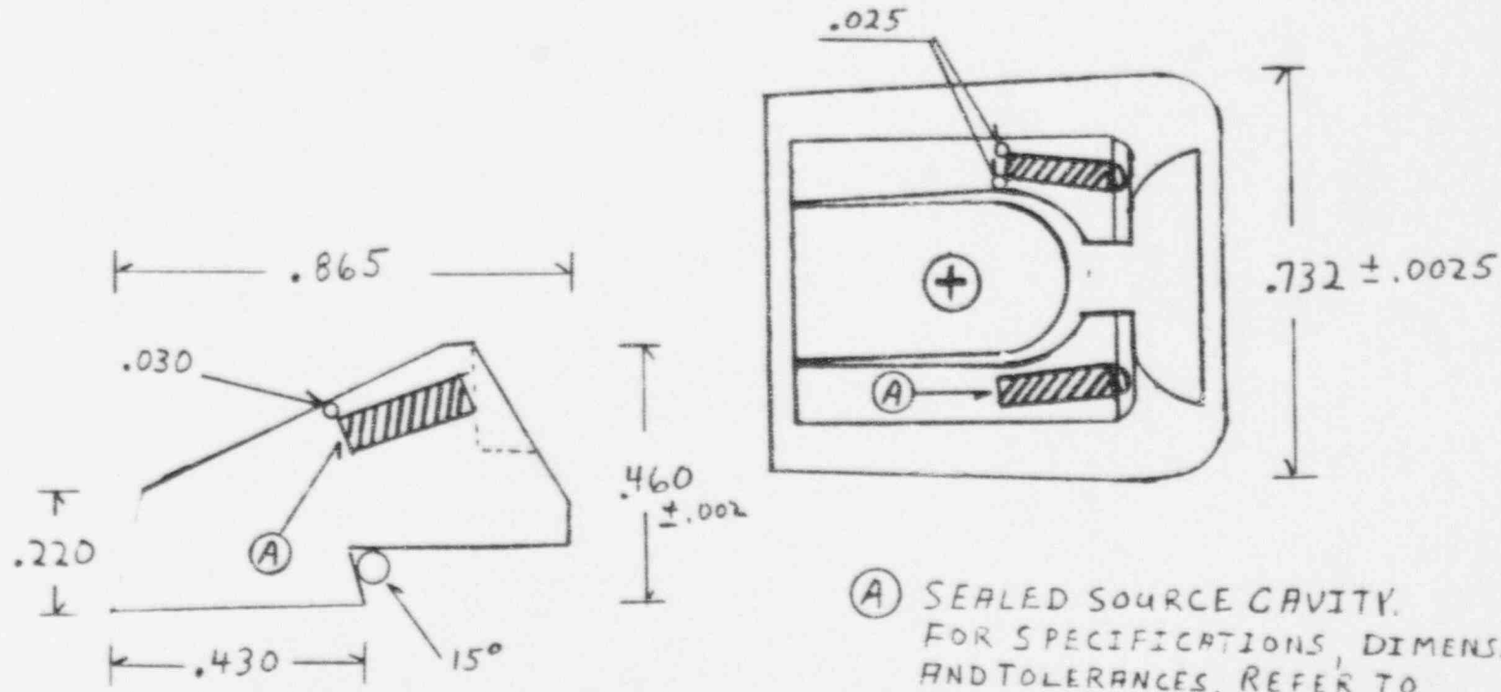




NOTE: SEALED SOURCE.
FOR DIMENSIONS, SPECIFICATIONS, AND TOLERANCES, REFER TO DRAWING NO.- SIC123

DRAWING NO: SWF004	FRONT SIGHT	MATERIAL: STEEL (CAST - HEAT TREATED)
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	SIGHT MANUFACTURED BY: SMITH AND WESSON FACTORY TOLERANCE ALL ± .001 UNLESS OTHERWISE STATED	FOR: SMITH AND WESSON PISTOL MODELS - 3904, 3905, 3906, 5904, 5905, 5906, 6904, 6906, 4006, 4026, 4046, 4013, 4014, 4053, 4054, 1006, 1016, 1026, 1046, 1066, 1076, 1086, 4506, 4516, 4526, 4546, 4566, 4576, 4586, 3913, 3914, 6924

[DRAWING NOT TO SCALE]



(A) SEALED SOURCE CAVITY.
FOR SPECIFICATIONS, DIMENSIONS, AND TOLERANCES, REFER TO DRAWING NO.- SIC123

DRAWING NO.- SWR040	REAR SIGHT	MATERIAL: STEEL (CAST - HEAT TREATED)
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	SIGHT MANUFACTURED BY: SMITH AND WESSON FACTORY TOLERANCE ALL ± .001 UNLESS OTHERWISE STATED	FOR: SMITH AND WESSON PISTOL MODELS - 3904, 3905, 3906, 5904, 5905, 5906, 6904, 6906, 4006, 4026, 4046, 4013, 4053, 4014, 4054, 1006, 1016, 1026, 1046, 1066, 1076, 1086, 4506, 4516, 4526, 4546, 4566, 4576, 4586, 3913, 3914, 6924

QUALITY ASSURANCE AND CONTROL

(QA/QC) DEPARTMENT MANUAL

P-T NIGHT SIGHT

Innovative Weaponry, Inc.

October 1991

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1. ORGANIZATION

2. FACILITY LAYOUT

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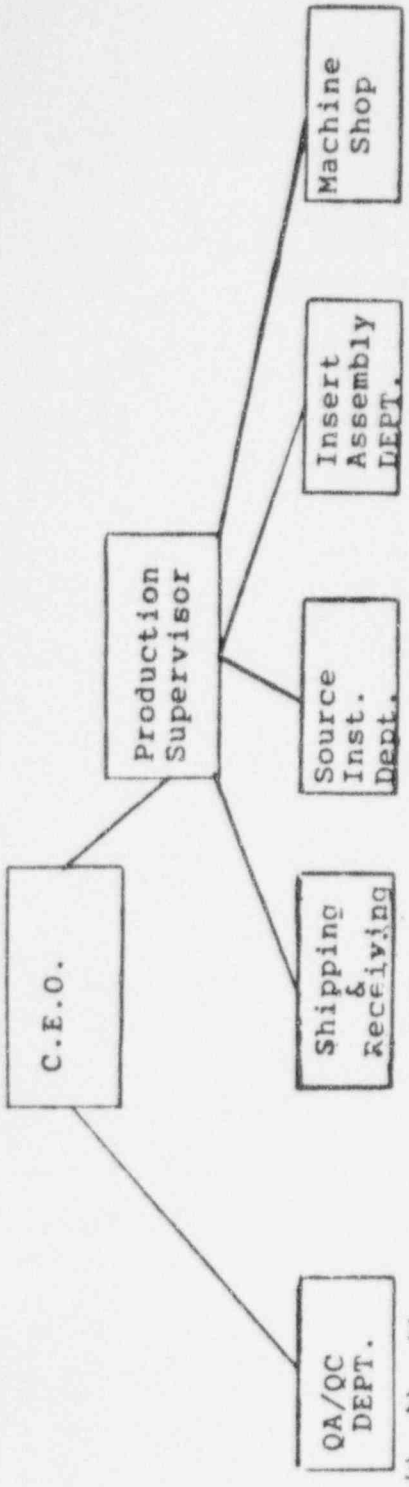
4. PROCEDURES

1. ORGANIZATION



Machine Shop
1. All Equipment maintained to insure quality
2. All Tolerances must be met inproduction
3. All Drawing maintained for exact specifications
4. Proper records kept

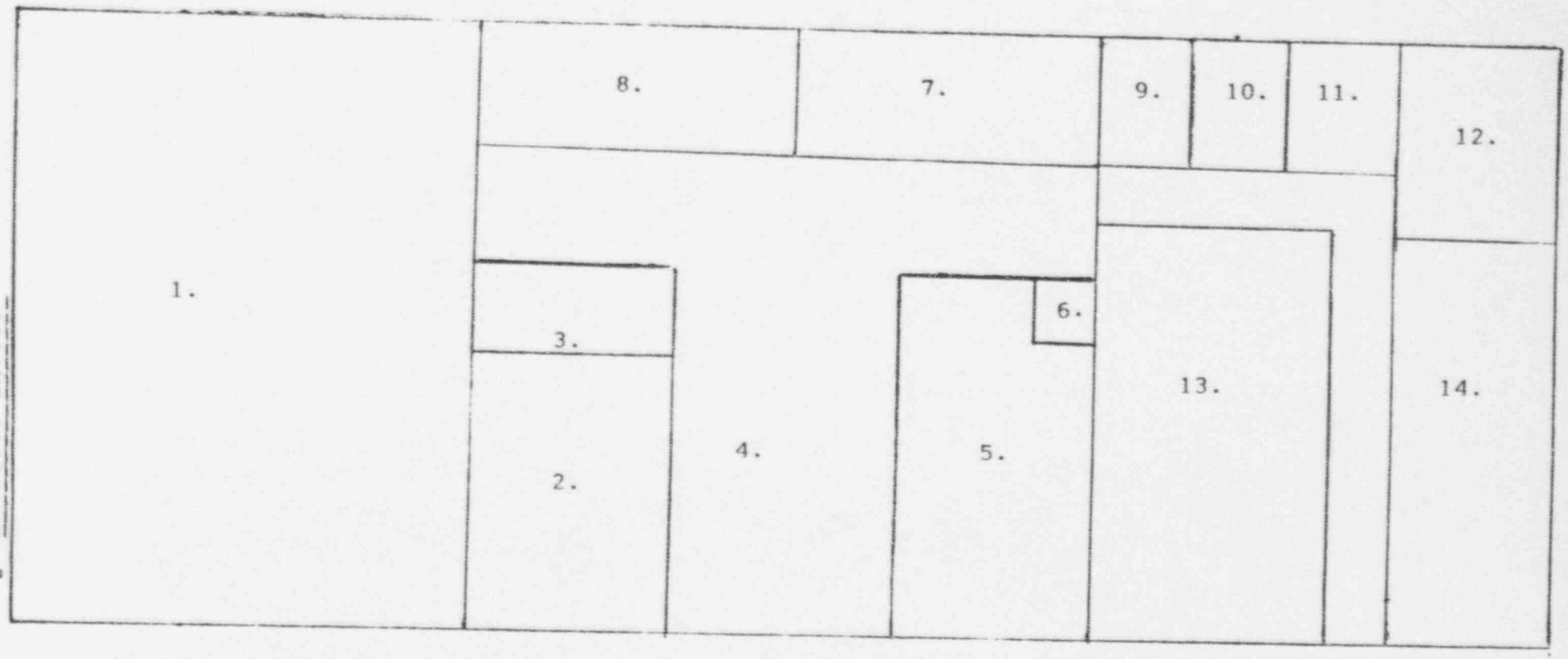
Insert Assembly DEPT.
1. Visual Inspection of all product before assembly
2. All Insert assembled to exact specifications
3. Critical curing times strictly maintained
4. proper records kept

Source Inst. Dept.
1. Visual inspection of all prouduct before assembly
2. All source and insert assembled to exact specification
3. Critical curing times strictly maintained
4. All product properly labeled
5. Proper records kept

Shipping & Receiving
1. All product must be properly packaged for storage handling, and shipping
2. Check for proper labeling
3. proper records kept

QA/QC DEPT.
1. QA/QC personal must strictly follow the QA/QC procedure manual and enforce the policies there in.
2. QA/QC is responsible foe insuring that all departments maintain quality work to exact specifications.
3. QA/QC is responsible for insuring that all departments maintain proper records.
4. QA/QC shallnotify the production supervisor of all immediate situations which need attention or correction
5. QA/QC answer and reports directly to the C.E.O.

2. FACILITY LAYOUT



1. Office Complex
2. Shipping and Receiving
3. Shop Office
4. Machine Shop
5. Production Room
6. Radioactive Area
7. Inspection Area
8. Employee Room
9. Restroom
10. Restroom
11. Vaulted Storage Area
12. R. and D. Area
13. Shop
14. Shop

3. PERSONNEL REQUIREMENTS

A. Personnel shall have in their records all drawing, specifications, and descriptions of all products and installation procedures.

B. Personnel must be properly trained to carry out all inspections.

C. Proper records must be maintained on all inspections.

4. PROCEDURES

(1). Inspectors shall have all drawings, descriptions, and specifications along with all proper equipment to perform their duties.

(2). Inspectors shall have written procedures for all processes in manufacturing the product.

(3). Inspect all sealed sources when received from the manufacturer.

A. Verify the certification from the scintillation test from the manufacturer.

B. Check for activity brightness (visual Inspection). If any sources do not pass the visual inspection, they are to be separated and set aside for periodic inspection for any change. If any source does not pass inspection, it shall be returned to the manufacturer.

c. Check source for fractures and check seals. (Microscopic Visual Inspection)

D. After Inspection, label with date, quantity, and QA/QC approval. Place in controlled area.

(4) All machine work, whether done in our shop or by a sublet vendor, shall be inspected for tolerances. The cavities for the source installation shall meet all tolerance specifications and surface quality.

(5) All sealed source inserts shall be inspected for proper sealant and lensing materials as per required specifications. the inserts shall also be inspected for proper dimensions as per requirement of drawing document.

(6) Inspection of sealed source installations shall be checked for adhesion tolerances and specifications,
As per requirement of drawing document.

(7) Quality control has the power to reject any and all product that does not meet specifications.

(8) Any product that is not visually correct shall be rejected.

(9) Quality control has the power to shut down the assembly line for any situation detrimental to QA/QC requirements.

(10) All product shall be final inspected visually for its proper identity and completeness before delivery to the shipping and receiving department.

(11) All inspection of any product shall be documented, passed or rejected, and reason of rejection.

(12) Records shall be kept of all product inspection reports.

(13) A complete inventory shall be kept of all product.

IWI INNOVATIVE WEAPONRY INC.

P.T. NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

Received 8/28/91

ENCLOSED

Innovative Weaponry Inc. response
to NRC question: #1 - #16.

Included: Attached Drawings
Attached Labels
Agreement State Licence
SRDL Supplement

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

NCR-1 Describe the type (s) and model number(s) of the device(s) Innovative Weaponry is registering. (Are sealed sources being attached directly to permanent sights which are attached to weapons? Are sealed sources being attached to iron sights? etc.)

I.W.I. Reply-1 All I.W.I devices are similar in that they all contain one or more sealed sources mounted into "iron sights" which are either OEM manufacture or are designed and manufactured by I.W.I. If OEM sights are capable of properly housing the sealed source, then installation is done directly into them.(see installation procedure sheet previously provided to NRC with initial application) If OEM sight are not compatible, I.W.I. manufactures a proper replacement type sight that will accept the sealed source installation. In certain situations "iron sights" are not separately attached to the weapon, but they are an integral part of the weapon itself. In this case, I.W.I. goes directly into the sight area of the weapon. All installations use the same procedures.

NRC-2 Explain how the device will be distributed to Innovative Weaponry's customers.

I.W.I. Reply-2 I.W.I. does several type of device systems (as described in reply #1) but the process of installation (description sent with initial application) is always the same. Distribution to the customer is done by (1) The customer sends his weapon to I.W.I. for direct installation into the existing sights. (2) I.W.I. manufactures replacement "Iron Sights" which are packaged for delivery to be properly installed by a competent gunsmith. This allows I.W.I. to manufacture and provide a night sighting system for virtually any small arms weapon of today's market. All proper labeling (see Reply #8) and instructions (see reply #11) are provided to the user.

NRC- 3 List all types of weapons onto which the sights will be attached
(handguns, shot guns, automatic weapons,etc.)

I.W.I. Reply- 3 I.W.I. will produce or install (refer to I.W.I. reply #1) Night sights for the small arms world of weapons and devices to include: Handguns, Shotguns, Rifles, Automatic Weapons, Gas Launching Devices, Grenade Launching Devices, other specialized and classified military arms and devices.

NRC-4 Submit drawings of the devices to be registered. The drawings must include all materials, dimensions and tolerances. If the light sources are being attached to permanently mounted sights, details of the mounting including dimensions must be sumitted.

NRC-5 Provide drawings of how the sealed sources and sights are to be mounted.

I.W.I. Reply-4&5 Regardless of which system I.W.I. uses, the installation process is always the same. The following drawings(see Drawing enclosed) show in detail how the sealed sources are mounted:

All Handgun front sights, 3-dot rear sights, shotgun sight, All specialty sight large dot sights ... See Attached drawing #1

Bar Rear sight and Rifle front sight....
See Attached drawing #2

Rifle rear dot and all specalty sight small dot sights... see attached drawing #3

NRC-6 Provide verification that the sealed sources to be used in the devices are registered with the NRC an Agreement States. Submit the model numbers and drawings of the sources to be used in the devices.

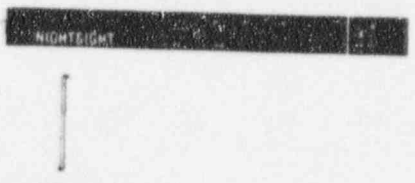
I.W.I. Reply-6 New Mexico is an NRC Agreement State. I.W.I. has a purchase and possession license from the New Mexico Heath and Environment Dept. (copy Enclosed see attachment number). All records and registrations are kept in accordance with the requirements of this licence. The SRDL model numbers of the sealed sources have been previously submitted with the original application. Their drawings and descriptions, along with their testing procedures are enclosed forthwith. (see Attachment to SRDL)

NRC-7 State the maximum activity of the sealed sources to be used in the devices and the maximum combined activity of the sealed sources to be use on each weapon.

I.W.I. Reply-7 The maximum activity per single source should not exceed forty (40) millicuries. I.W.I. requests usage up to three(3) sources per weapon. This makes the total combined maximum activity one hundred-Twenty(120) Millicuries per weapon.

NRC-8 Provide an example showing how the sight and/or weapons will be labelled.

I.W.I.Reply-8 Our Chemical Resistant label (Attached Below) is self adhesive and attached externally on the weapon itself. A label is provided with each sight set for the customer.



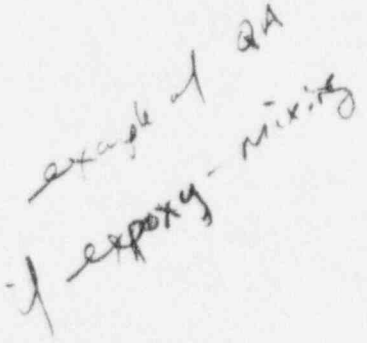
NRC-9 Demonstrate how the sights will meet the requirements of 10 CFR part 32, Section 32.32.

I.W.I. Reply-9 I.W.I. purchases Radioactive Material (Tritium in form 3H2 or H3H) in sealed sources (laser sealed borosilicate glass). External radiation exposure or internal contamination is very unlikely. I.W.I. takes maximum precaution in handling during installation and distribution, no breakage or fracturing occurs to allow exposure. If during an uncontrollable situation exposure occurs, Tritium (H derivative) will dissipate into the upper atmosphere very quickly. I.W.I has a specific area in which all storage and installation is performed. If exposure occurs, the area is immediately vacated and properly ventilated for a minimum of 30 minutes. (this is per Dept of Energy facilities requirements)
Because of the low amount of activity contained in a single sealed source, exposure of or dose ingested is very minimal for any individual involved in production, marketing or user of said product. I.W.I. takes every precaution in installation, no exposure should occur to the individuals involved in distribution or user of our finished products, under normal circumstances.

Rod (orange) paste
Cuvette guide)

NRC-10 Provide a copy of Innovative Weaponry's quality assurance and control procedures and their leak test procedures.

I.W.I. Reply-10 I.W.I. assures the utmost quality products manufactured and work performed. In the production of our night sights, we have taken every step possible to assure the highest quality and the safest sight available to the market today. Our sealed sources are totally encased by a shock absorbing material. Every effort is taken to eliminate any possibility of a fracture under any usage normal to the weapon to which they are installed. We purchase the highest quality sealed sources available in the world. (See Specifications and Test-SRDL supplement).



NRC-11 Provide a copy of the product bochure to be supplied to the device users.

I.W.I. Reply-11 I.W.I. Product User Brochure

(Attached Below)

A NOTE TO OUR CUSTOMERS:

THANK YOU! for purchasing **P-T NIGHT SIGHTS.** You are now the owner of the most advanced night sight made today.

WARNING: Please observe the instructions below.

CAUTION: **Do not** immerse into cleaning solutions or dunk tank for a prolonged period of time. Prolonged exposure to cleaning solvents may effect adhesives. Also, prolonged exposure to ultra-sound cleaning is not recommended.

NORMAL GUN CLEANING SOLVENTS WILL NOT AFFECT THE SIGHTS.

Do not expose to **extremely** high temperatures encountered in finishing and plating procedures.

P-T Night Sights contain Tritium. Purchaser is exempt from any regulatory responsibility. TRITIUM EXEMPT
[Tritium has a relatively low biological hazard because of its low energy-level beta radiation and because, being a gas it is quickly dispersed should it be released.]
If a Tritium tube becomes accidentally broken, ventilate and leave the area for a minimum of 30 minutes.

This Package conforms to the conditions and limitations specified in 49 CFR 173.422 for excepted radioactive material, instruments and articles UN2911.

15 year warranty. Satisfaction Guaranteed

QUESTIONS? Please Call 800 334-3573

NRC-12 Provide verification that all prototype test are performed with the sights attached to the weapon which will have the most detrimental effects.

I.W.I. Reply-12 All of IWI's night sights are designed for a particular weapon type, and do not interchange with other weapon types. Thus, it is most effective to do the testing with the sight on the weapon that it was designed for. We feel the testing demonstrates that our sights withstand greater than normal, up to, and including extreme heavy abuse, which in most cases would render the weapon useless. As with any manufacturer we feel a product cannot be designed that will withstand all circumstances. However, our sights do withstand more abuse than will occur to any weapon during normal usage, up to and including extreme abuse.

NRC-13 Submit the details of evaluations performed after the prototype testing. Include the leak test which are preformed.

I.W.I.Reply-13 Enclosed are the details (Refer to test Evaluation sheet #13A-E) for test evaluation of prototype testing. Also enclosed (see SRDL supplement Attached) are the sealed source manufacturer's tests performed before actual delivery of the sealed sources to our facility.

NCR-14 Describe for the chemical test how the chemicals submitted in your August 8, 1991 letter compare to trichloromethane. Why is 20 minutes of soaking considered a sufficient amount of time?

I.W.I. Reply-14 The chemicals used in the test are common chemicals, as stated in the "test name" section. Since Trichloromethane (CHCL.3) is chloroform and is highly suspected carcinogenic, per N.T.P. and I.A.R.C., we feel this is not a common chemical and did not conduct testing on this chemical.

In normal testing we try to duplicate actual gun cleaning procedures with actual products for that purpose.

Initial guidelines were established at 24 hours for these product test. We there after established our test criteria to better typify actual cleaning procedures, which we felt 30 minutes would be a minimum acceptable level. Our conclusion was no notable difference between 30 minutes and 24 hours.

NCR-15 For the thermal test, submit more detail of how the IMPRUV appears to separate from the sight.

I.W.I. reply- 15 Refer to Attachment sheet #13-C

(Test Evaluation-Thermal Abuse)

NRC-16 For the hot acid test, explain what would happen to the sight if it were subjected to temperatures of 300 degrees F for 35 minutes.

I.W.I. Reply-16 Although normal Black Oxide (common gun term,"bluing") finish process is done at the 260-265 degrees F For 20 minutes, temperature could possibly climb to 295-300 degrees F if care is not taken by the operator. Although no damage was detected in our test, we feel it is possible to damage the IMPRUV and/ or BlACK MAX adhesion if the sights are subjected to excessive temperatures for any length of time. This is why we strongly advise not to submit the sights to these conditions in our product user brochure (see I.W.I. Reply #11). Even though the bonding could become damaged, no damage will occur to the sealed source itself.

ATTACHMENT SHEET #13-A

Chemical (common) test

TEST EVALUATION

After the testing was completed, the sights were visually inspected for illumination and any other form of destruction. None of the products show any effects on the construction materials, sights themselves, or to the sealed sources.

The object of this test is to ensure that the common cleaning solvents and/or chemicals that are likely to be used on our sights will not effect the function or appearance of our sights.

ATTACHMENT SHEET #13-B

* Recoil Shock Test*

TEST EVALUATION

After testing, the sights were left on the weapon for aprox, 4 weeks. The weapons were visually inspected on a daily basis with no evidence of failure of any kind detected. The sights were removed from the weapons, then placed in a labeled, sealed container, and they are still being shown as samples on a frequent basis.

ATTACHMENT SHEET # 13-C

* Thermal Abuse*

TEST EVALUATION

1. After the testing, the sights were allowed to cool. Then the IMPROV was probed to see if adhesion failed at that point. The conclusion was that it still had adhesion qualities. The surface, or skin, of the IMPROV appeared to distort or refract the light, causing a dark ring around the edge of the material.

2. The sights were then immersed in loctite flushing solvent #12121 (Methylene Chloride) to remove the IMPROV and BLACKMAX. This took aprox. 24 Hours, at which time we were able to inspect the sealed source for damage. No damage was detected.

ATTACHMENT SHEET # 13-D

* Drop Test*

TEST EVALUATION

After testing, the sights were inspected for damage and illumination. Tests conclude that no damage had occured, and they were placed,in a labeled sealed, sealed container, and are still being shown as samples on a frequent basis.

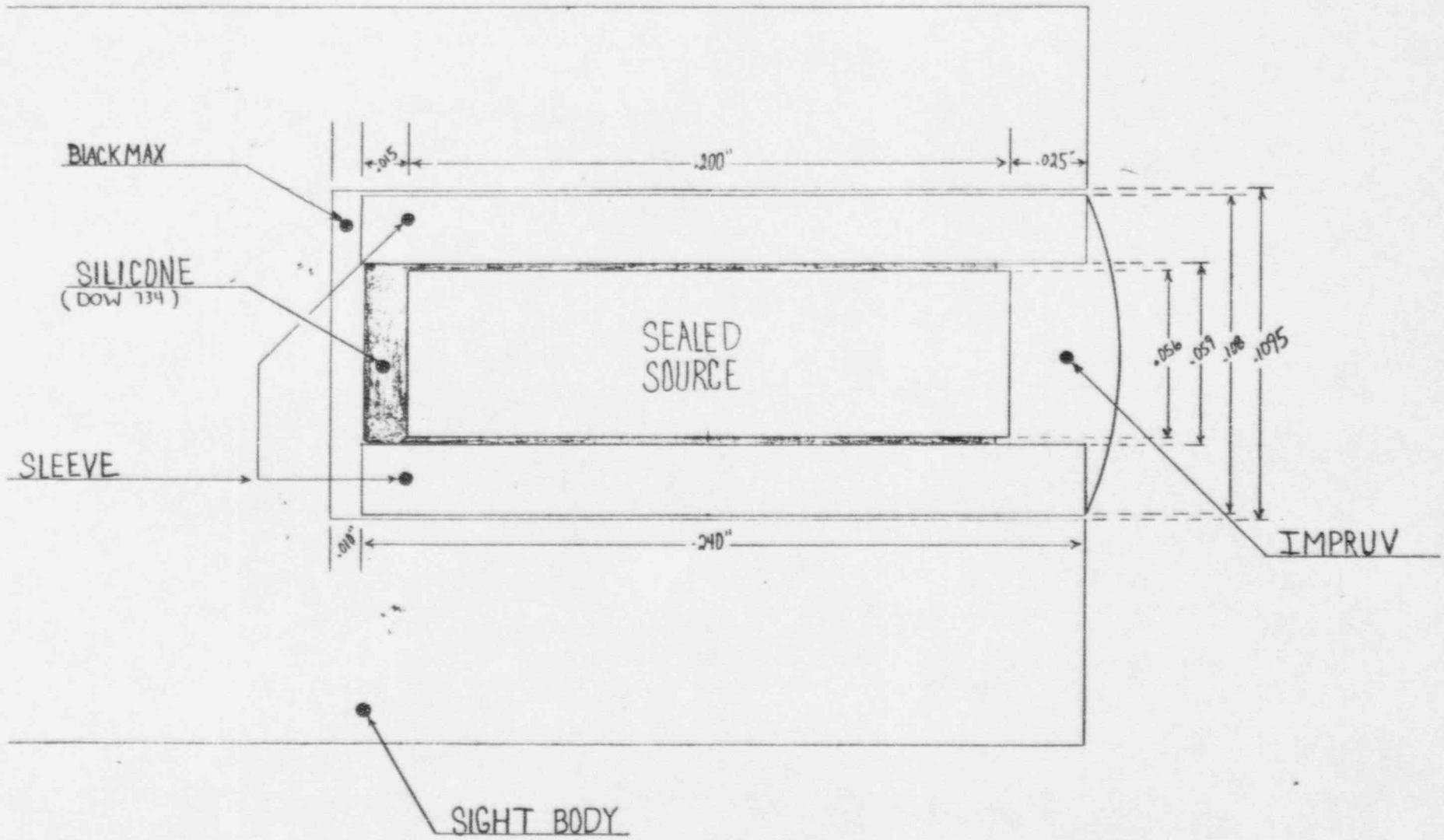
ATTACHMENT SHEET #13-E

* Hot Acid Tank*

TEST EVALUATION

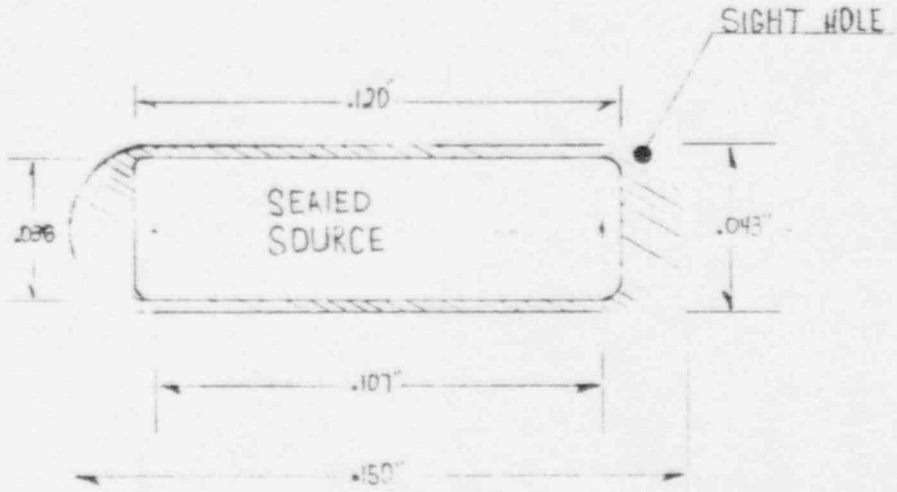
Once the testing had been completed,the sights were immersed in Loctite flushing solvent # 12121 (Methylene Chloride) to remove the Impruv And Blackmax. When the sealed sources were analized, using a visual magnafication device, no deteriation or visual effects were detected to the sealed sources. The sealed sources were then placed in a labeled, sealed container for periodic inspection. Tests conclude no effect on sealed source or installation procedures.

DRAWING #1

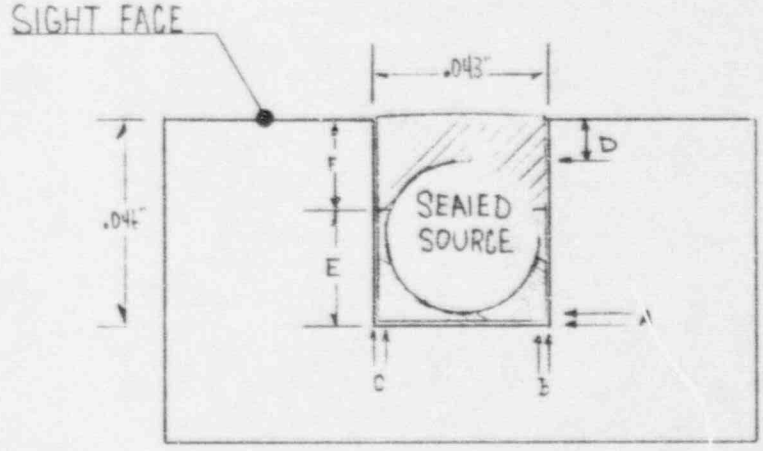

BLACK MAX
SILICONE
(DOW 734)
SLEEVE
SEALED
SOURCE
.015
.200"
.025"
.056
.059
.108
.1095
.010"
.240"
IMPRUV
SIGHT BODY

DRAWING #2

TOP VIEW



SIDE VIEW



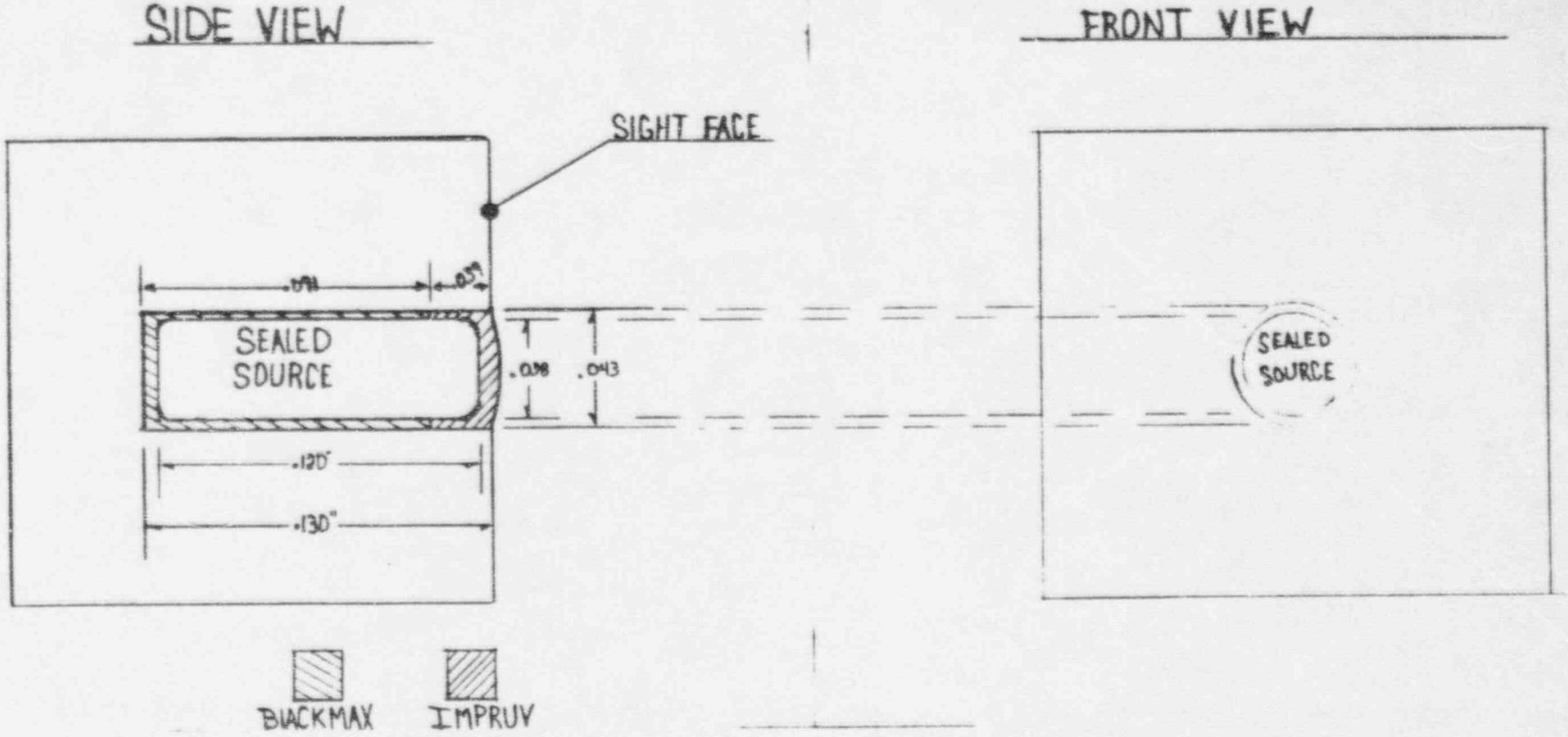
A = .0025
B = .0025
C = .0025
D = .0055
E = .020
F = .026

BLACK MAX.

IMPRUV

v15

DRAWING #3



NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION

RADIOACTIVE MATERIAL LICENSE

Pursuant to the New Mexico Radiation Protection Act of 1971, and the Radiation Protection Regulations Part 3, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect, of the New Mexico HED Environmental Improvement Division and to any conditions specified below.

1. LICENSEE NAME	3. LICENSE NUMBER
Innovative Weaponry, Inc.	NM-IWI-GS-03
2a. ADDRESS	**4. EXPIRATION DATE**
337 Eubank N.E. Suite 103 Albuquerque, NM 87123	January 31, 1993
	5. PREVIOUS/OTHER LICENSE NUMBER
	NM-IWI-GS-00 through NM-IWI-GS-02

2b. TELEPHONE NO.	2c. ACTUAL LOCATION OF OPERATION
(505)296-4645	337 Eubank N.E. Suite 103, Albuquerque, NM 87123.

6. RADIOACTIVE MATERIALS (element and mass number)	7. CHEMICAL or PHYSICAL FORM	8. MAXIMUM QUANTITY Licensee may possess at any one time
A. Hydrogen 3.	A. Sealed sources (Saunders-Roe Model PRH-880/G/200 or MB Microtec A.G. Model 400 series).	A. Not to exceed 250 curies total. Not to exceed 30 millicuries per source or 90 millicuries per weapon.

9. Authorized use.

   A. For possession and installation of sealed inserts to be used in gun sights.

10. The licensee shall comply with the provisions of Parts 3, 4 and 10, New Mexico Radiation Protection Regulations.

11. Licensed material shall be used by, or under the supervision of Barry Mowry, President.

12. The Director of the Division or his authorized representatives shall be allowed to enter the premises and inspect the radiation related activities at all times. Failure of the licensee to admit the Director or his authorized representatives shall constitute grounds for issuance of an immediate cease and desist order.

13. Sealed sources containing licensed material shall not be opened.

Ministry of Defence

SRDL

Defence Standard

62-4/Issue 3 14 September 1976

LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

Crown Copyright reprinted by

LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

This Defence Standard supersedes DEF STAN 62 - 4, Issue 2, dated 29 March 1972

1. This Defence Standard specifies material, manufacturing and other requirements for gaseous tritium light sources for Ministry of Defence use.

This Defence Standard has been written to conform wherever possible with the OECD Nuclear Energy Agency document 'Radiation Protection Standards for Gaseous Tritium Light Devices'.

2. The title 'Lamps, Nuclear' has been used to conform to the NATO Supply System Approved Item Name for this type of light source. The term preferred by the member countries of the OECD is Gaseous Tritium Light Sources (GTLSs). This term is now used throughout this Standard. See section 1 'Definition of Terms Used.

3. Table IA lists the Standard Range of GTLSs to be used in all future designs of equipment. Table IB lists GTLSs which have been introduced for a specific purpose. They are not to be used for any other application without the approval of the DELSC Electric and Nuclear Lamps Sub-Committee.

4. Because new Service applications are constantly being developed for GTLSs there are no Table II (Maintenance Range) or Table III (Obsolete) items.

5. This Standard contains all necessary technical information and it is the definitive specification for these items. It must be invoked for all tender and contract purposes.

6. Users of this Standard should note that these items may be claimed to be subject to patent rights in this and other countries.

7. This Standard has been prepared because there is no suitable national or any other standard acceptable to the Ministry of Defence available.

8. This Standard has been agreed by all authorities concerned who are to implement it from its date of issue.

9. If this Standard should be found unsuitable for a particular requirement the Director of Standardization shall be informed of the circumstances. Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is invoked should be addressed to the Quality Assurance Authority named in that invitation to tender or contract.

THE ATTENTION OF DESIGNERS CONSIDERING USING GTLSs IN SERVICE EQUIPMENT IS DRAWN TO SECTION 15 'SAFETY CONSIDERATIONS'

SPECIFICATION FOR
LAMPS, NUCLEAR,
(GASEOUS TRITIUM LIGHT SOURCES)

1. DEFINITION OF TERMS USED

a. Gaseous tritium light source (GTLS): A GTLS consists of a sealed glass container filled with gaseous tritium and coated internally with a phosphor.

b. Gaseous tritium light device (GTLD): A GTLD is an instrument, piece of equipment, article or sub-assembly containing one or more GTLS.

2. SCOPE

a. This Standard covers the technical requirements for gaseous tritium light sources suitable for use over the temperature range of -60 to + 70°C. It is emphasized that tritium filled sources are the only light source of this type authorized for Service use.

b. Lamps may be used at temperatures above 70°C, up to a maximum of 100°C, provided a shorter half life and lower luminance are accepted.

c. Over a period of time the luminance of a GTLS decays irrespective of whether in use or storage. (See section 7d) A warning is therefore given against buying and storing excess quantities.

d. Safety considerations governing production, storage, and use of GTLSs in Service equipments or installations are set out in Section 15 of this Standard.

3. RELATED DOCUMENTS

a. Reference is made in this Standard to:

BS 3G100: Part 2,	'General requirements for equipment in aircraft'
BS 2011	'The environmental testing of electronic components and electronic equipment'
BS 1376	'Colours of light signals'
BS 3510	'A basic symbol to denote the actual or potential presence of ionizing radiation'
UK/AID/944	'Specification for metal foil labels for aircraft use'
Def Stan 05-30	'Sampling procedures and charts for inspection by variables'
Def Stan 05-34	'Marking of Service Materiel'
HQPO/56	'Specification for the packaging of instruments containing radioactive materials'

3. a. (CONTD)

Radio Active Substances (Luminous Articles) Exemption Order 1962 (SI2644)

Explanatory Memorandum to the Radioactive Substances Act, 1960.

Radiation Protection Standards for Gaseous Tritium Light Devices.

Code of Practice for the Carriage of Radioactive Material by Road.

b. Copies of these documents are available as follows:

British Standards	British Standards Institution Newton House 101 Pentonville Road London N1 9ND
UK/AID/944	Ministry of Defence (PE) Materials Division AQD Harefield Uxbridge, Middlx, UB9BB
Defence Standards	Ministry of Defence D Stan First Avenue House High Holborn London WC1V 6HE
HQPO/56	Ministry of Defence (PE) MQAD Central Packaging Unit, Garland Road Plumstead, SE18 2PW
Radiation Protection Standards for Gaseous Tritium Light Devices	National Radiological Protection Board Harwell, Didcot, Oxfordshire OX11 ORQ
Explanatory Memorandum to the Radioactive Substances Act, 1960	HMSO
Radioactive Substances (Luminous Articles) Exemption Order 1962 (SI2644)	HMSO
Code of Practice for the Carriage of Radioactive Material by Road	HMSO

3. c. The Related documents listed above are those applicable at the date of publication of this Standard. Their current applicability must be confirmed by all users of the Standard. The Quality Assurance Authority will supply on request, information concerning any changes that may be necessary due to the cancellation, supersession or amendment of any related document.

Note: Any questions relating to 'approved' materials or processes should be referred to the Qualification Approval Authority.

4. DRAWINGS

a. Drawings giving dimensions of the standard range of GTLSs are reproduced in Figs 2 to 15. Special purpose lamps are reproduced in Fig 16.

b. These drawings are an integral part of this Standard.

5. PATENTS

Patent or design rights or copyright may subsist in connection with items defined as standard, and the issue of this Standard does not convey or imply any licence to use information which is the subject of such rights. Authority to use such rights, for UK Government purposes, must be obtained through the issue of an authorization in writing which will be incorporated in any contract placed by a Department of the said Government for such purposes.

6. MATERIALS

a. Capsule.

The capsule is to be of a clear borosilicate (hard) glass. The wall thickness is to be in accordance with the dimensions quoted in Figs 2 to 16.

b. Radioactive material.

(1) Only tritium in the form of $^{3}H_{2}$ or H ^{3}H shall be allowed in a GTLS except for small amounts of tritiated water which may be present provided that, during the mission lifetime of the GTLS, the activity in the form of tritiated water does not exceed 2% of the total tritium activity and, for sources containing less than 50 mCi of tritium, does not exceed 1mCi. Purity of the tritium is essential particularly in respect of:

(a) gamma emitting isotopes which would result in external radiation.

(b) alpha emitting isotopes which would result in radiation damage to binder, phosphor, or glass.

(c) chemical impurities which can damage the phosphor or accelerate radiation damage.

6. b. (2) In order to meet the above requirements the manufacturer must ensure that a certificate of purity from the supplier of the tritium used, in any batch of lamps submitted for inspection, is to be available to the Quality Assurance Authority.

c. Phosphor.

The zinc/cadmium sulphide phosphor is preferred.

d. Binder.

Any binder used to cement the phosphor to the wall of the capsule is to be unaffected by radiation, temperature (within the limits of -60 and + 70°C), and vibration.

7. MANUFACTURE

a. Gas pressure.

The nominal gas pressure inside the capsule is to be between 660 mbar (0.66 atm) and 2500 mbar (2.5 atm) as appropriate to the desired luminance.

b. Painting.

(1) When a GTLS is to be viewed from one side only, the luminous intensity may be increased by externally painting the reverse side of the lamp as indicated on the appropriate lamp drawing (Figs 2 to 16).

(2) One coat of high reflectance titanium dioxide base paint and one coat of semi-gloss air drying white paint shall be applied. Alternatively two coats of high reflectance titanium dioxide base paint may be applied.

(3) The paint shall be of best commercial quality and shall remain unaffected by the temperature tests specified in sections 11g and 14. The paint shall not exceed a total thickness of 0.4 mm.

c. Luminance

The minimum initial luminance is to be in accordance with Table I.

d. Rate of luminance decay.

The rate of luminance decay is to be such that after six years from the date of manufacture of a GTLS luminance is to be not less tnan 50 per cent of its initial value.

Note: The rate of decay is to be taken into account when specifying minimum acceptable levels of illumination in the design of equipments incorporating GTLSs See Fig 1.

e. Sealing test.

During manufacture all GTLSs are to be heated to between 450 and 450°C for a period of five minutes after sealing.

7. f. Colour of light.

Colours are to be determined in terms of BS 1376 chromaticity co-ordinates. Table A gives the co-ordinates of the corners of the areas within which the chromaticity co-ordinates of the respective colours are to fall. Where these boundary points lie on the pure spectrum curve the corresponding dominant wave length in nanometers is indicated.

TABLE A

COLOUR	CO-ORDINATES		DOMINANT WAVELENGTH nm
	X	Y	
RED	0.688 0.66 0.59 0.64	0.312 0.28 0.356 0.36	618.5 603.0
ORANGE	0.603 0.566 0.508 0.532	0.396 0.388 0.45 0.467	595.0 583.0
YELLOW	0.5 0.468 0.396 0.408	0.5 0.47 0.546 0.592	578.0 565.0
GREEN	0.302 0.31 0.22 0.014	0.692 0.48 0.48 0.744	550.0 510.0
BLUE	To BS 1376, Signal Blue Class A		481.0 450.0
WHITE	To be determined		

8. MARKING AND LABELLING

To enable GTLD's subject to recovery or disposal requirements to be identified the Design Authority and Procurement Branch are to ensure that marking and labelling shall be carried out as described in section 7 of NEA document 'Radiation Protection Standards for Gaseous Tritium Light Devices'

Note: Para 7.3 of this document requires that individual GTLS's containing over 500mCi shall be marked with a spot of colour in international use to denote hazard. At the moment this colour has not been decided. The requirement can therefore, for the time being, be ignored.

9. PACKAGING

a. GTLSs are to be supplied in a transparent polyethylene envelope. Each GTLS is to be provided with sufficient individual protection to prevent damage to or from other GTLSs in the envelope. Each envelope is to contain and show the following labels:

(1) an ungummed label giving the full NATO Stock Number (eg 6260-99-995-9769) and Defence Standard type number, (eg Def Stan 62-4/3 Type ZA2G), the quantity of GTLS's and the total radioactive content (curies).

(2) an ungummed label marked with the Trefoil symbol in accordance with BS 3510 and Def Stan 05-34.

Each envelope is also to contain the equivalent number of approved self-adhesive labels of 9.5mm maximum diameter giving the month and year of manufacture of the GTLS in figures. The label is to comply with UK/AID/944 and is to be gold in colour with red markings.

b. When a military level of packaging is specified in the tender or contract packaging shall be in accordance with HQ/P056 and the Services Packaging Instruction Sheet (Form 673)

c. To comply with the 'Code of Practice for the Carriage of Radioactive Material by Road,' the maximum number of lamps in one package is to be governed by the total radioactive content of that package.

(1) A package, wherein the radioactive content does not exceed 200 curies may be classified as 'Exempt' from the more rigorous packaging and labelling requirements of the international regulations providing the applicable requirements listed in the 'Specification for the packaging of instruments containing radioactive materials', HQPO/56, are fulfilled.

(2) Requirements for 'Exempt' packages containing tritium are detailed at paragraphs 3.4 and 4.1 to 4.4 of Specification HQPO/56.

10. QUALIFICATION APPROVAL PROCEDURE

a. The Qualification Approval Authority for GTLSs is the Defence Electrical and Electronics Standardization Committee, Electric and Nuclear Lamps Sub-Committee. Manufacturers are to apply to the Secretary of the Electric and Nuclear Lamps Sub-Committee Stan 3, First Avenue House, High Holborn, WC1V 6HE for Qualification Approval. Applications are to be accompanied by a statement that the manufacturer is satisfied that the articles comply with this specification.

b. After receipt of the application, the Secretary of the Qualification Approval Authority is to notify the manufacturer if it has been decided to accept the application, or give reasons for refusing it. If it has been decided to proceed with the Qualification Approval, the Secretary is to request the provision of samples. The manufacturer is to state whether or not the samples are from normal current production and, if requested, is to provide evidence that he has adequate facilities to produce, test, and inspect the articles in quantity.

10. c. Tenders for the supply of GTLSs to this Standard are to be accompanied by a quotation of the appropriate Qualification Approval certificate number and a statement that the articles offered conform in every detail to the sample Qualification Approved and that the place of manufacture is the same.

d. The Qualification Approval tests are to be carried out under standard atmospheric conditions of measurement (BS 2011).

(1) at the manufacturer's premises under the supervision of the Quality Assurance Authority, or,

(2) by a Government Quality Assurance Authority if the manufacturer is unable to provide or arrange for testing in the above way.

(a) If Qualification Approval tests are carried out by method 1, five copies of the test certificate are to be forwarded to the Secretary of the above Qualification Approval Authority.

(b) Initial and final measurements are to be carried out at any combination of temperature, and pressure within the following limits.

Temperature	15 to 35°C
Air Pressure	860 to 1060 mbar

Note 1: Where it is impracticable to carry out measurements under these conditions a note to this effect stating the actual conditions is to be added to the test report.

Note 2: The temperature is to be substantially constant during measurements carried out as part of one test on one batch of components:

e. If the Qualification Approval Authority decides that the testing of any of the articles which the manufacture wishes to submit for Qualification Approval is to be carried out at the manufacturer's premises, the manufacturer is to give to the representative of the Qualification Approval Authority full and free access to the said premises as and when required for that purpose and, at the manufacturer's expense, afford to such representative all such reasonable accommodation and facilities as may be required by him therefore and all appliances, materials, and labour required for testing purposes.

f. The manufacturer will be notified whether or not Qualification Approval has been granted and if successful a Qualification Approval certificate (normally for a period of five years) will be issued.

g. If, after receiving Qualification Approval, a manufacturer wishes to introduce any changes in the materials, construction, processes, finish, or place of manufacture of the Qualification Approved GTLSs he is first to notify the Qualification Approval Authority, who will decide whether a repetition of any or all of the Qualification Approval tests is necessary, and the number of samples to be tested before the change is approved.

10. h. Qualification Approval will be reviewed periodically by the Qualification Approval Authority and will also be reviewed when defects have been reported or other circumstances make this desirable. Should the result of repeat Qualification Approval tests be unsatisfactory, Qualification Approval may be withdrawn.

i. The Qualification Approval Authority reserve the right to carry out any or all of the Qualification Approval Tests on any design of GTLS not in the standard range.

11. QUALIFICATION APPROVAL

The number of GTLSs to be submitted for Qualification Approval is to be a minimum of twenty six and shall include the GTLSs from each group as indicated in Table B. These lamps are to be supplied at the manufacturer's expense and are to be manufactured from materials and by methods similar to those adopted for production.

TABLE B

QUANTITY	SELECTED FROM	GROUP	REMARKS
5	MB2, UB2, UG2, UE2 or UH2	1	High Pressure Painted One of each colour quoted in Table A
7	Figs 4, 5, 8, 9, 10, 12.	2	Low Pressure, non painted
7	Figs 2, 3, 6, 7, 11.	3	High Pressure, non painted
7	Figs 2, 3, 6, 7, 8, 9, 10, 11, 12.	4	Low Pressure, Painted

GTLSs are to be subjected to the following tests in the order specified.

a. Visual inspection.

All GTLSs are to be visually inspected for defects and dimensions checked.

b. Luminance.

(1) Initial luminance measurement is to be made 21 to 28 days after manufacture following a period of storage in total darkness for a minimum of 24 hours.

(2) Each GTLS is to be inspected visually in darkness to ensure that the whole of the area, shown in the appropriate figures as coated with phosphor, is emitting light. The area appearing brightest and the area appearing dimmest to the eye are to be noted.

11. b. (3) The GTLS is to be mounted with the brightest area immediately behind a sharp edged aperture which for tubular lights is to be a slit 0.6 mm by 2.5 mm (approx), and for all other types is to be a circle 1.4 mm diameter (approx) (see note). When viewed from the front the whole of the aperture is to appear illuminated. Luminance of the aperture is to be measured by comparison with a calibrated light source of the same colour. Geometry of the measurement is to be such that the angle subtended by the sensing element at the source does not exceed 10 degrees. The luminance is to be not less than that specified.

Note: When measuring very small GTLSs eg Type CW, it may be necessary to reduce this diameter to 1.0 mm (approx).

(4) The GTLS is to be mounted with the dimmest area behind the same aperture, and the luminance measured as before. If the luminance is not less than 90 per cent of that specified the GTLS is to be accepted. If the luminance is less than 75 per cent of that specified the GTLS is to be rejected.

(5) If on test (4) the luminance is between 90 and 75 per cent of the specified luminance the GTLS is to be inspected thoroughly to determine the area below the 90 per cent level, if this area is more than 10 per cent of the total luminous area, the GTLS is to be rejected.

c. Colour.

The GTLS as indicated in group 1 of Table B shall be subjected to tests to demonstrate that the colour of the light emitted by the lamps fall within the limits given in clause 7f. For this any technique approved by the Quality Assurance Authority may be used.

d. Purity.

A certificate of purity for the gas is to be submitted to the Qualification Approval Authority at the time that Qualification Approval for the GTLS is sought.

e. Vibration.

(1) Two samples from the groups 2, 3 and 4 (Table B) shall be selected at random and fixed to a suitable metal plate for attachment to a vertical thrust vibrator. The GTLSs are fixed into suitable grooves in the plate using silicon rubber cement.

(2) The amplitude of vibration shall be measured on the plate. The vibration need be applied in one plane only.

(3) The GTLS shall be subjected to three complete test cycles in the range of 25 to 500 Hz at 5g. The Test shall be conducted by sweeping through all the frequencies in the range at a uniform rate from the minimum to the maximum frequency and return to minimum frequency in 10 minutes or longer. In addition the tester shall dwell for 30 minutes at each resonance frequency found.

(4) After the vibration period the luminance of each light shall be measured. The deterioration is not to have exceeded 10 per cent

11. f. External pressure test.

(1) An external pressure test is to be performed on three of the remaining GTLSs of each Group (2, 3 and 4).

(2) The GTLSs shall be put into a test chamber and exposed to 0.25 and 2.0 bars for four periods of 15 minutes each, the pressure being returned to atmosphere between each period. The test shall be conducted in air.

(3) After the pressure test the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

g. Thermal cycling.

(1) Three rapid thermal cycles are to be performed on the GTLSs used for the pressure test.

(2) The GTLS shall be heated in air to + 80°C within 5 minutes, kept at this temperature for one hour, then cooled to - 30°C within 15 minutes and kept at this temperature for one hour.

(3) After the thermal cycling the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

h. Life.

(1) The GTLSs from Group 1 together with three samples from the vibration tests and three samples from the thermal cycling tests shall be mounted behind apertures, or mounted in a suitable jig to align with an aperture for the measurement of luminance.

(2) The luminance is to be measured after mounting and remeasured after three and six months storage at a temperature and pressure within the limits detailed in para 10d (b).

(3) The rate of decay of luminance is to be not greater than that specified in clause 7d and figure 1.

(4) Limited Qualification Approval may be granted pending the results of these decay measurements.

12. PRODUCTION INSPECTION

a. (1) The provisions of Def Stan 05 - 30 (as applicable) are to apply. Batching is to be agreed between the manufacturer and the Quality Assurance Authority.

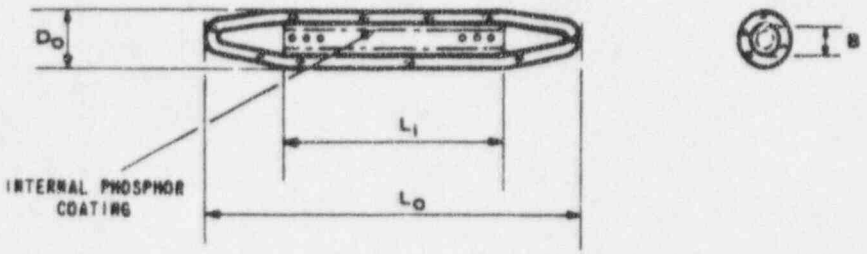
(2) Measurements are to be at Standard atmospheric conditions in accordance with BS 2011. (See clause 10d (2) of this Standard).

b. The following tests are to be applied in the order specified

(1) Visual (see clause 11a)
(2) Luminance (see clause 11b and Note below)
(3) Colour (see clause 11c)

Note: At the discretion of the user or the Quality Assurance Authority this requirement can be waived or confined to samples taken from the production batch.

TUBULAR STRAIGHT
(MINIATURE)



PATT REF	DIMENSIONS: millimetre			
	Lo	Li	Do	B
HA	9.5 ± 1.0	8.0 - 1.0	0.51 + 0.13	0.32 ± 0.08
HB	10.0 ± 1.0	8.5 - 1.0	0.51 + 0.13	0.32 ± 0.08
JA	9.5 ± 1.0	8.0 - 1.0	1.0 ± 0.1	0.6 ± 0.1
JB	11.5 ± 1.0	10.0 - 1.0	1.0 ± 0.1	0.6 ± 0.1
JC	14.0 ± 1.0	12.5 - 1.0	1.0 ± 0.1	0.6 ± 0.1
JD	19.5 ± 1.0	18.0 - 1.0	1.0 ± 0.1	0.6 ± 0.1
JE	22.0 ± 1.0	20.5 - 1.0	1.0 ± 0.1	0.6 ± 0.1
KA	9.5 ± 1.0	8.0 - 1.0	1.4 ± 0.13	0.84 ± 0.18
KB	11.5 ± 1.0	10.0 - 1.0	1.4 ± 0.13	0.84 ± 0.18
KC	14.0 ± 1.0	12.5 - 1.0	1.4 ± 0.13	0.84 ± 0.18
KD	19.5 ± 1.0	18.0 - 1.0	1.4 ± 0.13	0.84 ± 0.18
KE	29.5 ± 1.0	28.0 - 1.0	1.4 ± 0.13	0.84 ± 0.18

TABLE IA - CONTINUED

STANDARD RANGE

NATO STOCK NUMBER 6260-99-	ITEM NAME	ITEM DESCRIPTION							
		CAPSULE SHAPE	DIMENSIONS MILLIMETRE	MAXIMUM ACTIVITY CURIE (Ci)	NOMINAL PRESSURE BAR	MINIMUM INITIAL LUMINANCE cd/m² (nits)	COLOUR OF LIGHT	PATTERN REFERENCE	TYPE
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)	(k)
995-9543	LAMPS NUCLEAR	TUBULAR STRAIGHT (MINATURE)	SEE FIG 5	0.002	0.66	0.05	Green	HA	HA 1G
995-9544				0.002	0.66	0.05	Green	HB	HB 1G
995-9545				0.004	0.66	0.09	Green	JA	JA 1G
995-9546				0.004	0.66	0.09	Green	JB	JB 1G
995-9547				0.005	0.66	0.09	Green	JC	JC 1G
995-9548				0.006	0.66	0.09	Green	JD	JD 1G
995-9549				0.010	0.66	0.09	Green	JE	JE 1G
995-9550				0.010	0.66	0.15	Green	KA	KA 1G
995-9551				0.120	0.66	0.15	Green	KB	KB 1G
995-9552				0.140	0.66	0.15	Green	KC	KC 1G
995-9553				0.200	0.66	0.15	Green	KD	KD 1G
995-9554				0.300	0.66	0.15	Green	KE	KE 1G
963-1286			SEE FIG 6	0.120	0.66	0.15	Green	LA	LA 1G
995-9555		TUBULAR STRAIGHT	SEE FIG 7	0.060	0.66	0.411 (0.548)	Green	MA	MA 1G
995-9556				0.240	2.50	1.00 (1.280)	Green		MA 2G
995-9557				0.060	0.66	0.428 (0.548)	Yellow		MA 1Y
995-9558				0.240	2.50	1.00 (1.280)	Yellow		MA 2Y
995-9559				0.130	0.66	0.445	Green	MB	MB 1G
995-9560				0.500	2.50	1.370	Green		MB 2G
995-9561				0.130	0.66	0.445	Yellow		MB 1Y
995-9562				0.500	2.50	1.370	Yellow		MB 2Y
995-9563				0.450	2.50	0.340	Blue		MB 2B
995-9564				0.500	2.50	0.068	Red		MB 2R

Note: The higher initial luminance values shown in parenthesis are for lamps painted in accordance with the relevant lamp drawing.

ATTACHMENT

NUMBER

THREE (3)

QUALITY ASSURANCE AND CONTROL
(QA/QC) DEPARTMENT MANUAL

P-T NIGHT SIGHT

Innovative Weaponry, Inc.

October 1991

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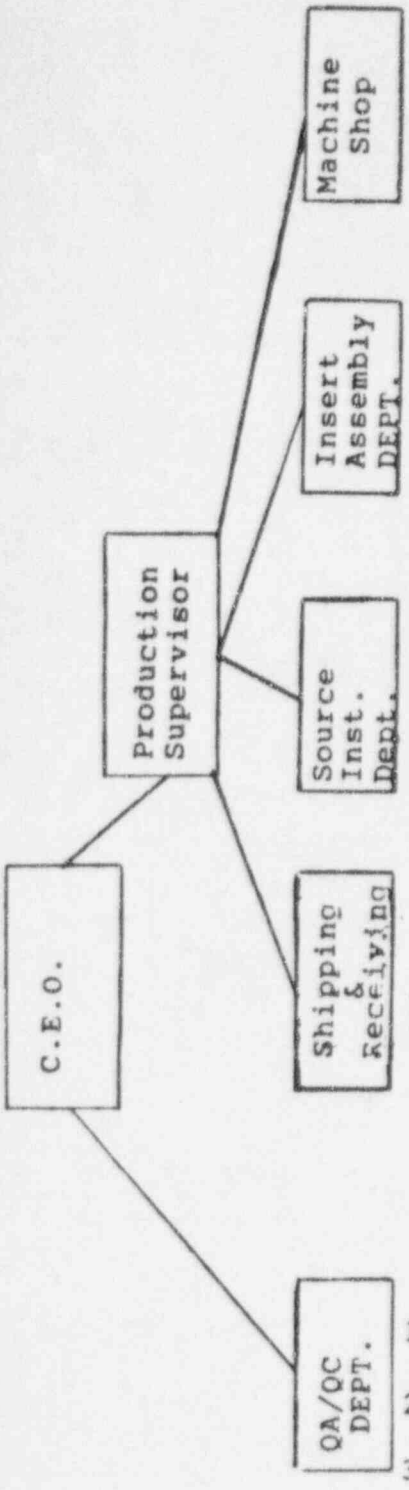
2. FACILITY LAYOUT

3. PERSONNEL REQUIREMENTS

4. PROCEDURES

1. ORGANIZATION



Machine Shop

1. All Equipment maintained to insure quality
2. All Tolerances must be met inproduction
3. All Drawing maintained for exact specifications
4. Proper records kept

Insert Assembly DEPT.

1. Visual Inspection of all product before assembly
2. All Insert assembled to exact specifications
3. Critical curing times strictly maintained
4. proper records kept

Source Inst. Dept.

1. Visual inspection of all prouduct before assembly
2. All source and insert assembled to exact specification
3. Critical curing times strictly maintained
4. All product properly labeled
5. Proper records kept

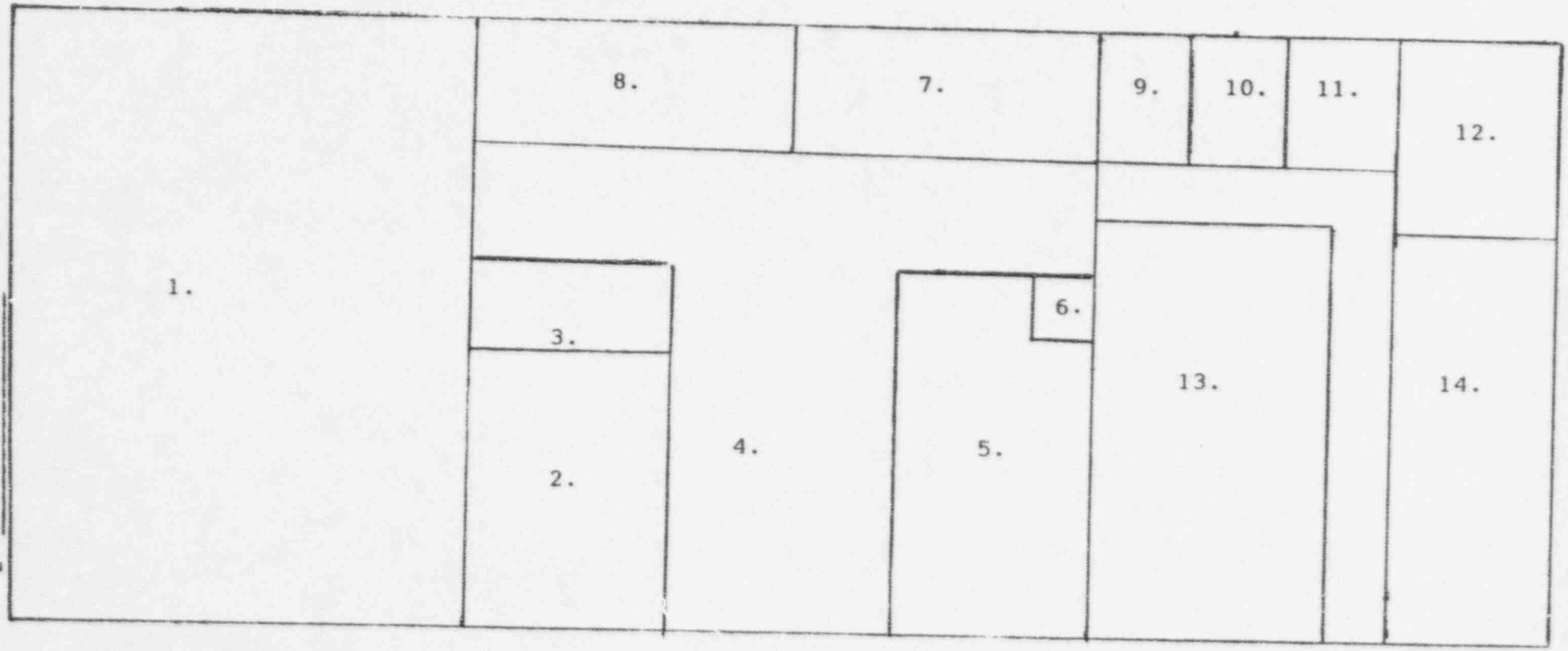
Shipping & Receiving

1. All product must be properly packaged for storage handling, and shipping
2. Check for proper labeling
3. proper records kept

QA/QC DEPT.

1. QA/QC personal must strictly follow the QA/QC procedure manual and enforce the policies there in.
2. QA/QC is responsible foe insuring that all departments maintain quality work to exact specifications.
3. QA/QC is responsible for insuring that all departments maintain proper records.
4. QA/QC shallnotify the production supervisor of all immediate situations which need attention or correction
5. QA/QC answer and reports directly to the C.E.O.

2. FACILITY LAYOUT



1. Office Complex
2. Shipping and Receiving
3. Shop Office
4. Machine Shop
5. Production Room
6. Radioactive Area
7. Inspection Area
8. Employee Room
9. Restroom
10. Restroom
11. Vaulted Storage Area
12. R. and D. Area
13. Shop
14. Shop

3. PERSONNEL REQUIREMENTS

A. Personnel shall have in their records all drawing, specifications, and descriptions of all products and installation procedures.

B. Personnel must be properly trained to carry out all inspections.

C. Proper records must be maintained on all inspections.

4. PROCEDURES

(1) Inspectors shall have all drawings, descriptions, and specifications along with all the proper equipment to perform their duties.

(2) Inspectors shall have written procedures for all processes in manufacturing the product.

(3) Inspect all sealed sources when received from the manufacturer.

A. Check for activity brightness
(Visual Inspection)

B. Check source for fractures and check seals.
(Microscopic Visual Inspection)

C. After Inspection, label with date, quantity, and QA/QC approval. Place in controlled area.

(4) All machine work, whether done in our shop or by a sublet vendor, shall be inspected for tolerances. The cavities for the source installation shall meet all tolerance specifications and surface quality.

(5) All sealed source inserts shall be inspected for sealant and lensing quality and specifications.

(6) Inspection of sealed source installations shall be checked for adhesion tolerances and specifications.

(7) Quality control has the power to reject any and all product that does not meet specifications.

(8) Any product that is not visually correct shall be rejected.

(9) Quality control has the power to shut down the assembly line for any situation detrimental to QA/QC requirements.

(10) All product shall be final inspected visually before given to the shipping and receiving department.

(11) All inspection of any product shall be documented, passed or rejected, and reason of rejection.

(12) Records shall be kept of all product inspection reports.

(13) A complete inventory shall be kept of all product.

ATTACHMENT

NUMBER

FOUR (4)

BREAK-FREE, INC.

MATERIAL SAFETY DATA SHEET

400-00-00001-0-001
Page 1 of 2

BREAK-FREE CLP, LIQUID

Section I — PRODUCT IDENTITY

Trade Name: Break-Free CLP, Liquid
Description: Cleaner, Lubricant, Preservative
Class: Lubricating Oil, Solvent Cutback
NFPA Rating: Health=1, Fire=1, Reactivity=0

Manufacturer:
Break-Free, Incorporated
1035 S. Linwood Avenue
Santa Ana, CA 92705-4396

Information Phone: 714-953-1900
Date Prepared: 25 March 1991
Prepared by:

TRANSPORTATION EMERGENCY PHONE NUMBER: CHEMTREC 1-800-424-9300 or 1-202-483-7616

Section II — HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Chemical or Common Name:	CAS Numbers	PEL:	TLV:	STEL:	% VOL
Synthetic & Parafinic Oils & Other Proprietary Ingredients	Mixture	5 mg/M AS OIL MIST	5 mg/M AS OIL MIST	NE	74.1
n-Butyl Acetate	123-86-4	150ppm	150ppm	200ppm	4.0
Trichlorotrifluoroethane (Freon TF)	76-13-1	1000ppm	1000ppm	1250	6.2
1,1,1-Trichloroethane	71-55-6	350ppm	350ppm	450ppm	12.0
Isopropyl Alcohol	67-63-0	450	450	500	2.0
Tricresylphospate (<0.1% Ortho-Isomer)	68952-35-2	NE	NE	NE	1.0
Insoluble Barium Compounds	Mixture	NE	NE	NE	.6 (AS Ba)
Tert-Butyl Alcohol	75-65-0	100ppm	100ppm	150ppm	0.1

Section III — PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point: 140°F. Initial
Vapor Pressure: NE
Appearance: Light Amber Color
Odor: Slight Fruity Odor

Specific Gravity: 0.9
Vapor Density: 2.4
Pour Point: <-75° F.

Solubility in Water: Nil
Evaporation Rate: 3.8 (Solvents Only)
% Volatile: 26.0 (By Volume)

Section IV — FIRE & EXPLOSION HAZARD DATA

Flash Point: >200° F. PMCC

Flammable Limits: LEL/UEL NE

Autoignition Threshold: NE

Extinguishing Media: Carbon Dioxide, Foam, Dry Chemical, Water Spray

Special Fire Fighting Procedures: Use normal procedures for OIL and HALOGENATED COMPOUNDS found together. Water and foam may cause frothing. If a leak or spill has not ignited, use water spray to disperse vapors and/or cool containers. Firefighters should wear NIOSH APPROVED SELF CONTAINED BREATHING APPARATUS to avoid exposure to decomposition products from OIL and SOLVENT.

Unusual Fire and Explosion Hazards: Solvent vapors, when concentrated in confined or poorly ventilated areas may flash upon contact with flames, sparks or high intensity heat sources.

Section V — REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Keep from open flames

Incompatibility: Avoid Strong Oxidizers

Hazardous Decomposition Products: Oxides of Carbon, Sulfur and Nitrogen, acidic products of thermal decomposition, including Hydrogen Chloride and possibly traces of Phospene.

Hazardous Polymerization: Will not occur.

Break-Free, Inc.

MATERIAL SAFETY DATA SHEET

400-00-00001-0-001

Section VI — HEALTH HAZARD DATA

Primary Routes of Entry: Inhalation, Ingestion, Skin, Eyes.

SIGNS & SYMPTOMS OF EXPOSURE:

Inhalation: May cause irritation to nose and throat. Solvent vapors may cause lightheadedness, dizziness, nausea to unconsciousness and possibly be lethal. Solvent vapors may also cause an irregular heartbeat.

Eyes: Possible transient irritation, although found not to be an irritant under formal test procedures.

Skin: Possible systemic effects to blood, liver and kidneys due to potential absorption through the skin.

Ingestion: The mixture has a low level of toxicity (LD50 > 500mg/kg). May cause irritation to digestive tract; and if inhaled as liquid, may cause rapid absorption through the lungs resulting in systemic effects.

Acute Health Hazards: While expected to be non-irritating from the skin, eye and oral testing done, as with all petroleum products prolonged and repeated contact on the skin could cause irritation and possible dermatitis. The synthetic oils and additives could also be absorbed through abraded skin, but the results of dermal toxicity tests suggest that no acute systemic effects would be expected in healthy individuals.

Chronic Health Hazards: Repetitive and continuous exposures to high vapor levels or direct contact on the skin could possibly result in liver and kidney damage due to the halogenated solvents. Traces of the ortho-isomer of TCP could also cause delayed neurotoxicity but only at exposure levels of three (3) pounds of product per pound of body weight.

Medical Conditions Generally Aggravated by Exposure: Pre-existing skin, eye and respiratory disorders may be aggravated by exposure to this material.

Emergency and First Aid Procedures: Some halogenated solvents in this product may increase the sensitivity of the heart to adrenalin and related drugs. Never administer these drugs TO PERSONS THAT DISPLAY SYMPTOMS WHICH COULD BE ATTRIBUTED TO OVEREXPOSURE TO THIS PRODUCT. Follow good industrial hygiene practices: Flush eyes immediately with water for at least 15 minutes, wash skin with soap and water, launder contaminated clothing before re-use. If swallowed, do NOT induce vomiting. If conscious, drink large quantities of water and seek immediate medical attention. If inhaled, move to fresh air. Anesthetic or narcotic effects could occur from overexposure to vapors, so call a physician; if available, give oxygen. If breathing stops, give mouth-to-mouth resuscitation.

NOTE: This material is not known to contain any carcinogen required to be listed under the Hazard Communication Standard (29CFR 1910.1200) from the "National Toxicology Program" (NTP) or the "International Agency for Research on Cancer" (IARC) sources.

Section VII — PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Small Spills: Wipe up small spills or use absorbent material to soak up. Store in closed containers, DO NOT FLUSH TO SEWER.

Large Spills: If in a poorly ventilated area, evacuate personnel and equip the clean-up crew with respiratory and skin/eye protection. Follow normal industrial practices for cleaning solvent/oil spills. Use proper protective equipment, dike the area to confine the spill, shut off potential ignition sources and use a good absorbent to soak up the spill. Always store the waste in closed containers.

Disposal: Dispose of all wastes in accordance with federal, state and local regulations. Treat this type of waste as waste oil containing halogenated hydrocarbons. Incineration is normally preferred. Never dump into the sewer or on the ground or into any navigatible waters, streams, lakes or rivers.

Precautions to be taken in Storage & Handling: Do not store above 120° F. Do not use around open flames. Maintain adequate ventilation and keep from children. Note that some vapors are heavier than air and can collect in low areas such as pits and storage tanks. Do not enter those areas where large quantities of vapors are suspected of collecting until exchanging the air or using special breathing apparatus with an observer present for possible assistance.

Section VIII — CONTROL MEASURES

Respiratory Protection: Not required in unconfined or well ventilated areas. For emergencies or for working in confined areas with low air exchange rates, follow OSHA Std. 29CFR 1910.133.

Ventilation: General dilution or local exhaust sufficient to maintain adequate air exchange to avoid vapor build-up.

Protective Gloves: Polyethelene, neoprene or PVC advised for prolonged and repeated contact.

Eye Protection: Although irritation or damage to the eyes is unlikely, it is advised to comply with OSHA Standard 29CFR 1910.133.

Other Protective Clothing: Not required.

Work/Hygienic Practices: Do not smoke, eat or drink while using the product. Wash hands with soap and water before

(01)

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

MANUFACTURER'S NAME Thompson & Formby Inc.	EMERGENCY TELEPHONE NO. (901) 685-7555
ADDRESS 10136 Magnolia Drive Olive Branch, MS 38654	INFORMATION TELEPHONE NO. (601) 895-5594
PRODUCT TYPE Lubricant Mixture	PRODUCT NAME Tri-Flow / Tri-Flow Aerosol
PRODUCT CLASS: Penetrating Lubricant	PRODUCT COMPOSITION: Petroleum Distillates Chlorinated Solvents and Additives

SECTION II - HAZARDOUS INGREDIENTS

CHEMICAL NAME	CAS #	APPROX % BY WT.	TLV	PEL
1,1,1-Trichloroethane	71-55-6	25	350 ppm	350 ppm
n-Amyl Acetate	628-63-7	2	100 ppm	100 ppm
Dipropylene Glycol Monomethyl Ethyl (DPM)	34590-94-8	2	100 ppm	100 ppm
Aliphatic Hydrocarbon Oil (as Oil Mist)	64741-96-4	32	5 mg/m3	
Mixture of Zinc Salt of Dialkylphosphorodithioic Acid	Unknown	1	Not est.	Unknown
Propane (aerosol only)	74-98-6	10	Not est.	1000 ppm
Isobutane (aerosol only)	75-28-5	10	Not est.	Unknown
NON-HAZARDOUS INGREDIENTS				
Polytetrafluorethylene	N/A	1-5%	N/A	N/A
Corrosion Inhibitors	6170-48-5	7-15%	N/A	N/A
Antiwear Agents	2215-35-2	1-5%	N/A	N/A
Mineral Spirits	64742-88-7	5-10%	N/A	N/A
1,1,2-Trichloro - 2,2,1-Trifluoroethane	76-13-1	1-5%	N/A	N/A

SECTION III - PHYSICAL DATA

BOILING I.B.P. (deg. F)	212	SPECIFIC GRAVITY (H2O=1)	.998 g/ml
VAPOR PRESSURE (mm Hg.)	23.75	WEIGHT PER GALLON	8.34
VAPOR DENSITY (Air=1)	Heavier than air	VOLATILE ORGANIC CONTENT	
EVAPORATION RATE (Ethyl Ether=1)	Slower than ether	(grams per liter less water)	N/A
		PERCENT VOLATILE BY WEIGHT	65

APPEARANCE AND ODOR: Amber, opaque liquid; odor - banana; two phase liquid and solid. Product should be agitated before use.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION OSHA - Non-Flammable DOT - ORM-D	Flammable Limit LEL: Unknown FLASH POINT (Method Used): Seta 154 deg. F

EXTINGUISHING MEDIA: Foam, Carbon Dioxide or Dry Chemical.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None other than those associated with combustible petroleum distillates or self-pressurized containers when Tri-Flow is packaged as an aerosol.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus with full face-piece operating in pressure-demand or positive pressure mode when fighting fires.

(Continued on reverse side)

Tri-Flow (114 2.)

SECTION V - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE: Eye - can cause irritation, redness, tearing, blurred vision. Skin - prolonged or repeated contact can cause moderate irritation, defatting, dermatitis. Breathing - excessive inhalation of vapors can cause nasal and respiratory irritation dizziness, weakness, fatigue, nausea, headache, possible unconsciousness, and even asphyxiation. Swallowing - can cause gastrointestinal irritation, nausea, vomiting, and diarrhea. Aspiration of material into the lungs cause chemical pneumonitis which can be fatal.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: None known.

PRIMARY ROUTE(S) OF ENTRY: Inhalation and dermal.

TOXICITY INFORMATION: Oral Toxicity LD50 - 22.5 ml/kg.

EMERGENCY AND FIRST AID PROCEDURES: Skin: thoroughly wash exposed area with soap and water Remove contaminated clothing. Launder contaminated clothing before re-use. Eyes: flush with large amounts of water, lifting upper and lower lids occasionally, get medical attention. Swallowing: do not induce vomiting, keep person warm, quiet, and get medical attention. Aspiration of material into the lungs due to vomiting cause chamical pneumonitis which can be fatal. Breathing: if affected, remove individual to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped give artificial respiration. Keep person warm, quiet, and get medical attention.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		HAZARDOUS	WILL OCCUR	
	STABLE	X	POLYMERIZATION	WILL NOT OCCUR	X

CONDITIONS TO AVOID: Keep away from heat, spark, flames and other sources of ignition.

INCOMPATIBILITY (Materials to avoid): Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon Dioxide, Carbon Monoxide and possibly Hydrogen Chloride, Chlorine Gas and Phosgene.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Handle as a combustible liquid. Absorb on sand, clay, or other absorbent materials. Eliminate ignition sources.

WASTE DISPOSAL METHOD: Dispose of in accordance with local, state and federal regulations governing combustible waste containing 1,1,1-Trichloroethane.

SECTION VIII - SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION: If TLV is exceeded then use NIOSH/MSHA approved respirator.

VENTILATION: Use with adequate ventilation to prevent exceeding TLV.

PROTECTIVE GLOVES: Hydrocarbon-insoluble rubber or plastic.

EYE PROTECTION: Safety glasses or goggles are recommended when transferring bulk liquid.

OTHER PROTECTIVE EQUIPMENT: None

HYGIENIC PRACTICES: Avoid skin contact. Wash contaminated skin and clothing with soap and water.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep containers closed. Store and use away from high temperature, sparks or open flame. Use only with adequate ventilation.

OTHER PRECAUTIONS: Avoid prolonged and repeated breathing of vapor or contact with skin. When Tri-Flow is packaged as an aerosol: Extremely flammable - contents under pressure - Do not store near heat, sparks or flame. Do not puncture, incinerate or store above 120 deg F. KEEP OUT OF REACH OF CHILDREN.

Prepared by: Thompson & Formby Inc. Date: March 4, 1991

MATERIAL SAFETY DATA SHEET

SECTION I - IDENTIFICATION

NUFACTURER:	Muscle Products Corp. 188 Freeport Road Butler, PA 16001	PRODUCT NAME:	Firepower FP-10 Lubricant Elite
		EMERGENCY TELEPHONE NUMBER:	(412) 283-7355
TE PREPARED:	February 15, 1991		
EPARED BY:	George C. Fennell	TELEPHONE FOR INFORMATION:	(412) 283-0567

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

ZARDOUS COMPONENTS	OSHA PEL	ACGIH TLV	OTHER LIMITS RECOMMENDED
troleum Hydrocarbon Oils	500 ppm	5 mg/m^3	None
iphat.c Petroleum Distillates	500 ppm	5 mg/m^3	None

This product does not contain any chemical listed as a carcinogen or mutagen by OSHA, IARC Monographs, or the National Toxicology Program.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

ILING POINT:	>340°F @ 760 mmHg	SPECIFIC GRAVITY:	0.95
POR PRESSURE (mm Hg):	<1 @ 25°C	MELTING POINT:	N/A
POR DENSITY (Air=1):	4.0	EVAPORATION RATE (Butyl Acetate=1):	<0.02
LUBILITY IN WATER:	Insoluble	VISCOSITY:	44 cps
PEARANCE AND ODOR:	Light milky amber liquid, mild petroleum odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

ASH POINT AND METHOD USED:	170°F PMCC
AMMABLE LIMITS:	Lower: 0.2% Upper: 3%
TINGUISHING MEDIA:	CO_2, foam, chemical, waterfog
ECIAL FIRE FIGHTING PROCEDURES:	Use waterspray to cool drums or containers
USUAL FIRE AND EXPLOSION HAZARDS:	None

SECTION V - REACTIVITY DATA

ABILITY:	Stable under normal conditions
NDITIONS TO AVOID:	Open flames and sparks
COMPATIBILITY (Materials to Avoid):	Strong oxidizers
ZARDOUS DECOMPOSITION OR BYPRODUCTS:	CO, CO_2, trace amounts of HCl if combustion is not complete
ZARDOUS POLYMERIZATION:	Will not occur
NDITIONS TO AVOID:	None known

ower FP-10 Lubricant Elite (cont.)

SECTION VI - HEALTH HAZARD DATA

TE(S) OF ENTRY: Inhalation? No Skin? No Ingestion? Yes

LTH HAZARDS-ACUTE TOXICOLOGICAL PROPERTIES:
Eyes - Mild irritant
Ingestion - May produce mild narcotic effect, gastrointestinal discomfort, diarrhea
Skin - Very long term exposure may produce mild irritation

CINOGENICITY: None- NTP? No IARC Monographs? No OSHA Regulated? No

NS & SYMPTOMS OF EXPOSURE: Redness or irritation of eyes; nausea, stomach cramps, diarrhea, mild itching of skin (long term)

ICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis

RGENCY & FIRST AID PROCEDURES:
Inhalation of combusted fumes - Remove to fresh air
Eyes - Flush with water for 15 minutes
Skin - Wash thoroughly with soap and water
Ingestion - DO NOT induce vomiting; contact physician immediately

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

PS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Contain spill and recover excess. Do not discharge to streams or sewer. Absorb with earth, sand, or vermiculite.

TE DISPOSAL METHOD: Incinerate liquid. Dispose of absorbant in accordance with Federal, State, and Local regulations. Treat as a petroleum oil.

CAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store away from ignition sources.

ER PRECAUTIONS: Do not store in temperatures above 130°F.

SECTION VIII - CONTROL MEASURES

PIRATORY PROTECTIONS: If vapors form from combustion, use OSHA/NIOSH approved, self contained, breathing apparatus

TILATION: Local exhaust - None Special - None
Mechanical (General) - None Other - None

TECTIVE GLOVES: Neoprene

PROTECTION: Chemical goggles

ER PROTECTIVE EQUIPMENT/CLOTHING: None

K/HYGIENIC PRACTICES: Use usual good hygienic practices; wash thoroughly after use

NFPA RATING

HEALTH:	1	FIRE:	1
REACTIVITY:	0	PERSONAL PROTECTION:	0

OTHER DATA

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. This Material Safety Data sheet was prepared to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200). This supersedes any previous information.

MATERIAL SAFETY DATA SHEET

Manufacturer's Name: PENGUIN INDUSTRIES INC.
Street Address: AIRPORT INDUSTRIAL MALL
City, State, Zip Code: [illegible]
Emergency Telephone No.: (215) 381-6000
Speak With: EMERGENCY PERSONNEL

SECTION 1: IDENTITY

Product Name: Hoppe's #9 Nitro Powder Solvent
Synonyms: Famous #9 Solvent
CAS #: Not Applicable (Mixture)
Chemical Family: Petroleum Distillate
Formula: Not Applicable (Mixture)

SECTION 2: SAFETY AND HAZARD RATINGS

Health (Acute-Chronic) 1-2
Flammability: 3
Reactivity: 0
Environment (Air-Water-Soil): 1-1-1
Special Hazards: None
Protective Equipment: Explosion-proof, ventilation equipment, eye and hand wash.

RATINGS	
Minimal	0
Slight	1
Moderate	2
Severe	3
Extreme	4

SECTION 3: EMERGENCY AND FIRST AID PROCEDURES

EYES: Flush eyes with copious amounts of water for at least 15 minutes.
SKIN: Wash thoroughly with soap and water.
INGESTION: Give large amounts of milk or water to dilute. Do NOT induce vomiting. Do not give anything to an unconscious person.
INHALATION: Remove victim to fresh air. If breathing is difficult, give oxygen.

CALL A PHYSICIAN
CONTACT A POISON CONTROL CENTER

SECTION 4: HAZARDOUS INGREDIENTS

NAME	CAS #	%	CARCINOGEN IARC	CARCINOGEN NTP	CARCINOGEN OSHA	HAZARD DATA ACGIH TLV	HAZARD DATA OSHA PEL
Ethyl Alcohol	64-17-5	<35.0	No	No	No	1000ppm	1000ppm
Kerosene	8008-20-6	<35.0	No	No	No	Not Determined	
Trade Secret	Trade Secret	<25.0	No	No	No	Not Determined	
Organic Ester	Trade Secret	<10.0	No	No	No	100ppm	100ppm
Ammonium Hydroxide	1336-21-6	<3.0	No	No	No	Not Determined	

Product Name: Hoppe's #9 Nitro Powder Solvent

SECTION 5: FIRE AND EXPLOSION HAZARD DATA

Flash Point °F (Closed Cup): 59 (OC)
DOT Hazard Classification: Flammable Liquid
Auto-ignition Temperature °F: Not Reported
Flammable Limits in Air by Volume LEL: Not Reported
UEL: Not Reported

Extinguishing Media: Carbon dioxide, dry chemical, foam.

Special Fire Fighting Procedures: Use self-contained breathing apparatus and protective clothing.

Unusual Fire and Explosion Hazards: Dangerous when exposed to extreme heat, open flame or powerful oxidizers.

SECTION 6: REACTIVITY DATA (PHYSICAL HAZARDS)

Stability: [X] Stable [ ] Unstable

Incompatibility (Material to Avoid): Extreme heat, sparks, open flame, and oxidizers.

Hazardous Decomposition Products: Decomposition emits acrid smoke and fumes.

Hazardous Polymerization: [ ] May Occur [X] Should Not Occur

SECTION 7: HEALTH HAZARDS

Primary Route(s) of Entry: Inhalation and Dermal

Signs and Symptoms of Exposure

a. Overexposure Effects: Headache and dizziness. Lung, skin and eye irritation.
b. Chronic Effects: Dizziness, weakness, anemia. Effects liver, kidneys, and bone marrow.

1. Inhalation: Causes nausea, cough, headache, dizziness and lung irritation

2. Eyes: May cause irritation if not removed.

3. Skin: Causes dryness and skin irritation.

4. Ingestion: Harmful or fatal if swallowed. Causes gastro-intestinal irritation, weakness, dizziness, headache, pulmonary irritation. Extreme care must be taken to prevent aspiration.

5. Medical Conditions Potentially Aggravated By: Lung, liver, kidney, bone marrow and skin diseases. Susceptible individuals may have an allergic reaction.

Product Name: Hoppe's #9 Nitro Powder Solvent

SECTION 8: SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions To Be Taken In Handling/Storage: Keep containers closed when not in use. Do not handle or store near heat, flame or oxidizers. Use in a well-ventilated area. Avoid eye and prolonged skin contact. There should be no smoking where this product is handled or stored.

Hygienic Practices: Wash thoroughly after handling. Use general ventilation to protect your lungs. Do not wear contaminated clothing until thoroughly laundered.

When Material Is Released Or Spilled: Assure slippery conditions are nullified. Cover with an absorbent, sweep up and place in a suitable container. Flush area with water. Dispose of in accordance with local, state and federal regulations.

Waste Disposal Methods: Assure conformity with applicable disposal regulations. Dispose of absorbed material at approved incineration or chemical landfill waste disposal site.

SECTION 9: SPECIAL PROTECTION INFORMATION

Respiratory Protection: Explosion-proof, ventilation equipment.

Skin Protection: Wear gloves.

Eye Protection: Safety goggles.

Other Protective Clothing or Equipment: As needed to prevent repeated/prolonged contact.

SECTION 10: REGULATORY INFORMATION

Refer to the following references:

California Proposition 65: This product is regulated under California Proposition 65.
CERCLA: Not Applicable
DOT Regulations: 49 CFR 172.101, 172.102, 173.110, 173.119
EPCRA: Not Applicable
NDC 0168-0018-33
OSHA Regulations: 29 CFR 1910.132, 1910.133, 1910.134 if respirator is used.
SARA Title III: This product is subject to SARA Title III reporting requirements: Section 313: Organic Ester (<10%)
Section 311/312: Immediate Health (irritant), Chronic Health and Fire Hazard.
State Right-To-Know Laws: Components of this product are found on the Alaska, California, Florida, Illinois, Massachusetts, Minnesota, Missouri, New Jersey, North Dakota, Pennsylvania, Rhode Island, West Virginia, Wisconsin and Texas state lists.

Product Name: Hoppe's #9 Nitro Powder Solvent

SECTION 13: PHYSICAL DATA

Appearance: Liquid
Color: Pungent odor
Odor: Amber colored
Viscosity CPS @ 25°C: Not Indicated
Boiling Point°F: 250
Vapor Density (Air=1): 4.5
Solubility In Water: Not Indicated
% Volatile by Volume: Not Indicated
Evaporation Rate: Not Indicated

Date of Preparation/Change: September 5, 1989

The information presented herein relates to the specific material described and may not be valid for this material used in combination with any other materials or in any process. This information is, to the best of our knowledge, accurate and reliable on the date compiled. We make no representation, warranty, or guarantee as to its accuracy, reliability or completeness.
It is the reader's responsibility to ascertain whether the information supplied is suitable and complete for that person's specific uses.

This material safety data sheet was prepared for Penguin Industries Inc. by The Forum For Scientific Excellence, Inc., 200 Woodport Road, Sparta, New Jersey, 07871-2628. Phone (201) 729-4823.

LOCTITE CORPORATION
705 NORTH MOUNTAIN ROAD
NEWINGTON, CONNECTICUT 06111
EMERGENCY PHONE: (203) 278-1280

ISSUED 10/09/91
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TELEX: 275207

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MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Product Name:	Equipment Flushing Solvent
Item No.:	12121
Product Type:	Chlorinated Hydrocarbon
Formula No.:	Does not apply

II. COMPOSITION

Ingredients	CAS No.	%
METHYLENE CHLORIDE*	75-09-2	100

* This component is listed as a SARA Section 313 Toxic Chemical.

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	380mm at 72-F
Vapor Density:	2.93
Solubility in Water:	1.3%
Specific Gravity:	1.326 at 70-F
Boiling Point:	104-F
Volatile Organic Compound (EPA Method 24)	Not available
Evaporation Rate (Ether = 1)	0.7
pH:	Does not apply
Appearance:	Clear liquid.
Odor:	Sweet

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	None Method: TCC
Estimated NFPA Code:	
Health Hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0
Specific Hazard:	Does not apply
Estimated HMIS Code:	
Health Hazard:	2
Flammability Hazard:	1
Reactivity Hazard:	0
Personal Protection:	See Section X.
Explosive Limits:	
(% by volume in air)Lower	13% at 25-C Methylene chloride
(% by volume in air)Upper	23% at 25-C Methylene chloride
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical
Hazardous Products Formed by Fire or Thermal Decomp	Toxic chlorides.
Unusual Fire or Explosion Hazards:	None
Compressed Gases:	None
Pressure at Room Temp.:	Does not apply

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak:	Allow to evaporate with good ventilation.
Recommended methods of disposal:	Incinerate following EPA and local regulations.

VI. STORAGE AND HANDLING PROCEDURES

Storage:	Store below 90-F to preserve shelf life.
Handling:	Avoid prolonged breathing of vapors. Keep away from eyes. Avoid prolonged skin contact.

VII. SHIPPING REGULATIONS

Type or Class	DOT: ORM-A IATA: Class 6.1, Packing Group III
Proper Shipping Name	DOT: Dichloromethane

Product Name: Equipment Flushing Solvent
Item No.: 12121

VII. SHIPPING REGULATIONS (continued)

IATA: Dichloromethane

Identification Number:
DOT: NONE UN 1593 >1pt
IATA: UN 1593

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will Not Occur
Hazardous Decomposition Products (non-thermal): None
Incompatability: Active metals, strong oxidizers, strong caustics.

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention.
Inhalation: Remove to fresh air. If symptoms persist, obtain medical attention.
Skin Contact: Flush with water.
Eye Contact: Flush at least 15 minutes with water. Obtain medical attention.

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles.
Skin: Rubber or plastic gloves.
Ventilation: Sufficient to maintain vapor concentration below TLV.

XI. HEALTH HAZARD DATA

Toxicity: Eye irritant. Moderately toxic by ingestion. Estimated dermal LD50 more than 2000 mg/kg.
Primary Routes of Entry: Inhalation, ingestion, contact.
Signs and Symptoms of Exposure: Headache, nausea, dizziness. Narcosis at high concentration.
Existing Conditions Aggravated by Exposure: None known

Exposure Limits Ingredients	ACGIH (TLV)	OSHA (TLV)	OTHER
METHYLENE CHLORIDE	50 ppm TWA 174 mg/m3	100 ppm TWA 200 ppm ceiling	None

Ingredients	Literature Referenced Target Organ and Other Health Effects	Carcinogen NTP	IARC	OSHA
METHYLENE CHLORIDE	IRR LIV MET MUT NER	YES	2B	NO

Abbreviations

2B Possibly carcinogenic to humans
LIV Liver
MUT Mutagen
IRR Irritant
MET Metabolic
NER Nervous System

XII. PREPARATION INFORMATION

Prepared By: Stephen Repetto
Title: Research Chemist, Environmental Health & Safety
Company: Loctite Corp., 705 N. Mt. Rd, Newington, CT 06111
(24hr.) Phone: (203) 278-1280
Revision Date: January 07, 1991 Revision: 0008

COPY

AMSOIL Inc.
AMSOIL Bldg
Superior, WI 54880
715/392-7101

MATERIAL SAFETY DATA SHEET

Product Trade Name:	Metal Protector
CAS#:	Mixture
Synonyms:	AMP2
Generic/Chemical Name:	The specific chemical name and percent composition of the components not disclosed are trade secrets.
Product Type:	Anti-corrosion lubricant
Preparation/Revision Date:	1/30/90
NFPA Code:	Health: 2 Fire: 2 Reactivity: 0
HMIS Code:	Health: 2* Fire: 2 Reactivity: 0
Principal Hazards:	Warning- Harmful if inhaled May cause eye irritation May cause skin irritation Combustible liquid May cause allergic skin reaction May cause chronic health effects

SECTION 1- HAZARDOUS INGREDIENTS

-This material is not known to contain greater than 0.1% of any carcinogen required to be listed under the OSHA Hazard Communication Standard (29CFR1910.12000)
-70.7% Mineral Spirits, CAS# 8052-41-3; OSHA PEL: 100.00 ppm; ACGIH TLV-TWA: 525.00 mg/cu M, 100.0 ppm
-0.5 to 1.5% Paraffin wax

SECTION 2 - FIRE & EXPLOSION HAZARDS

Flash Point:	55°C(131°F) by PMCC
Upper/Lower Flammable Limit:	Not determined
Extinguishing Media:	CO2, dry chemical, alcohol foam. Water may be used to cool & protect exposed material.
Special Fire Fighting Procedures:	Recommend wearing self-contained breathing apparatus. Water may cause splattering. Material will float on water.
Unusual Fire & Explosion Hazards:	Toxic fumes, gases or vapors may evolve on burning. Vapors may be heavier than air & may travel along the ground to a distant ignition source & flash back. Container may rupture on heating.

SECTION 3A - HEALTH HAZARD DATA

--ACUTE EXPOSURE--

Oral Toxicity: The LD50 in rats is >5000 mg/kg based on data from components or similar materials. Swallowing this material causes severe irritation of the gastrointestinal lining, nausea, vomiting, diarrhea and abdominal pain. Ingestion may cause CNS depression.

Eye Irritation: Eye irritant based on data from components or similar material.

Skin Irritation: Skin irritant based on data from components or similar material. Prolonged or repeated skin contact as from clothing wet with material may cause dermatitis. Symptoms may include redness, edema, drying, defatting and cracking of the skin.

Dermal Toxicity: The LD50 in rabbits is >2000 mg/kg based on data from components or similar materials.

Inhalation Toxicity: High concentrations may cause headaches, dizziness, nausea, stupor and other central nervous system (CNS) effects leading to visual impairment, difficulty in breathing and convulsions.

Respiratory Irritation: If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.

Dermal Sensitization: May cause skin sensitization based on data from components or similar materials.

Inhalation Sensitization: No data available to indicate product or components to be respiratory sensitizers.

--CHRONIC EXPOSURE--

Chronic Toxicity: Repeated overexposure to aliphatic minerals spirits such as Stoddard Solvent can cause chronic nervous system disease.

Carcinogenicity: No data available to indicate any components present at greater than 0.1% may be a carcinogenic hazard.

Mutagenicity: No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Reproductive Toxicity: No data available to indicate either product or components present at greater than 0.1% may cause reproductive toxicity.

Teratogenicity: No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

--ADDITIONAL INFORMATION--

Other: No other health hazards known.

Exposure Limits: Contains mineral oil. Under conditions which may generate mists, observe OSHA PEL of 5 mg/cu M; ACGIH STEL of 10 mg/cu M.

SECTION 3B - EMERGENCY FIRST AID PROCEDURES

Skin: Wash immediately with soap and water. Immediately remove contaminated clothing. Get medical attention if irritation persists. Launder contaminated clothing before reuse and discard shoes and other leather articles saturated with the material.
Eye: Flush immediately with water for at least 15 minutes. Get immediate medical attention if eye irritation develops or persists.
Inhalation: Remove exposed person to fresh air if adverse effects are observed. If breathing is labored, administer oxygen. If breathing has stopped, apply artificial respiration.
Oral: DO NOT INDUCE VOMITING. If conscious, give 2 glasses of water. Aspiration of material due to vomiting can cause chemical pneumonitis which can be fatal. Get medical attention immediately.
Additional: Note to physicians: Treat symptomatically.

SECTION 4 - SPECIAL PROTECTION INFORMATION

Ventilation Procedure: Use local exhaust ventilation to control mists or vapors. Additional ventilation or exhaust may be required to maintain air concentrations below recommended exposure limits. Use explosion proof equipment.
Glove Protection: Nitrile
Eye Protection: Chemical goggles or faceshield.
Respiratort Protection: Use NIOSH/MSHA approved full face respirator with an organic vapor cartridge if exposure limit is exceeded. Use self-contained breathing apparatus for entry into confined space and for other poorly ventilated areas and for large spill clean-up sites.
Clothing Recommendation: Long sleeve shirt is recommended. Wear either a chemical protective suit or apron when potential for contact exists. When working with heated material, wear heat protective clothing. Use neoprene or nitrile rubber boots when necessary to avoid contaminating shoes. Do not wear rings, watches or similar apparel that could entrap the material and cause a skin reaction. Launder contaminated clothing before re-use.

SECTION 5 - PHYSICAL DATA

Vapor Pressure:	Not determined
pH:	Not determined
Specific Gravity:	0.81 @ 15.6°C
Water Solubility:	Insoluble
Percent Volatile:	Unknown
Vapor Density:	Not determined
Evaporation Rate:	Not determined
Odor:	Mild
Appearance:	Light colored liquid
Viscosity:	1.9 cSt @ 40°C
Odor Threshold:	Unknown

SECTION 6 - STABILITY

Stability:	Material is normally stable at moderately elevated temperatures and pressures
Incompatibity:	Oxidizing agents
Polymerization:	Will not occur
Thermal Decomposition:	Smoke, carbon monoxide, aldehydes and other products of incomplete combustion.

SECTION 7 - SPILL OR LEAK PROCEDURES

Spill Procedures: Evacuate all non-essential personnel. Personal protective equipment must be worn. Remove sources of ignition. Ventilate spill area. Prevent entry into sewers or waterways. Pick up free liquid for recycle and/or disposal if it can be accomplished safely with explosion proof equipment. Residual liquid may be absorbed on inert material. Report to appropriate regulatory agencies where required.

Waste Disposal: Material expected to meet hazardous waste criteria under RCRA for ignitability. Disposal should be in compliance with federal, state and local laws.

SECTION 8 - SPECIAL PRECAUTIONS

Special Precautions: Keep away from potential sources of ignition. Store in well ventilated area. Open container in a well ventilated area. Avoid breathing vapors. Keep containers closed when not in use. Wash thoroughly after handling. Launder contaminated clothing before reuse. Empty containers retain material residue. Do not cut, weld, braze, solder, drill, grind or expose containers to heat, flame, spark or other sources of ignition.

SECTION 9 - TRANSPORTATION AND LABELING

DOT Proper Shipping Name:	Combustible Liquid, NOS
DOT Hazard Class:	Combustible Liquid
DOT ID Number (UN No.):	NA1993
IMO Class:	Class 3.3, Packaging Group III
ICAO Class:	Class 3, Packaging Group III
CERCLA Hazardous Substances:	None known
Precautionary Labels:	Warning - Harmful if inhaled May cause eye irritation May cause skin irritation Combustible liquid May cause allergic skin reaction May cause chronic health effects

SECTION 10 - OTHER REGULATORY INFORMATION

SARA §302: This product is not known to contain greater than 1.0% of any chemical substance on the SARA Title III §302 Extremely Hazardous Substance List.

SARA §313: This product is not known to contain greater than 1.0% (greater than 0.1% for a carcinogen) of any chemical substance listed under SARA Title III § 313.

The information presented herein has been compiled from sources considered to be dependable and is accurate to the best of AMSOIL Inc.'s knowledge; however, AMSOIL Inc. makes no warranty whatsoever, expressed or implied, of merchantability or fitness for the particular purpose, regarding the accuracy of such data or the results to be obtained from the use thereof. AMSOIL Inc. assumes no responsibility for injury to recipient or to third persons or for any damage to any property and recipient assumes all such risks.

COPY

MATERIAL SAFETY DATA SHEET

Blount, Inc.
Outers Location
P.O. Box 39
Onalaska WI 54650
(608) 781-5800

MSDS NO.: 112
PRODUCT NAME: Outers Nitro Powder Solvent Gunslick Gun Cleaning Solvent
DATE: 5-21-90

SECTION I: MATERIAL IDENTIFICATION

Chemical Name: cleaning solvent
Product Code: see page 5
Formula: mixture
Chemical Family: petroleum distillate solvent
Synonyms: NA
Molecular Weight: NA

D.O.T. Hazard Classification: Flammable liquid
Shipping Name: Flammable liquid n.o.s.
Small container: Consumer Commodity ORM-D
Identification #: UN 1993
CAS #: NA CAS Name: NA

SECTION II: HAZARDOUS INGREDIENTS

Material:	% wt.	(Units) TLV (Source)	OSHA PEL	CAS #
odorless mineral spirits <85%	*			8030306
*use Stoddard Solvent as guide = 100		ppm (ACGIH 89-90)		
Turpentine	< 10%	100 ppm	(ACGIH 89-90)	8006642
Gun Oil	< 10%	5 mg/m as oil mist (ACGIH 89-90)		8012951
Amyl Acetate	< 5%	100 ppm	(ACGIH 89-90)	628-63-7
Acetone	< 5%	750 ppm	(ACGIH 89-90)	67641

For chemical emergency spill, leak, fire, exposure or accident, call CHEMTREC, 800-424-9300, day or night.

SECTION III: PHYSICAL DATA

Boiling Point: 80 deg. C.
Physical State at 60 degrees F: liquid
Specific Gravity: .77
Vapor Pressure at 20 degrees C: Reid PSI 1.1
Viscosity: at 100 F 30.8
Melting Point: -73
Vapor Density (Air = 1): 1
Solubility in Water: NA
Per Cent Volatiles by Volume: 100%
Evaporation Rate: similar to kerosene
pH NA
Appearance & Odor: pale yellow liquid with odor of turpentine

SECTION IV: HEALTH HAZARD DATA

TLV & SOURCE: mixture not established; see section II for ingredient TLV

PRIMARY ROUTE OF EXPOSURE: inhilation and skin

ACUTE EFFECTS OF OVEREXPOSURE:

Swallowing: Can cause burning, vomiting drowsiness, diarrhea

Inhalation: Headache, nausea; can cause aspiration pneumonia

Skin Contact: Irritant to skin and mucous membrane; defatting

Eye Contact: irritation

CHRONIC EFFECTS OF OVER EXPOSURE: possible dermatitis

CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN: no

EMERGENCY AND FIRST AID PROCEDURES

Swallowing: Consult physician. DO NOT induce vomiting.

Skin: Wash well with soap and water. Apply skin cream or lotion.

Inhalation: Remove from concentrated vapors. Give fresh air or oxygen if needed.

Eyes: Flush with water for 15 minutes; get medical attention.

NOTES TO PHYSICIAN:

SECTION V: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 42 deg. F TCC AUTO IGNITION TEMP. unknown
(test method)

FLAMMABLE LIMITS IN AIR, % BY VOLUME: LEL unknown UEL unknown

EXTINGUISHING MEDIA: carbon dioxide, dry chemical or foam

SPECIAL FIRE FIGHTING PROCEDURES: In case where product is heated to decomposition, gives off acrid fumes.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Fire fighters should use self contained breathing apparatus. Do not spray water directly on fire as this may contribute to spread of burning debris.

SECTION VI: REACTIVITY DATA

STABILITY: stable at ambient temperature CONDITIONS TO AVOID: Strong oxidizer. Some bases.
INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.

HAZARDOUS POLYMERIZATION: does not occur CONDITIONS TO AVOID: Do not store near heat or flames.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal breakdown can produce toxic vapors of carbon dioxide, carbon monoxide, asphyxiants, acrid fumes, soot.

SECTION VII: SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Absorb with absorbant materials.

WASTE DISPOSAL METHOD: Use a licensed waste hauler. Can be incinerated. Dispose of following local, state and foderal regulations for an ignitable petroleum distillate. Report large spill to authorities may be required.

VIII: SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): When TLV is exceeded use NIOSH approved for organic vapors.

VENTILATION: Provide general ventilation to keep vapors below TLV.

PROTECTIVE GLOVES: Use solvent resistant gloves when working in product.

EYE PROTECTION: Use splash goggles when splash will occur.

OTHER PROTECTIVE EQUIPMENT: Aprons or other protective garments may be required in some industrial situations.

SECTION IX: SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep away from heat, flame, spark. Do not mix refuse with strong oxidizers. Store in cool, well ventilated area.

PRECAUTIONS DURING USE: Follow good personal hygiene practice, avoiding skin contact. Clean skin when contact occurs. Wash skin several times a day when working with this product. DO NOT smoke around product. Work in well ventilated area.

SECTION X: ADDITIONAL COMMENTS:

This information, is to the best of Blount Inc.'s knowledge and belief, accurate and reliable. However, no representation, warranty or guarantee is made to its accuracy, reliability or

completeness. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

PREPARED BY:
Sylvia A. Allen, Chemist

SUPERSEDES MSDS DATED: 11-13-89

PRODUCT CODES

Outers Pump Spray Solvent, #44	42030
Outers Pump Spray Solvent, #44*	42031
Outers Sportsmen's Solvent, #444-A	42032
Outers Sportsmen's Solvent, #444-A*	42033
Outers Solvent - gallon, #444-G	42034
Outers Solvent - pint, #444-P	42035
Outers Solvent - quart, #444-Q	42036
Outers Solvent - 5 gallon pail	47009
Outers Solvent - 55 gallon drum	47010

COPY

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Product Name:	Impruv(TM) Optically Clear UV Adhesive
Item No.:	34931
Product Type:	UV Curing Adhesive
Formula No.:	FMD-21B

II. COMPOSITION

Ingredients	CAS No.	%
Polyurethane methacrylate resin	Unknown	45-50
Hydroxyalkyl methacrylate	868-77-9	15-20
Higher boiling methacrylate	75662-22-5	20-25
Alkyl methacrylate	142-90-5	5-15
ACRYLIC ACID*	79-10-7	5-7
Alkyl methacrylate	2549-53-3	3-5
Substituted silane	2530-83-8	1-3
Photoinitiator	947-19-3	1-3

* This component is listed as a SARA Section 313 Toxic Chemical.

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	Less than 10mm at 75°F
Vapor Density:	Not Available
Solubility in Water:	Slight
Specific Gravity:	1.02 at 68°F
Boiling Point:	More than 300°F
Volatile Organic Compound (ASTM D2369)	54.5%
Evaporation Rate (Ether = 1)	Not available
pH:	Not Applicable
Appearance:	Optically clear
Odor:	Sharp, irritating

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	More than 200°F Method: Tag closed cup
Estimated NFPA Code:	
Health Hazard:	2
Fire Hazard:	1
Reactivity Hazard:	1
Specific Hazard:	Does not apply
Estimated HMIS Code:	
Health Hazard:	2
Flammability Hazard:	1
Reactivity Hazard:	1
Personal Protection:	See Section X.
Explosive Limits:	
(% by volume in air)Lower	2.0% Acrylic acid
(% by volume in air)Upper	8.0% Acrylic acid
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical
Hazardous Products Formed by Fire or Thermal Decomp	Irritating organic vapors.
Unusual Fire or Explosion Hazards:	None
Compressed Gases:	None
Pressure at Room Temp.:	Does not apply

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak:	Soak up with an inert absorbent. Store in partly filled, closed container until disposal. Residue may be cleaned with solvent.
Recommended methods of disposal:	Incinerate following EPA and local regulations.

VI. STORAGE AND HANDLING PROCEDURES

Storage:	Store below 110°F to preserve shelf life. Protect from light.
Handling:	Keep away from eyes. Avoid prolonged skin contact. Avoid prolonged breathing of vapors.

VII. SHIPPING REGULATIONS

Type or Class	DOT: Unrestricted
	IATA: Unrestricted

Product Name: Impruv(TM) Optically Clear UV Adhesive
Item No.: 34931

VII. SHIPPING REGULATIONS (continued)

Proper Shipping Name Identification Number: DOT and IATA: Unrestricted

DOT: None
IATA: None

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will Not Occur
Hazardous Decomposition Products (non-thermal): None
Incompatability: None

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention.
Inhalation: Remove to fresh air. If symptoms persist, obtain medical attention.
Skin Contact: Flush with water.
Eye Contact: Flush at least 15 minutes with water. Obtain medical attention.

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles mandatory.
Skin: Rubber or plastic gloves recommended.
Ventilation: Sufficient to maintain vapor concentration below TLV.

XI. HEALTH HAZARD DATA

Toxicity: Eye irritant. Possible skin irritant.
Estimated Oral LD greater than 5000 mg/kg.
Estimated Dermal LD50 greater than 2000 mg/kg.
Primary Routes of Entry: Not Available
Signs and Symptoms of Exposure: May cause dermatitis on prolonged contact in sensitive individuals.
Existing Conditions Aggravated by Exposure: None known

Exposure Limits Ingredients	ACGIH (TLV)	OSHA (TLV)	OTHER
Polyurethane methacrylate resin	None	None	None
Hydroxyalkyl methacrylate	None	None	3 ppm ceiling
Higher boiling methacrylate	None	None	None
Alkyl methacrylate	None	None	50ppm
ACRYLIC ACID	2 ppm TWA 5.9 mg/m3	10 ppm TWA skin 30 mg/m3 skin	2ppm
Alkyl methacrylate	None	None	50 ppm
Substituted silane	None	None	None
Photoinitiator	None	None	None

Ingredients	Literature Referenced Target Organ and Other Health Effects	Carcinogen NTP	IARC	OSHA
Polyurethane methacrylate resin	No Data	NO	NO	NO
Hydroxyalkyl methacrylate	No Data	NO	NO	NO
Higher boiling methacrylate	No Data	NO	NO	NO
Alkyl methacrylate	No Data	NO	NO	NO
ACRYLIC ACID	IRR REP	NO	N/A	NO
Alkyl methacrylate	No Data	NO	NO	NO
Substituted silane	No Data	NO	NO	NO
Photoinitiator	No Data	NO	NO	NO

Abbreviations

N/A Not Applicable
REP Reproductive
IRR Irritant

XII. PREPARATION INFORMATION

Prepared By: Stephen Repetto
Title: Research Chemist, Environmental Health & Safety
Company: Loctite Corp., 705 N. Mt. Rd, Newington, CT 06111

XII. PREPARATION INFORMATION (continued)

(24hr.) Phone: (203) 278-1280
Revision Date: March 05, 1991 Revision: 0012

I. PRODUCT IDENTIFICATION

Product Name:	Black Max(TM) Black Tough Adhesive
Item No.:	38061
Product Type:	Cyanoacrylate
Formula No.:	LO-863B

II. COMPOSITION

Ingredients	CAS No.	%
Ethyl cyanoacrylate	7085-85-0	85-90
Ethylene copolymer rubber	54545-50-5	7-12
CARBON BLACK	1333-86-4	1-3
PHTHALIC ANHYDRIDE*	85-44-9	0.1-1
HYDROQUINONE	123-31-9	0.1-0.5

* This component is listed as a SARA Section 313 Toxic Chemical.

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	Less than 0.2mm
Vapor Density:	Approximately 3
Solubility in Water:	Polymerized by water
Specific Gravity:	1.1
Boiling Point:	More than 300°F
Volatile Organic Compound (ASTM D2369)	Not available
Evaporation Rate (Ether = 1)	Not available
pH:	Does not apply
Appearance:	Viscous, black liquid
Odor:	Sharp, irritating

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	150 - 200°F Method: Tag Closed Cup
Estimated NFPA Code:	
Health Hazard:	2
Fire Hazard:	2
Reactivity Hazard:	2
Specific Hazard:	No water
Estimated HMIS Code:	
Health Hazard:	2
Flammability Hazard:	2
Reactivity Hazard:	2
Personal Protection:	See Section X.
Explosive Limits:	
(% by volume in air)Lower	1.7% Phthalic anhydride
(% by volume in air)Upper	10.5% Phthalic anhydride
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical
Hazardous Products Formed by Fire or Thermal Decomp	Irritating organic vapors
Unusual Fire or Explosion Hazards:	None
Compressed Gases:	None
Pressure at Room Temp.:	Does not apply

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak:	Flood with water to polymerize completely. Solid polymer is non-hazardous.
Recommended methods of disposal:	After polymerization as above, incinerate following EPA and local regulations. Phthalic anhydride is listed by EPA as hazardous waste.

VI. STORAGE AND HANDLING PROCEDURES

Storage:	Store below 75°F to maximize shelf life.
Handling:	Avoid contact with skin and eyes. Avoid breathing vapor.

VII. SHIPPING REGULATIONS

Type or Class	DOT: Not restricted (Less than or = 1 pint); ORM-A (1 pint to 110 gallons); Combustible liquid (Greater than 110 gallons) IATA: Unrestricted; DOT regulations apply in U.S.
Proper Shipping Name	DOT: Not restricted (Less than or = 1 pint); ORM-A, n.o.s. (One pint to 110 gallons); Combustible liquid, n.o.s. (More than 110

Product Name: Black Max(TM) Black Tough Adhesive
Item No.: 38061

VII. SHIPPING REGULATIONS (continued)

gallons)(Ethyl Cyanoacrylate Solution)
IATA: Unrestricted; DOT regulations apply in U.S.

Identification Number:
DOT: NONE NA 1693 >1pt; NA 1993 >110gals
IATA: NONE ID8027 (NA1693 Domestic Air Only) >16oz

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will Not Occur
Hazardous Decomposition Products (non-thermal): None
Incompatability: Polymerized by contact with water, alcohols, amines, alkalies.

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: See supplemental page for emergency procedures. Obtain medical attention.
Inhalation: Remove to fresh air. Treat symptomatically.
Skin Contact: See supplemental page for emergency procedures.
Eye Contact: See supplemental page for emergency procedures. Obtain medical attention.

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles.
Skin: Polyethylene gloves recommended. Do not use cotton gloves.
Ventilation: Positive down-draft exhaust ventilation should be provided to maintain vapor concentration below TLV.

XI. HEALTH HAZARD DATA

Toxicity: Bonds skin rapidly and strongly.
Skin and eye irritant.
Estimated oral LD 50 more than 5000 mg/kg
Estimated dermal LD50 more than 2000 mg/kg.
Primary Routes of Entry: None known
Signs and Symptoms of Exposure: Vapor is irritating to eyes and mucous membranes above TLV. Prolonged and repeated overexposure to vapors may produce allergic reactions with asthma-like symptoms in sensitive individuals.
Existing Conditions Aggravated by Exposure: None known

Exposure Limits Ingredients	ACGIH (TLV)	OSHA (TLV)	OTHER
Ethyl cyanoacrylate	None	None	2 ppm TWA
Ethylene copolymer rubber	None	None	None
CARBON BLACK	3.5 mg/m3 TWA	3.5 mg/m3 TWA	5ppm
PHTHALIC ANHYDRIDE	1 ppm TWA 6.1 mg/m3	1 ppm TWA 6 mg/m3	None
HYDROQUINONE	2 mg/m3 TWA	2 mg/m3 TWA	None

Ingredients	Literature Referenced Target Organ and Other Health Effects	Carcinogen NTP	IARC	OSHA
Ethyl cyanoacrylate	LUN	NO	NO	NO
Ethylene copolymer rubber	No Data	NO	NO	NO
CARBON BLACK	No Data	NO	N/A	NO
PHTHALIC ANHYDRIDE	IRR	NO	NO	NO
HYDROQUINONE	No Data	NO	N/A	NO

Abbreviations

N/A Not Applicable
IRR Irritant
LUN Lung

XII. PREPARATION INFORMATION

Prepared By: Stephen Repetto
Title: Research Chemist, Environmental Health & Safety
Company: Loctite Corp., 705 N. Mt. Rd, Newington, CT 06111
(24hr.) Phone: (203) 278-1280
Revision Date: January 28, 1991 Revision: 0014

Product Name: Black Max(TM) Black Tough Adhesive
Item No.: 38061

Supplement

INFORMATION FOR FIRST AID AND CASUALTY ON TREATMENT FOR ADHESION OF HUMAN SKIN TO ITSELF IF CAUSED BY CYANOACRYLATE ADHESIVES

Cyanoacrylate adhesive is a very fast setting and strong adhesive. It bonds human tissue including skin in seconds. Experience has shown that accidents due to cyanoacrylates are handled best by passive, non-surgical first aid. Treatment of specific types of accidents are given below.

SKIN ADHESION

First immerse the bonded surfaces in warm soapy water. Peel or roll the surfaces apart with the aid of a blunt edge, e.g. a spatula or a teaspoon handle; then remove adhesive from the skin with soap and water. Do not try to pull surfaces apart with a direct opposing action.

EYELID TO EYELID OR EYEBALL ADHESION

In the event that eyelids are stuck together or bonded to the eyeball, wash thoroughly with warm water and apply a gauze patch. The eye will open without further action, typically in 1-4 days. There will be no residual damage. Do not try to open the eyes by manipulation.

ADHESIVE ON THE EYEBALL

Cyanoacrylate introduced into the eyes will attach itself to the eye protein and will disassociate from it over intermittent periods, generally covering several hours. This will cause periods of weeping until clearance is achieved. During the period of contamination, double vision may be experienced together with a lachrymatory effect, and it is important to understand the cause and realize that disassociation will normally occur within a matter of hours, even with gross contamination.

MOUTH

If lips are accidentally stuck together, apply lots of warm water to the lips and encourage maximum wetting and pressure from saliva inside the mouth. Peel or roll lips apart. Do not try to pull the lips with direct opposing action.
It is almost impossible to swallow cyanoacrylate. The adhesive solidifies and adheres in the mouth. Saliva will lift the adhesive in 1/2 to 2 days. In case a lump forms in the mouth, position the patient to prevent ingestion of the lump when it detaches.

BURNS

Cyanoacrylates give off heat on solidification. In rare cases a large drop will increase in temperature enough to cause a burn.
Burns should be treated normally after the lump of cyanoacrylate is released from the tissue as described above.

SURGERY

It should never be necessary to use such a drastic method to separate accidentally bonded skin.

COPY

MATERIAL SAFETY DATA SHEET

SECTION 1 - IDENTIFICATION

Product: GUN SCRUBBER

Chemical Family: Mixture
Chemical Formula: NA 7410
Chemical Trade Name, synonyms: NA

Distributed by: Birchwood Laboratories
7900 Fuller Road
Eden Prairie, MN. 55344
Telephone: 612-937-7933

MSDS#: 0319
Date: 6-7-89
Prepared by IKI: Derek J. Bemis

SECTION 2 - INGREDIENTS

CAS REG #	NAME	PEL/TLV, SOURCE
124-38-9	Carbon dioxide	5000 ppm, OSHA
75-69-4	1,1,1-Trichloroethane * Percentage of this ingredient in product is 80-98%	350 ppm, ACGIH

* NOTE: This chemical is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

SECTION 3 - PHYSICAL DATA

Boiling Range: -109.3°F to 165°F
Pressure in can at 70°F: Approx. 90 psig
Vapor Density (Air = 1): Approx. 4.3
Solubility in water: Less than 1%
Specific Gravity (Water = 1) of product: Approx. 1.30
Percent volatile by weight: 97%
Evaporation Rate (Ether = 1): Less than 1
Appearance and odor: Clear liquid, chlorinated odor.

SECTION 4 - FIRE AND EXPLOSION HAZARDS

Flammability category: Not Flammable
(Reference - Consumer Product Commission, flame projection test for aerosol products, per 16 CFR 1500.45)
Flash Point, method: None estimated
Flammable Limits: LEL: 7 UEL: 15
Extinguishing media: Not applicable
Unusual fire and explosion hazards: Avoid possible bursting of aerosol can. Do not store where temperature may exceed 120°F. Do not puncture or incinerate.

Special fire fighting procedures: Avoid possible accumulations of vapors at floor level, as vapor is heavier than air. Self-contained breathing apparatus and protective clothing should be worn in fighting fires involving chemicals.

SECTION 5 - HEALTH HAZARD DATA

Suggested exposure guideline: 350 ppm
Primary route of exposure: Inhalation,skin contact

Effects of overexposure - inhalation: Central nervous system depression producing effects such as headaches, nausea, dizziness, and loss of consciousness.
Effects of overexposure - skin contact: Irritation upon prolonged contact. Defatting of skin.
Effects of overexposure - eye contact: Irritation. Prolonged contact could result in permanent eye damage.
Emergency and first aid procedures - inhalation: Remove to fresh air. Artificial respiration, consult physician.
Emergency and first aid procedures - skin contact: Wash with soap and water. Remove soaked clothing to avoid prolonged skin contact.
Emergency and first aid procedures - eye contact: Flush eyes well with running water for 15 minutes.
Emergency and first aid procedures - ingestion: Get immediate medical attention. Consult Poison Control Center. Treatment is dependent on condition of victim.

This product contains no known or potential carcinogens as listed per NTP, IARC, or OSHA (29 CFR 1910.1200(D)#4).

Additional Health Hazard Data:
Note to physician: Chlorinated solvent. Do not administer adrenaline, epinephrine, or other stimulant following overexposure. Increased cardiac sensitivity and possible arrhythmia may result from overexposure.

SECTION 6 - REACTIVITY DATA

Stability: Stable
Conditions to avoid: Heat, sparks, flames.
Incompatibility: Strong oxidizers. Alkalies. Aluminum.
Hazardous polymerization: Will not occur
Hazardous decomposition products: Carbon monoxide, Carbon dioxide, Hydrogen Chloride vapors, traces of phosgene, and unidentifiable organic materials.

SECTION 7 - SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled: Ventilate area well. Soak up on suitable absorbent material.

Waste disposal method: Dispose of in accordance with all local, state and federal regulations. Do not puncture or incinerate.

SECTION 8 - SPECIAL PROTECTION INFORMATION

Respiration protection: If TLV is exceeded wear NIOSH-approved self-contained breathing device or respirator.

Ventilation: Must be adequate to maintain vapors at less than 350 ppm, particularly at floor level as vapors are heavier than air.
Protective gloves: Solvent-resistant rubber type recommended if exposure expected.
Eye protection: Safety glasses or goggles recommended.

SECTION 9 - HANDLING AND STORAGE PRECAUTIONS

Precautions to be taken in handling and storage: Do not store where temperature may exceed 120°F. Store away from, fire, sparks or flame.

D.O.T. Shipping Classification: Consumer Commodity ORM-D
Hazard Class: ORM-D ID#: None
Label required: None, carton must be marked with ORM-D

SECTION 10 - SPECIAL PRECAUTIONS

Precautions for usage: Do not use near heat, fire, flame or sparks. Avoid excessive breathing of vapor. Do not spray in direction of body. Use only in accordance with directions.

Notice: This data represents typical values, not product specifications. No guarantee of accuracy or completeness is made. No responsibility is assumed for any kind of loss or damages arising from use of this data.

DOW CORNING CORPORATION
MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE NO: (517) 496-5900

SECTION I

PRODUCT NAME OR NUMBER: DOW CORNING(R) 734 RTV SELF-LEVELING ADHESIVE

MANUFACTURERS NAME: DOW CORNING CORPORATION
ADDRESS: SOUTH SAGINAW ROAD, MIDLAND MI 48640

PROPER SHIPPING NAME(49 CFR 172.101): COMBUSTIBLE LIQUID
D.O.T. HAZARD NAME(49 CFR 172.101): NONE
D.O.T. ID NO(49 CFR 172.101): N.A. 1993
D.O.T. HAZARD CLASS (49 CFR 172.101): COMBUSTIBLE LIQUID(EXEMPT IN PACKAGES OF 110 GALLONS OR LESS)
RCRA HAZARD CLASS*(40 CFR 261): NONE
E.P.A. PRIORITY POLLUTANTS (40 CFR 122.53): NONE
HEALTH (NFPA): 1 FLAMABILITY (NFPA): 2 REACTIVITY (NFPA): 1
CAS. NO.: MIXTURE DCWC: 57, 84
GENERIC DESCRIPTION: SILICONE
* IF DISCARDED

SECTION II HAZARDOUS INGREDIENTS

Acetoxysilane	%: 5	TLV (units):10 ppm*
	%:	TLV (units):

*Based on Acetic Acid.

SECTION III HEALTH HAZARD DATA HEALTH (NFPA) 1

EFFECTS OF OVEREXPOSURE: Irritates eyes. Prolonged or repeated contact may irritate skin.

THRESHOLD LIMIT VALUE OF PRODUCT: 10 ppm (based on liberated acetic acid)

EMERGENCY AND FIRST AID PROCEDURES: Wipe off. Flush with water. Obtain medical attention for eyes if necessary.

SECTION IV FIRE AND EXPLOSION HAZARD DATA FLAMMABILITY (NFPA) 2

FLASH POINT (METHOD USED): OPEN CUP ABOVE 189°F/87°C
FLAMMABLE LIMITS IN AIR, % BY VOLUME: LOWER: NOT DETERMINED
UPPER: NOT DETERMINED
EXTINGUISHING MEDIA: CARBON DIOXIDE OR FOAM.
SPECIAL FIRE FIGHTING PROCEDURES: SELF CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING CHEMICALS.
UNUSUAL FIRE AND EXPLOSION HAZARDS: NOT KNOWN TO DOW CORNING

(R) INDICATES REGISTERED OR TRADEMARK NAME OF DOW CORNING CORPORATION

DOW CORNING CORPORATION
MATERIAL SAFETY DATA SHEET

NAME OR NUMBER: DOW CORNING(R) 734 RTV SELF-LEVELING ADHESIVE

SECTION V PHYSICAL DATA

BOILING POINT: ABOVE 300°F/149°C
SPECIFIC GRAVITY: 1.05
MELTING POINT: NOT APPLICABLE
VAPOR PRESSURE: LESS THAN 5 MM
VAPOR DENSITY (AIR=1): NOT APPLICABLE
PERCENT VOLATILE BY VOLUME (%): LESS THAN 5%
EVAPORATION RATE (ETHER =1): LESS THAN 1
SOLUBILITY IN WATER (%): LESS THAN 0.1%
FLASH POINT (METHOD USED): OPEN CUP ABOVE 189°F/87°C.
ODOR, APPEARANCE, COLOR: ACETIC ACID-LIKE, PASTE, VARIOUS.

SECTION VI REACTIVITY DATA REACTIVITY (NFPA) 1

STABILITY: STABLE
CONDITIONS TO AVOID: AIR OR MOISTURE CAUSES POLYMERIZATION AND ACETIC ACID VAPORS ARE FORMED.

INCOMPATABILITY (MATERIALS TO AVOID): OXIDIZING MATERIAL CAN CAUSE A REACTION.
HAZARDOUS DECOMPOSITION PRODUCTS: SILICON DIOXIDE, CARBON DIOXIDE, AND TRACES OF INCOMPLETLEY BURNED CARBON PRODUCTS.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: NOT APPLICABLE

SECTION VII SPILL, LEAK AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: USE ABSORBENT MATERIAL TO COLLECT AND CONTAIN FOR SALVAGE OR DISPOSAL.

WASTE DISPOSAL METHOD: DOW CORNING SUGGESTS THAT ALL LOCAL,STATE AND FEDERAL REGULATIONS CONCERNING HEALTH AND POLLUTION BE REVIEWED TO DETERMINE APPROVED DISPOSAL PROCEDURES. CONTACT DOW CORNING IF THERE ARE ANY DISPOSAL QUESTIONS.

D.O.T.(49 CFR 171.8)/E.P.A.(40 CFR 117)SPILL REPORTING INFORMATION

HAZARDOUS SUBSTANCE: NONE RQ: NOT APPLICABLE
CONCENTRATION OF HAZARDOUS SUBSTANCE: NOT APPLICABLE
REPORTABLE QUANTITY OF PRODUCT: NOT APPLICABLE

(R) INDICATES REGISTERED OR TRADEMARK NAME OF DOW CORNING CORPORATION

NAME OR NUMBER: DOW CORNING(R) 734 RTV SELF-LEVELING ADHESIVE

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): ACID VAPOR TYPE.

VENTILATION
LOCAL EXHAUST: NONE SHOULD BE NEEDED.
SPECIAL: NONE KNOW TO DOW CORNING.
MECHANICAL (GENERAL): RECOMMENDED.
OTHER: NONE KNOW TO DOW CORNING.

PROTECTIVE GLOVES: RUBBER OR PLASTIC RECOMMENDED.

EYE PROTECTION: PROPER EYE PROTECTION SHOULD BE WORN IN ANY TYPE OF INDUSTRIAL OPERATION.
OTHER PROTECTIVE EQUIPMENT: AS REQUIRED BY YOUR COMPANY.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: STORE BELOW 90F/32C. PRODUCT IS COMBUSIBLE. USE REASONABLE CARE AND CAUTION.

OTHER PRECAUTIONS: NONE KNOWN TO DOW CORNING.

NOTE: NONE

THIS DATA IS OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT AS A PRODUCT SPECIFICATION. NO WARRANTY, EITHER EXPRESS OR IMPLIED, IS HEREBY MADE. THE RECOMMENDED INDUSTRIAL HYGIENE AND SAFE HANDLING PROCEDURES ARE BELIEVED TO BE GENERALLY APPLICABLE. HOWEVER, EACH USER SHOULD REVIEW THESE RECOMMENDATIONS IN THE SPECIFIC CONTEXT OF THE INTENDED USE AND DETERMINE WHETHER THEY ARE APPROPRIATE.

PREPARED BY: NONE

DATE: JULY 08, 1985

LAST REVISED: SEPTEMBER 30, 1983
PREVIOUS REVISION DATE: JUNE 11, 1982

(R) INDICATES REGISTERED OR TRADEMARK NAME OF DOW CORNING CORPORATION

Brownells, Inc.
200 S. Front
Montezuma, Iowa 50171

3 = High
2 = Moderate
1 = Slight
0 = Insignificant

Health 1 X 0 Reactivity

Specific Hazard

SECTION I

PRODUCT NAME OR NUMBER (as it appears on label) Oxpho Blue CREME/LIQUID	
MANUFACTURER'S NAME MANUFACTURED FOR: Brownells Inc.	EMERGENCY TELEPHONE NO. 515-623-5401
ADDRESS (Number, Street, City, State and Zip Code) 200 So. Front St. Montezuma, Iowa 50171	
HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) Corrosive Liquid N.O.S. UN1760/IMCO Class 8	
ADDITIONAL HAZARD CLASSES (as applicable) Corrosive Material	
CHEMICAL FAMILY Dilute Aqueous Acid	FORMULA N/A (Mixture)

SECTION II — INGREDIENTS (list all ingredients)

CAS REGISTRY NO.	%W	%V	CHEMICAL NAME(S)	Listed as a Carcinogen in NTP, IARC or OSHA 1910(z) (specify)
7783-00-8	Under	2 (w/w)	Selenious Acid H_2SeO_3	mg 0.2*/m3
7664-38-2	Under	5 (w/w)	Phosphoric Acid H_3PO_4	mg 1/m3
7758-99-8	Under	3 (w/w)	Cupric Sulfate $CuSO_4 \cdot 5H_2O$	mg 1**/m 3
7786-81-4	Under	2 (w/w)	Nickel Sulfate $NiSO_4$	mg 1(Ni)/m3
7732-18-5	Over	88 (w/w)	Water H_2O	N/E***
* as Se				
** PEL 8-Hr TWA (as CU, dust or mist)				
*** None Established				

SECTION III — PHYSICAL DATA

BOILING POINT Approx. 213°F. °C	SPECIFIC GRAVITY (H_2O = 1) 1.007		
VAPOR PRESSURE No Data °C °F ☐ mm Hg ☐ psi	PERCENT VOLATILE BY VOLUME (%) None except water	PERCENT SOLID BY WEIGHT (%) N/A	
VAPOR DENSITY (AIR = 1) less than 1	EVAPORATION RATE (= 1) greater than 1		
SOLUBILITY IN WATER Completely miscible	pH = 1.48	Total acidity under 1N to pH.	
APPEARANCE AND ODOR odorless blue liquid		IS MATERIAL: GAS PASTE LIQUID X SOLID POWDER	

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT °F °C method used non-flammable	FLAMMABLE LIMITS N/A	LEL N/A	UEL N/A
EXTINGUISHING MEDIA non-flammable			
SPECIAL FIRE FIGHTING PROCEDURES non-flammable			
UNUSUAL FIRE AND EXPLOSION HAZARDS non-flammable - non-explosive except with water-reactive substances.			

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: OXPHO BLUE	DATE PREPARED:	FORMULA NO:	EMERGENCY TELEPHONE NO:

NOTES

1. The following ingredients are listed under the Michigan Critical Materials Register, Act 293, or Hazardous Waste Management Act, Act 64 of 1981: From Table 302b — Selenious Acid (I.D. Number: a 204, Parameter Number: 7783-00-6); from Table 303 -- Copper and Compounds (I.D. Number: 001D, Parameter Number: Class-01-8); from Table Miscellaneous -- Copper and Compounds (I.D. Number: None, Parameter Number: Class-01-7) and Nickel and Compounds (I.D. Number: None, Parameter Number: Class-02-2).

2. While both selenium and copper are classified as essential trace elements in animals, the Registry of Toxic Effects of Chemical Substances cites experimental evidence of mutagenic, reproductive, and tumorigenic effects of selenites and various copper compounds. In anima studies, selenites have produced fetotoxic and teratogenic effects. The implications of the experimental data for human exposure are uncertain. However, it would be prudent for pregnant individuals to avoid contact with the product.

3. With regard to carcinogenesis in animals, the status of selenium is indefinite according to IARC (the International Agency for Research on Cancer). Among rats surviving 18 to 24 months on diets containing 4, 7 or 10 ppm selenium, some developed adenoma or low-grade carcinoma in cirrhotic livers and a few others had advanced adenomatoid hyperplasia. Othe animal or epidemiological studies suggest that selenium may have anti-carcinogenic effects

4. RTECS cites experimental evidence of mutagenic effects and equivocal tumorigenic effects of nickel sulfate. NIOSH has proposed that all "airborne nickel" be considered and regulated as an occupational carcinogen, although this is under dispute. There is good evidence that chronic inhalation of nickel dusts and fumes in refining processes can produce cancer in the respiratory passages and lungs. Such exposure would not be anticipated with Oxpho Blue; and inorganic nickel compounds are not considered carcinogenic by ingestion.

5. HMIS Label ratings for this product: Health-2, Flammabiltiy-0, Reactivity-0, Personal Protection-C

NFPA Rating 1 0 0

EFFECTS OF OVEREXPOSURE: ACUTE

Eyes: The product is an eye irritant. It can cause redness of the eyes, conjunctivitis, iritis, swelling of a watery-mucoid discharge and corneal opacity.

Inhalation:

Toxic fumes not generated normally. Breathing mists can result in lost sense of smell, nose and throat garlic odor of breath, headache, dizziness, lassitude, tremors, difficulty breathing, bronchitis, pneu bronchial asthma.

Ingestion:

Oral LD_{50} (rats) is 2.2 g/kg. May produce metallic taste, garlic odor of breath, headache, dizziness, l nausea, vomiting, abdominal pain, diarrhea, difficulty breathing. - Target Organs - liver, kidneys, spl heart, adrenal glands, pancreas.

Skin: The product is not a primary skin irritant. However, it can produce redness of the skin and slight edem prolonged or repeated contact. Also it can cause skin sensitization in some individuals.

EMERGENCY AND FIRST AID PROCEDURES:

Eyes: Immediately rinse eyes thoroughly with clean water. Instillation of aqueous 10% sodium thiosulfate solut also recommended. Consult a physician.

Inhalation:

Remove from exposure. If breathing difficult, provide artificial respiration or oxygen. Consult a physic Watch for delayed pulmonary edema. Diuretics speed elimination of selenium. Vitamin B Complex, Vitamin C methionine supplements recommended.

Ingestion:

If breathing difficult, provide artificial respiration or oxygen. If victim is conscious and not vomiting emesis. Seek medical attention. A diuretic will speed elimination of selenium. Vitamin B Complex, Vitamin methionine supplements are recommended.

Skin: Remove contaminated clothing to avoid prolonged contact. Wash affected areas with soap and water. Applica of a 10% sodium thiosulfate cream has been recommended.

EFFECTS OF OVEREXPOSURE: CHRONIC

Eyes: No data specific to chronic exposures. (See acute eye exposure above.)

Inhalation:

Besides effects as in acute, chronic exposure may cause weakness, pallor, anemia, enlargement of liver and degenerative changes in target organs. Preclude from contact with product those with Wilson's disease or diseases of the skin, lungs, liver, kidneys, or gastrointestinal tract. (See Notes 2, 3 and 4)

Ingestion:

Same as above for Inhalation.

Skin: Selenium may cause skin sensitization resulting in irritation, dermatitis, or edema. Nickel is a strong sensitizer (sensitization permanent) resulting in "Nickel itch" - erythma, nodular eruptions, eczema.

WASTE DISPOSAL METHOD:

Waste Oxpho Blue or its solutions are assigned the EPA Hazardous Waste Number U204 (contains selenious acid Precipitates filtered from the operating bath or generated from treating the liquid are assigned the EPA Haz ous Waste Number D010 (EP Toxicity-Selenium). The wastes can be disposed of thorugh a licensed waste disposa company. To treat the liquid and convert it to a solid waste, add 2 ounces of degreased steel wool or steel machining fines or turnings per gallon of diulted product or 8 ounces per gallon of concentrate. Stir freque or continuously for at least two hours. Periodically adjust pH down to 1.5 with nitric acid. When reaction i complete, adjust pH to 8.0 with sodium bicarbonate or sodium hydroxide and filter. Liquid can go down the drain.

EFFECTS OF OVEREXPOSURE — Conditions to Avoid	THRESHOLD LIMIT VALUE / PERMISSIBLE EXPOSURE LIMIT / OTHER LIMIT
SEE ATTACHED SHEET	content of produc
PRIMARY ROUTES OF ENTRY Inhalation ☐ Skin Contact ☒ Other (specify) Eyes, Ingestion	
EMERGENCY AND FIRST AID PROCEDURES	
SEE ATTACHED SHEET	

SECTION VI-REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	XX	

INCOMPATIBILITY (materials to avoid)
Cyanides, water-reactive substances, organic solvents, oils, strong reducing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: Reaction with organics and strong reducing agents can produce volatile organo-selenides or hydrogen selenide. Thermal decomposition, e.g., evaporation to dryness can produce selenium dioxide fume oxides of phosphorus and sulfur.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Recover as much free liquid as possible and collect in acid-resistant container. Use absorbent to pick up residue. Avoid discharging the liquid directly into a sewer or surface waters. CERCLA Reportable quantity is 1 lb. for selenious acid (approx. 8 gal. of the product.)

WASTE DISPOSAL METHOD
SEE ATTACHED SHEET

CERCLA (Superfund) REPORTABLE QUANTITY (in lbs)
1 lb. for selenious acid (approx. 8 gallons of the product).

RCRA HAZARDOUS WASTE NO. (40 CFR 261.33)
N/A

VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water)
N/A

☐ Theoretical _____ lb/gal. N/A ☐ Analytical _____ lb/gal N/A

SECTION VIII-SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type) High efficiency particulate filter respirator, supplied-air respirator or self contained breathing apparatus each with full facepiece, helmet or hood if misting is likely.

VENTILATION	LOCAL EXHAUST (Specify Rate) To keep mists below TLV	SPECIAL equipment for containment and collection of mists if spray applicat us
	MECHANICAL (General) (Specify Rate) No information	OTHER

PROTECTIVE GLOVES (specify type) Rubber or plastic gloves	EYE PROTECTION (specify type) glasses, goggles or face shie

OTHER PROTECTIVE EQUIPMENT
As appropriate to operation to guard against contamination of clothing and prolonged or repeated skin contact.

SECTION IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Avoid co-loading or storing with cyanides, water-reactive substances or strong reducing agents. Store in acid-resistant containers. Protect containers from physical damage.

OTHER PRECAUTIONS
Workers handling the product should wash before smoking or eating.

Name (print)	Gary L. Snebeck
Signature	Gary L. Snebeck
Title	Product Information Director
Date	

IWI INNOVATIVE WEAPONRY INC.

NIGHT SIGHT

Mowry Custom Handguns
Specialty Shotgun Systems

October 24, 1991

Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: Susan L. Green
Commercial Section
Medical, Academic,and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety,NMSS

Dear Ms Green,

Enclosed is our response to your letter dated October 4, 1991 requesting more information regarding our application for amendment of our license. In response to page one of your letter, you are correct in that we wish to both install our tritium system into existing (original) sights, and to manufacture our own replacement sights with our tritium insert system installed. Our fabrication and installation of the tritium sources is the same process for either system. You are correct in that we do not wish to distribute our tritium inserts to other specific licensees.

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

9209050277 146pp

In regards to the archery sight pins, I would like to with draw this request at the current time. At a later date, we will file a letter of request for amendment to distribute this product. At that time we will include all descriptions, drawings, tests, specifications, etc. for this product. At present, I would like all efforts concentrated on the gun sight license amendment.

The following pages include our response to the requirements set forth in 10 CFR 32.22 32.23, 32.24 and 32.25 along with response to your questions and requests in your letter.

Thank you for expiditing this response of application for amendment, as it is of utmost importance to the welfare of our company. If you, or anyone, has a question concerning this response, Please contact me or Mr. Jim Hall at (505) 296-4645.

Sincerely,

Barry Mowry- President

NRC-#1 Your August 28,1991, letter indicates that the tritium sources will be mounted in one of three configurations(drawings1-3). It also indicates that the sources will either be mounted in permanently fixed sights on weapons or in removable type sights.

(A) For sources mounted in permanently fixed sights. Please provide the model number classification for each type of mounting configuration and provide a detailed list of the types of weapons to which each mounting configuration applies and will be prototype tested against.

REPLY-#1(A) In permanently fixed sights, one of three model numbers (see drawing number RBI010, RDI111, SIC123 Attachment Number One (1) will be installed. The installation must meet all requirements in dimensions and tolerances. If requirements are met, this installation process can, and will be used for all weapons including handguns, shotguns, rifles, and special classified military arms. For prototype tests, see Attachment Number Five.

(B) For removable sights, please provide drawings and model numbers for each sight you intend to manufacture. The drawings should specify model numbers, dimensions including tolerances, and mounting details. A detailed list of the types of weapons to which each sight model will be attached should also be submitted. In addition, you should specify the minimum sight material thickness surrounding the sealed source and identify the material from which the sights are made.

REPLY #1(B) For removable sights and sights manufactured by IWI, one of three types of installations will be used. (see Drawing numbers RDI111, RDI010, SIC123 in attachment number one(1) The sights specifications, dimensions, and tolerances are shown on drawing numbers HFS100, HRS001 HRS002 (see Attachment number one (1) for drawings). All the sights mount in the normal procedure of gunsight installation(note-sight packaging card requesting gunsmith installation-attached

NRC-# 2 Provide detailed drawings, showing dimensions including tolerances, and model numbers of the tritium source to be used in the sights.

REPLY-# 2 Enclosed are drawings(see attachment #2) from the manufacturer(Saunders-Roe Developments Limited) of the sealed sources. Also enclosed in the attachment are the American Standards and UK Standards to which each sealed source must pass before delivery to us. In addition, each source must pass a final scintillation test before shipment.

NRC-# 3 In your letter of August 28, 1991, you indicate that the maximum activity of each tritium source is to be 40 millicuries and the maximum activity per weapon is to be 120 millicuries. We note that these activities are different from what you are currently authorized for. Please clarify.

Reply-# 3 Because our original license is for 30 millicuries per source and 90 millicuries per weapon, and our application for amendment dated April 17,1991 states the same, I would like to withdraw the request for the increase stated in our reply letter dated August 28, 1991 as I feel the original request is sufficient for all our applications. I hope this simplifies this matter.

NRC- # 4 Paragraph 32.22 (a)(2)(x). 10 CFR Part 32, requires that the labels be durable and and legible, contain the identification of the manufacturer or initial transferor, and the byproduct material in the product.

(A) Show how you intend to meet these requirements for removable sights.

(B) Indicate the locations where you will label weapons with permanently fixed sights and describe the durability characteristics of this label.

REPLY We have chosen to permanently stamp our logo (registered Trademark) and Tritium symbol (H3) into all sights and/or weapons. (see sample attachment number six (6) on all sights manufactured by IWI, the stamping will be directly on an exposed surface. On permanently fixed sights either the sights (If possible) or the frame of the weapon will will be stamped on an exposed surface.

NRC-# 5 You must demonstrate that the sights will meet the requirements of 10 CFR Part 32, Section 32.23. This must be accomplished by explaining all scenarios in which person may be in contact with the sights, such as loading of packages of sights warehousing of sights, persons using the sights, etc. Indicate, in detailed calculations, the doses which persons involved in each scenario may receive and show that the doses will not exceed those specified in section 32.23.

REPLY Refer to our reply to 32.22(A)(2) part (xiii) and (xiv).

NRC- # 6 Submit quality assurance and quality control procedures which Innovative Weaponry will follow to ensure that all sights will continue to meet the appropriate specifications.

Reply # 6 See Quality Assurance and control (QA/QC) Department Manual.

(ATTACHMENT # 3)

NRC-# 7 Provide more complete information concerning prototype testing. Note that prototype test must be performed with each model sight attached to the weapon which will have the most detrimental effects.

(A) Provide details of prototype testing performed. Why you believe this weapon would result in most detrimental impact, and the results as required in paragraph 32.22(A)(2)(xii), 10 CFR part 32.

(B) Provide assurance that the prototype testing demonstrates the typical environments which the sights may experience. If the sights may experience environmental conditions which exceed those experienced during prototype testing explain the effects of these environments on the sights and why such environments will not risk the source or dislodge the source from the weapon.

REPLY For all the details of the prototype test and results (see Attachment Number Five (5))

NRC-# 8 Explain how you arrived at the conclusion that the results after 30 minutes of chemical testing representative of 24 hours when also indicated that 24 hours of exposure to methylene chloride will remove the Improv and BLACKMAX.

Reply-# 8 We used 30 minutes as a basis for our tests, because if a chemical is going to attack a surface or a material, reaction would start within this time period. No commercial labeled gun cleaning solvent affected the installed source in any manner. However there are harsh chemicals(Methyl Ethyl Ketone, Methylene chloride, Acetone, Trichloroethylene) that if prolonged exposure (12 Hours or more) occurs could possibly damage the clarity of the lensing (Loctite Impruv 349) or even attack the adhesive (Loctite Blake Max 386). In our product brochure (Refer to Q&A Number II) we warn against usage of said harsh chemicals.

NRC-# 9 Describe the effects of trichloroethylene, a popular cleaning solvent, on the sights.

Reply-# 9 Trichloroethylene is a highly toxic chemical and an extreme irritant to the skin. After acquiring MSDS information (see Attachment# 4) on cleaning solvents marketed for gun cleaning, we have found this chemical not to be used in any thing labeled for the weapons industry. The chemical Trichloroethane is commonly used in various cleaning solvents. This chemical reacts very quickly, usually in less than 5 minutes. Since our tests we performed were for approximately 30 minutes with no affects, I feel we surpassed any activity of chemical conduct during weapon cleaning.

We also acquired this chemical in pure form and tested our sights for the period of one hour with absolutely no effect in any manner.

(Note on Trichloroethylene: This product is no longer allowed to be used as a solvent by the Federal Government and its use is not permitted in most states.)

NRC- # 10 Describe the type of damage which may occur if the sights are subjected to temperatures of 300 degrees F for extended periods of time during the black oxide finishing process.

Reply-#10 The process of black oxide finishing on a fire arm normally consists of submersion of parts into the solution for a time period of 18 to 20 minutes. The normal temperature is 265 to 268 degrees F. Since this is an accelerated rust process, either increasing the heat or the time will create the steel to rust erode. In our test we went beyond both the normal time and temperature (See Attachment Sheet # 5). The metal did start to rust erode, but note that neither the sealed source device or the adhesion of the device was in any way effected. Because of the damage to the metal, this finish requires strict control. I feel that we went beyond any finisher's processing in our test.

NRC-# 11 The product brochure provided to the user of the sights should include clear instructions for care of the sights. Wording such as "... prolonged periods of time "and " normal cleaning fluids" must be clarified if the results of not following the instructions will be detrimental to the sights.

Reply# 11 Attached is a copy of our new product brochure. we have reworded it to be more specific.

A NOTE TO OUR CUSTOMERS:

THANK YOU! for purchasing **P-T NIGHT SIGHTS**. You are now the owner of the most advanced night sight made today.

PLEASE OBSERVE THE INSTRUCTIONS BELOW.

USE ONLY COMMERCIALLY LABELED GUN CLEANING SOLVENTS.

CAUTION: **Do not** use harsh solvents that contain the chemicals: Metylethylketone, Metylenechloride, Acetone or Trichloroethylene.

Do not expose to **extremely** high temperatures encountered in finishing and plating procedures.

P-T Night Sights contain Tritium. Purchaser is exempt from any regulatory responsibility. TRITIUM EXEMPT
[Tritium has a relatively low biological hazard because of its low energy-level beta radiation and because, being a gas it is quickly dispersed should it be released.]
If a Tritium tube becomes accidentally broken, ventilate and leave the area for a minimum of 30 minutes.

This Package conforms to the conditions and limitations specified in 49 CFR 173.422 for excepted radioactive material, instruments and articles UN2911.

15 year warranty. Satisfaction Guaranteed

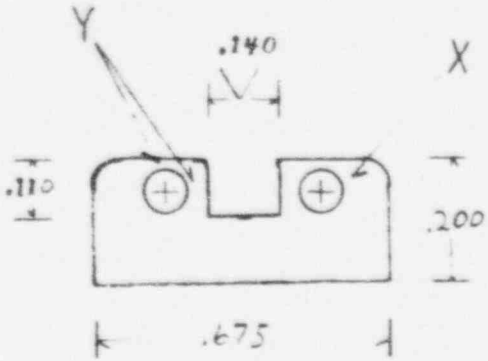
QUESTIONS? Please Call 800 334-3573

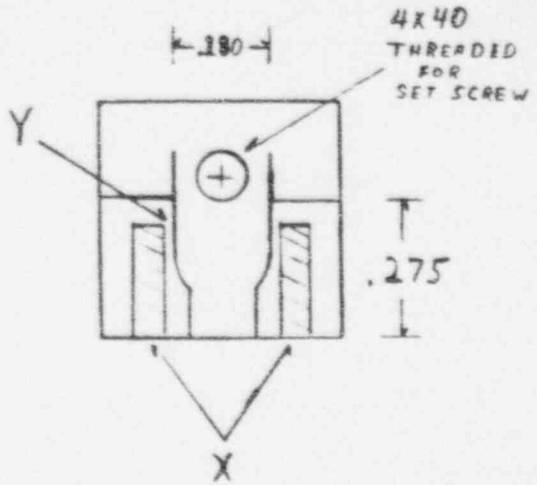
Encl 10/24/91

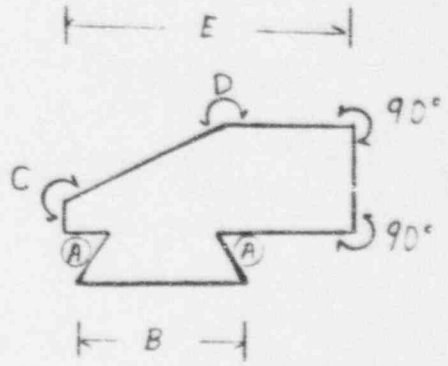
ATTACHMENT

NUMBER

ONE (1)







X: HOLE DIMENSION- REFER TO DRAWING No.- SIC123 or RDI111

Y: DIMENSION DEPENDS ON HOLE DIAMETER, MINIMAL ALLOWED-.018±.0005

DRAWING NOT TO SCALE

DIMENSION- A,B,C,D,E

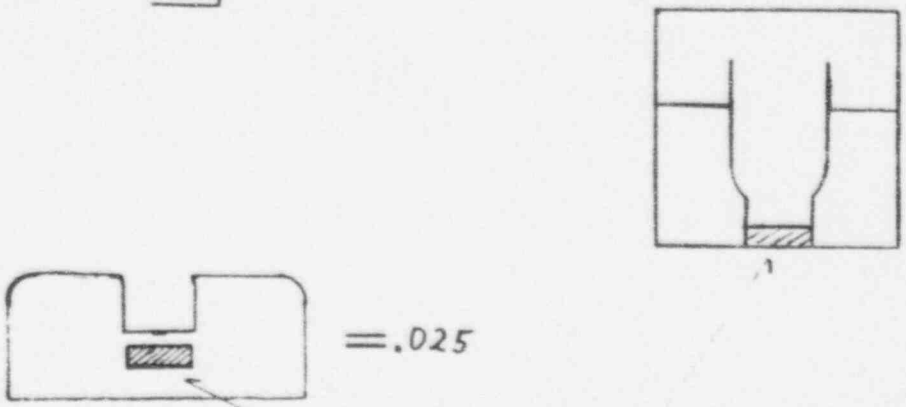
NOTE: THESE LENGTHS AND ANGLES VARY TO CONFORM TO EACH MODEL OF HANDGUN

DRAWING NO.- HRS001	REAR SIGHT	MATERIAL: 4130 STEEL	CODES REFER TO NOTATIONS
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK NE. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .001 UNLESS OTHERWISE STATED MINIMUM STEEL WALL THICKNESS: .018±	FINISH: - BEADBLAST SURFACE - BLACK OXIDE	FOR: '2-DOT' NIGHT SIGHT

DRAWING NOT TO SCALE

SUPPLEMENT TO DRAWING NO.- HRS001

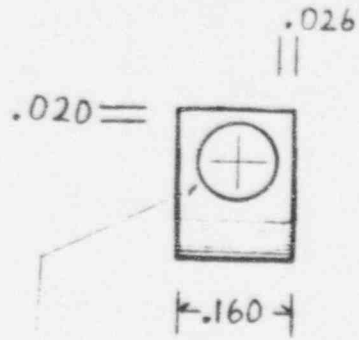
ALL DIMENSIONS ARE THE SAME UNLESS STATED OTHERWISE.

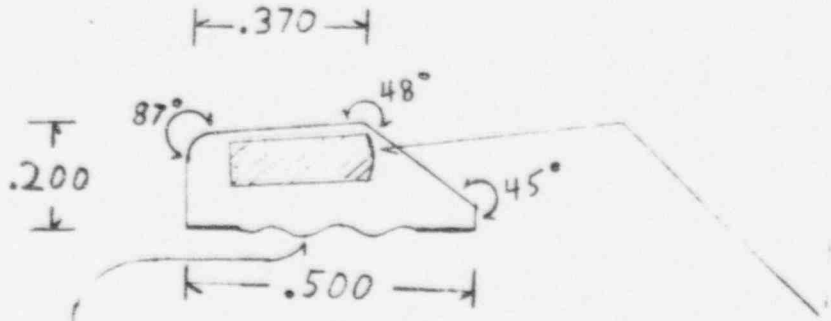


SLOT DIMENSION- REFER TO DRAWING NO.- RBI010

DRAWING NO.- HRS002	REAR SIGHT	
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA		FOR: 'BAR' NIGHT SIGHT

DRAWING NOT TO SCALE



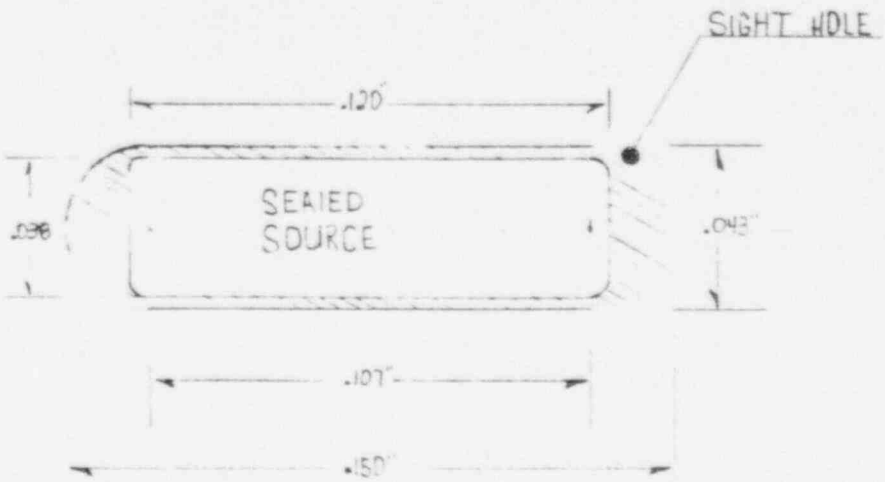


METAL BELOW THIS AREA IS THE MEANS OF ATTACHMENT TO THE WEAPON.

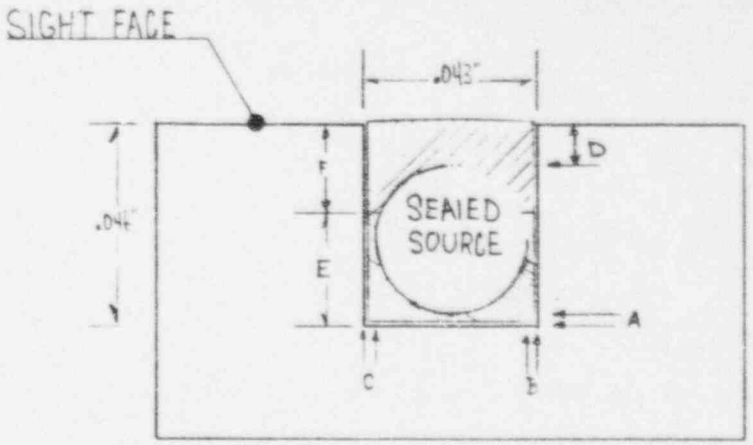
CAVITY FOR SEALED SOURCE INSERT. FOR DIMENSIONS SEE DRAWING NO.- SIC123

DRAWING NO.- HFS100	FRONT SIGHT	MATERIAL: 4130 STEEL	
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .001 UNLESS OTHERWISE STATED MIMIMUN STEEL WALL THICKNESS: .018±	FINISH: - BEADBLAST SURFACE - BLACK OXIDE	FOR: 'DOT' NIGHT SIGHT

TOP VIEW



SIDE VIEW



A = .0025
B = .0025
C = .0025
D = .0055
E = .020
F = .026

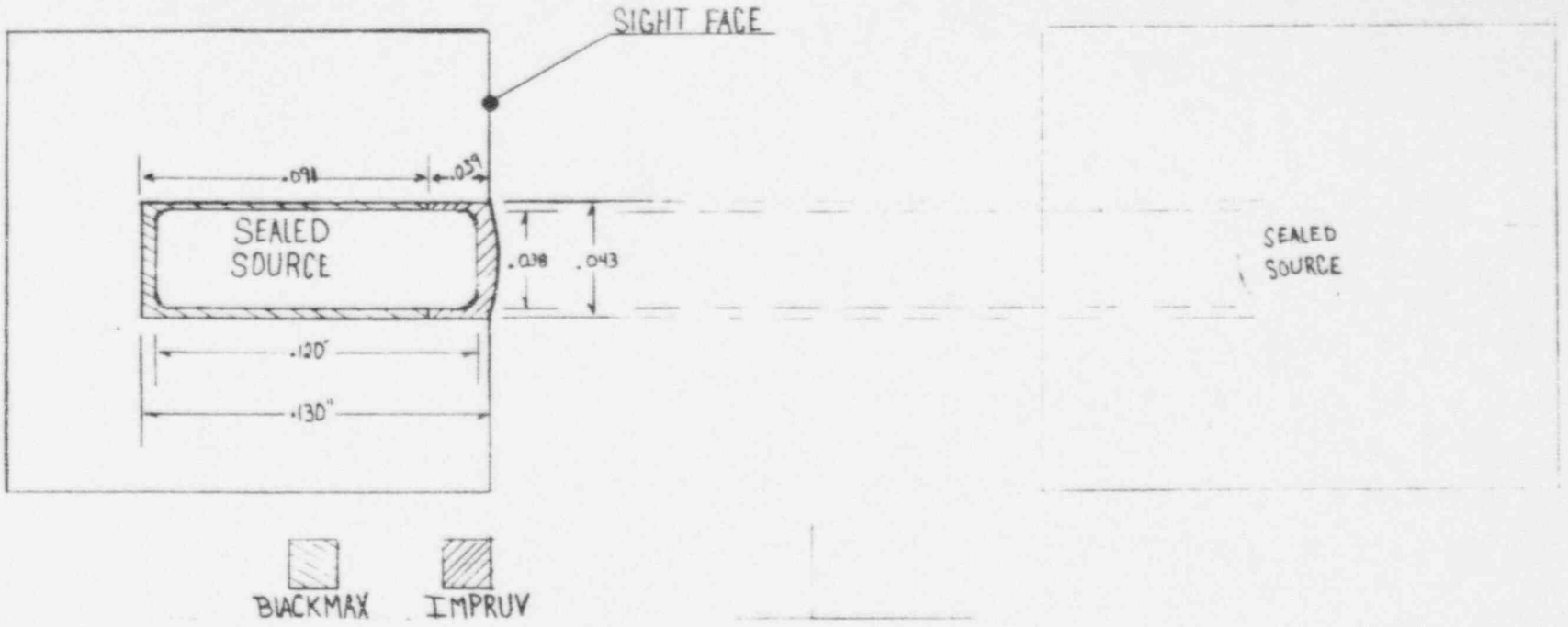
BLACK MAX IMPRUV

DRAWING NOT TO SCALE

DRAWING NO: RBI010	SEALED SOURCE INSTALLATION	SEALED SOURCE MANUFACTURER: SAUNDERS-ROE DEVELOPMENTS, LIMITED
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA	TOLERANCES: ALL ± .0005 MINIMUM STEEL WALL THICKNESS: .018	FOR: 'BAR' NIGHT SIGHT

SIDE VIEW

FRONT VIEW



DRAWING NOT TO SCALE

DRAWING NO.- RDI 111	SEALED SOURCE INSTALLATION	SEALED SOURCE MANUFACTURER: SAUNERS-ROE DEVELOPMENTS, LIMITED
PROPERTY OF: INNOVATIVE WEAPONRY, INC. 337 EUBANK N.E. ALBUQUERQUE, N.M. 87123 USA.	TOLERANCES: ALL ± .0005 MINIMUM STEEL WALL THICKNESS: .018	FOR: 'DOT' NIGHT SIGHT

JWG NO. SIC123 has

been replaced

ATTACHMENT

NUMBER

TWO(2)

Two DWGs of

SRBTs Series Sources have

been replaced.

SRDL

Ministry of Defence

Defence Standard

62-4/Issue 3 14 September 1976

LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

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LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

This Defence Standard supersedes DEF STAN 62 - 4, Issue 2, dated 29 March 1972

1. This Defence Standard specifies material, manufacturing and other requirements for gaseous tritium light sources for Ministry of Defence use.

This Defence Standard has been written to conform wherever possible with the OECD Nuclear Energy Agency document 'Radiation Protection Standards for Gaseous Tritium Light Devices'.

2. The title 'Lamps, Nuclear' has been used to conform to the NATO Supply System Approved Item Name for this type of light source. The term preferred by the member countries of the OECD is Gaseous Tritium Light Sources (GTLSs). This term is now used throughout this Standard. See section 1 'Definition of Terms Used.

3. Table IA lists the Standard Range of GTLSs to be used in all future designs of equipment. Table IB lists GTLSs which have been introduced for a specific purpose. They are not to be used for any other application without the approval of the DELSC Electric and Nuclear Lamps Sub-Committee.

4. Because new Service applications are constantly being developed for GTLSs there are no Table II (Maintenance Range) or Table III (Obsolete) items.

5. This Standard contains all necessary technical information and it is the definitive specification for these items. It must be invoked for all tender and contract purposes.

6. Users of this Standard should note that these items may be claimed to be subject to patent rights in this and other countries.

7. This Standard has been prepared because there is no suitable national or any other standard acceptable to the Ministry of Defence available.

8. This Standard has been agreed by all authorities concerned who are to implement it from its date of issue.

9. If this Standard should be found unsuitable for a particular requirement the Director of Standardization shall be informed of the circumstances. Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is invoked should be addressed to the Quality Assurance Authority named in that invitation to tender or contract.

THE ATTENTION OF DESIGNERS CONSIDERING USING GTLSs IN SERVICE EQUIPMENT IS DRAWN TO SECTION 15 'SAFETY CONSIDERATIONS'

SPECIFICATION FOR
LAMPS, NUCLEAR,
(GASEOUS TRITIUM LIGHT SOURCES)

1. DEFINITION OF TERMS USED

a. Gaseous tritium light source (GTLS): A GTLS consists of a sealed glass container filled with gaseous tritium and coated internally with a phosphor.

b. Gaseous tritium light device (GTLD): A GTLD is an instrument, piece of equipment, article or sub-assembly containing one or more GTLS.

2. SCOPE

a. This Standard covers the technical requirements for gaseous tritium light sources suitable for use over the temperature range of -60 to + 70°C. It is emphasized that tritium filled sources are the only light source of this type authorized for Service use.

b. Lamps may be used at temperatures above 70°C, up to a maximum of 100°C, provided a shorter half life and lower luminance are accepted.

c. Over a period of time the luminance of a GTLS decays irrespective of whether in use or storage. (See section 7d) A warning is therefore given against buying and storing excess quantities.

d. Safety considerations governing production, storage, and use of GTLSs in Service equipments or installations are set out in Section 15 of this Standard.

3. RELATED DOCUMENTS

a. Reference is made in this Standard to:

BS 3G100: Part 2,	'General requirements for equipment in aircraft'
BS 2011	'The environmental testing of electronic components and electronic equipment'
BS 1376	'Colours of light signals'
BS 3510	'A basic symbol to denote the actual or potential presence of ionizing radiation'
UK/AID/944	'Specification for metal foil labels for aircraft use'
Def Stan 05-30	'Sampling procedures and charts for inspection by variables'
Def Stan 05-34	'Marking of Service Materiel'
HQPO/56	'Specification for the packaging of instruments containing radioactive materials'

3. a. (CONTD)

Radio Active Substances (Luminous Articles) Exemption Order 1962 (SI2644)

Explanatory Memorandum to the Radioactive Substances Act, 1960.

Radiation Protection Standards for Gaseous Tritium Light Devices.

Code of Practice for the Carriage of Radioactive Material by Road.

b. Copies of these documents are available as follows:

British Standards	British Standards Institution Newton House 101 Pentonville Road London N1 9ND
UK/AID/944	Ministry of Defence (PE) Materials Division AQD Harefield Uxbridge, Middlx, UB9BB
Defence Standards	Ministry of Defence D Stan First Avenue House High Holborn London WC1V 6HE
HQPO/56	Ministry of Defence (PE) MQAD Central Packaging Unit, Garland Road Plumstead, SE18 2PW
Radiation Protection Standards for Gaseous Tritium Light Devices	National Radiological Protection Board Harwell, Didcot, Oxfordshire OX11 ORQ
Explanatory Memorandum to the Radioactive Substances Act, 1960	HMSO
Radioactive Substances (Luminous Articles) Exemption Order 1962 (SI2644)	HMSO
Code of Practice for the Carriage of Radioactive Material by Road	HMSO

3. c. The Related documents listed above are those applicable at the date of publication of this Standard. Their current applicability must be confirmed by all users of the Standard. The Quality Assurance Authority will supply on request, information concerning any changes that may be necessary due to the cancellation, supersession or amendment of any related document.

Note: Any questions relating to 'approved' materials or processes should be referred to the Qualification Approval Authority.

4. DRAWINGS

a. Drawings giving dimensions of the standard range of GTLSs are reproduced in Figs 2 to 15. Special purpose lamps are reproduced in Fig 16.

b. These drawings are an integral part of this Standard.

5. PATENTS

Patent or design rights or copyright may subsist in connection with items defined as standard, and the issue of this Standard does not convey or imply any licence to use information which is the subject of such rights. Authority to use such rights, for UK Government purposes, must be obtained through the issue of an authorization in writing which will be incorporated in any contract placed by a Department of the said Government for such purposes.

6. MATERIALS

a. Capsule.

The capsule is to be of a clear borosilicate (hard) glass. The wall thickness is to be in accordance with the dimensions quoted in Figs 2 to 16.

b. Radioactive material.

(1) Only tritium in the form of $^{3}H_{2}$ or H ^{3}H shall be allowed in a GTLS except for small amounts of tritiated water which may be present provided that, during the mission lifetime of the GTLS, the activity in the form of tritiated water does not exceed 2% of the total tritium activity and, for sources containing less than 50 mCi of tritium, does not exceed 1mCi. Purity of the tritium is essential particularly in respect of:

(a) gamma emitting isotopes which would result in external radiation.

(b) alpha emitting isotopes which would result in radiation damage to binder, phosphor, or glass.

(c) chemical impurities which can damage the phosphor or accelerate radiation damage.

6. b. (2) In order to meet the above requirements the manufacturer must ensure that a certificate of purity from the supplier of the tritium used, in any batch of lamps submitted for inspection, is to be available to the Quality Assurance Authority.

c. Phosphor.

The zinc/cadmium sulphide phosphor is preferred.

d. Binder.

Any binder used to cement the phosphor to the wall of the capsule is to be unaffected by radiation, temperature (within the limits of -60 and + 70°C), and vibration.

7. MANUFACTURE

a. Gas pressure.

The nominal gas pressure inside the capsule is to be between 660 mbar (0.66 atm) and 2500 mbar (2.5 atm) as appropriate to the desired luminance.

b. Painting.

(1) When a GTLS is to be viewed from one side only, the luminous intensity may be increased by externally painting the reverse side of the lamp as indicated on the appropriate lamp drawing (Figs 2 to 16).

(2) One coat of high reflectance titanium dioxide base paint and one coat of semi-gloss air drying white paint shall be applied. Alternatively two coats of high reflectance titanium dioxide base paint may be applied.

(3) The paint shall be of best commercial quality and shall remain unaffected by the temperature tests specified in sections 11g and 14. The paint shall not exceed a total thickness of 0.4 mm.

c. Luminance

The minimum initial luminance is to be in accordance with Table I.

d. Rate of luminance decay.

The rate of luminance decay is to be such that after six years from the date of manufacture of a GTLS luminance is to be not less than 50 per cent of its initial value.

Note: The rate of decay is to be taken into account when specifying minimum acceptable levels of illumination in the design of equipments incorporating GTLSs See Fig 1.

e. Sealing test.

During manufacture all GTLSs are to be heated to between 450 and 450°C for a period of five minutes after sealing.

7. f. Colour of light.

Colours are to be determined in terms of BS 1376 chromaticity co-ordinates. Table A gives the co-ordinates of the corners of the areas within which the chromaticity co-ordinates of the respective colours are to fall. Where these boundary points lie on the pure spectrum curve the corresponding dominant wave length in nanometers is indicated.

TABLE A

COLOUR	CO-ORDINATES		DOMINANT WAVELENGTH nm
	X	Y	
RED	0.688	0.312	618.5
	0.66	0.28	
	0.59	0.356	
	0.64	0.36	603.0
ORANGE	0.603	0.396	595.0
	0.566	0.388	
	0.508	0.45	
	0.532	0.467	583.0
YELLOW	0.5	0.5	578.0
	0.468	0.47	
	0.396	0.546	
	0.408	0.592	565.0
GREEN	0.302	0.692	550.0
	0.31	0.48	
	0.22	0.48	
	0.014	0.744	510.0
BLUE	To BS 1376, Signal Blue Class A		481.0 450.0
WHITE	To be determined		

8. MARKING AND LABELLING

To enable GTLD's subject to recovery or disposal requirements to be identified the Design Authority and Procurement Branch are to ensure that marking and labelling shall be carried out as described in section 7 of NEA document 'Radiation Protection Standards for Gaseous Tritium Light Devices'

Note: Para 7.3 of this document requires that individual GTLS's containing over 500mCi shall be marked with a spot of colour in international use to denote hazard. At the moment this colour has not been decided. The requirement can therefore, for the time being, be ignored.

9. PACKAGING

a. GTLSs are to be supplied in a transparent polyethylene envelope. Each GTLS is to be provided with sufficient individual protection to prevent damage to or from other GTLSs in the envelope. Each envelope is to contain and show the following labels:

(1) an ungummed label giving the full NATO Stock Number (eg 6260-99-995-9769) and Defence Standard type number, (eg Def Stan 62-4/3 Type ZA2G), the quantity of GTLS's and the total radioactive content (curies).

(2) an ungummed label marked with the Trefoil symbol in accordance with BS 3510 and Def Stan 05-34.

Each envelope is also to contain the equivalent number of approved self-adhesive labels of 9.5mm maximum diameter giving the month and year of manufacture of the GTLS in figures. The label is to comply with UK/AID/944 and is to be gold in colour with red markings.

b. When a military level of packaging is specified in the tender or contract packaging shall be in accordance with HQ/P056 and the Services Packaging Instruction Sheet (Form 673)

c. To comply with the 'Code of Practice for the Carriage of Radioactive Material by Road,' the maximum number of lamps in one package is to be governed by the total radioactive content of that package.

(1) A package, wherein the radioactive content does not exceed 200 curies may be classified as 'Exempt' from the more rigorous packaging and labelling requirements of the international regulations providing the applicable requirements listed in the 'Specification for the packaging of instruments containing radioactive materials', HQP0/56, are fulfilled.

(2) Requirements for 'Exempt' packages containing tritium are detailed at paragraphs 3.4 and 4.1 to 4.4 of Specification HQP0/56.

10. QUALIFICATION APPROVAL PROCEDURE

a. The Qualification Approval Authority for GTLSs is the Defence Electrical and Electronics Standardization Committee, Electric and Nuclear Lamps Sub-Committee. Manufacturers are to apply to the Secretary of the Electric and Nuclear Lamps Sub-Committee Stan 3, First Avenue House, High Holborn, WC1V 6HE for Qualification Approval. Applications are to be accompanied by a statement that the manufacturer is satisfied that the articles comply with this specification.

b. After receipt of the application, the Secretary of the Qualification Approval Authority is to notify the manufacturer if it has been decided to accept the application, or give reasons for refusing it. If it has been decided to proceed with the Qualification Approval, the Secretary is to request the provision of samples. The manufacturer is to state whether or not the samples are from normal current production and, if requested, is to provide evidence that he has adequate facilities to produce, test, and inspect the articles in quantity.

10. c. Tenders for the supply of GTLSs to this Standard are to be accompanied by a quotation of the appropriate Qualification Approval certificate number and a statement that the articles offered conform in every detail to the sample Qualification Approved and that the place of manufacture is the same.

d. The Qualification Approval tests are to be carried out under standard atmospheric conditions of measurement (BS 2011).

(1) at the manufacturer's premises under the supervision of the Quality Assurance Authority, or,

(2) by a Government Quality Assurance Authority if the manufacturer is unable to provide or arrange for testing in the above way.

(a) If Qualification Approval tests are carried out by method 1, five copies of the test certificate are to be forwarded to the Secretary of the above Qualification Approval Authority.

(b) Initial and final measurements are to be carried out at any combination of temperature, and pressure within the following limits.

Temperature 15 to 35°C

Air Pressure 860 to 1060 mbar

Note 1: Where it is impracticable to carry out measurements under these conditions a note to this effect stating the actual conditions is to be added to the test report.

Note 2: The temperature is to be substantially constant during measurements carried out as part of one test on one batch of components:

e. If the Qualification Approval Authority decides that the testing of any of the articles which the manufacture wishes to submit for Qualification Approval is to be carried out at the manufacturer's premises, the manufacturer is to give to the representative of the Qualification Approval Authority full and free access to the said premises as and when required for that purpose and, at the manufacturer's expense, afford to such representative all such reasonable accommodation and facilities as may be required by him therefore and all appliances, materials, and labour required for testing purposes.

f. The manufacturer will be notified whether or not Qualification Approval has been granted and if successful a Qualification Approval certificate (normally for a period of five years) will be issued.

g. If, after receiving Qualification Approval, a manufacturer wishes to introduce any changes in the materials, construction, processes, finish, or place of manufacture of the Qualification Approved GTLSs he is first to notify the Qualification Approval Authority, who will decide whether a repetition of any or all of the Qualification Approval tests is necessary, and the number of samples to be tested before the change is approved.

10. h. Qualification Approval will be reviewed periodically by the Qualification Approval Authority and will also be reviewed when defects have been reported or other circumstances make this desirable. Should the result of repeat Qualification Approval tests be unsatisfactory, Qualification Approval may be withdrawn.

i. The Qualification Approval Authority reserve the right to carry out any or all of the Qualification Approval Tests on any design of GTLS not in the standard range.

11. QUALIFICATION APPROVAL

The number of GTLSs to be submitted for Qualification Approval is to be a minimum of twenty six and shall include the GTLSs from each group as indicated in Table B. These lamps are to be supplied at the manufacturer's expense and are to be manufactured from materials and by methods similar to those adopted for production.

TABLE B

QUANTITY	SELECTED FROM	GROUP	REMARKS
5	MB2, UB2, UG2, UE2 or UH2	1	High Pressure Painted One of each colour quoted in Table A
7	Figs 4, 5, 8, 9, 10, 12.	2	Low Pressure, non painted
7	Figs 2, 3, 6, 7, 11.	3	High Pressure, non painted
7	Figs 2, 3, 6, 7, 8, 9, 10, 11, 12.	4	Low Pressure, Painted

GTLSs are to be subjected to the following tests in the order specified.

a. Visual inspection.

All GTLSs are to be visually inspected for defects and dimensions checked.

b. Luminance.

(1) Initial luminance measurement is to be made 21 to 28 days after manufacture following a period of storage in total darkness for a minimum of 24 hours.

(2) Each GTLS is to be inspected visually in darkness to ensure that the whole of the area, shown in the appropriate figures as coated with phosphor, is emitting light. The area appearing brightest and the area appearing dimmest to the eye are to be noted.

11. b. (3) The GTLS is to be mounted with the brightest area immediately behind a sharp edged aperture which for tubular lights is to be a slit 0.6 mm by 2.5 mm (approx), and for all other types is to be a circle 1.4 mm diameter (approx) (see note). When viewed from the front the whole of the aperture is to appear illuminated. Luminance of the aperture is to be measured by comparison with a calibrated light source of the same colour. Geometry of the measurement is to be such that the angle subtended by the sensing element at the source does not exceed 10 degrees. The luminance is to be not less than that specified.

Note: When measuring very small GTLSs eg Type CW, it may be necessary to reduce this diameter to 1.0 mm (approx).

(4) The GTLS is to be mounted with the dimmest area behind the same aperture, and the luminance measured as before. If the luminance is not less than 90 per cent of that specified the GTLS is to be accepted. If the luminance is less than 75 per cent of that specified the GTLS is to be rejected.

(5) If on test (4) the luminance is between 90 and 75 per cent of the specified luminance the GTLS is to be inspected thoroughly to determine the area below the 90 per cent level, if this area is more than 10 per cent of the total luminous area, the GTLS is to be rejected.

c. Colour.

The GTLS as indicated in group 1 of Table B shall be subjected to tests to demonstrate that the colour of the light emitted by the lamps fall within the limits given in clause 7f. For this any technique approved by the Quality Assurance Authority may be used.

d. Purity.

A certificate of purity for the gas is to be submitted to the Qualification Approval Authority at the time that Qualification Approval for the GTLS is sought.

e. Vibration.

(1) Two samples from the groups 2, 3 and 4 (Table B) shall be selected at random and fixed to a suitable metal plate for attachment to a vertical thrust vibrator. The GTLSs are fixed into suitable grooves in the plate using silicon rubber cement.

(2) The amplitude of vibration shall be measured on the plate. The vibration need be applied in one plane only.

(3) The GTLS shall be subjected to three complete test cycles in the range of 25 to 500 Hz at 5g. The Test shall be conducted by sweeping through all the frequencies in the range at a uniform rate from the minimum to the maximum frequency and return to minimum frequency in 10 minutes or longer. In addition the tester shall dwell for 30 minutes at each resonance frequency found.

(4) After the vibration period the luminance of each light shall be measured. The deterioration is not to have exceed [illegible]

11. f. External pressure test.

(1) An external pressure test is to be performed on three of the remaining GTLSs of each Group (2, 3 and 4).

(2) The GTLSs shall be put into a test chamber and exposed to 0.25 and 2.0 bars for four periods of 15 minutes each, the pressure being returned to atmosphere between each period. The test shall be conducted in air.

(3) After the pressure test the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

g. Thermal cycling.

(1) Three rapid thermal cycles are to be performed on the GTLSs used for the pressure test.

(2) The GTLS shall be heated in air to + 80°C within 5 minutes, kept at this temperature for one hour, then cooled to - 30°C within 15 minutes and kept at this temperature for one hour.

(3) After the thermal cycling the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

h. Life.

(1) The GTLSs from Group 1 together with three samples from the vibration tests and three samples from the thermal cycling tests shall be mounted behind apertures, or mounted in a suitable jig to align with an aperture for the measurement of luminance.

(2) The luminance is to be measured after mounting and remeasured after three and six months storage at a temperature and pressure within the limits detailed in para 10d (b).

(3) The rate of decay of luminance is to be not greater than that specified in clause 7d and figure 1.

(4) Limited Qualification Approval may be granted pending the results of these decay measurements.

12. PRODUCTION INSPECTION

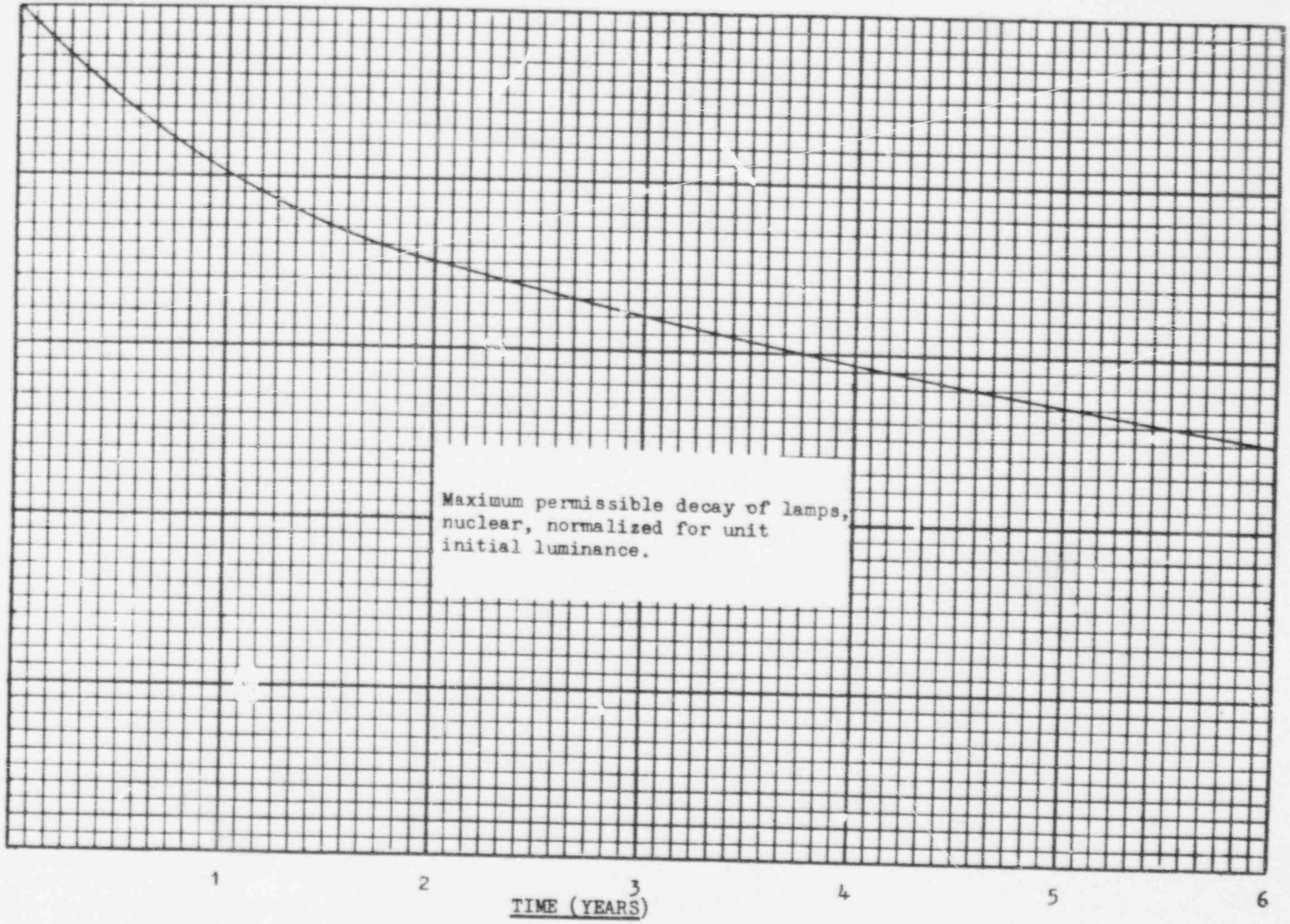
a. (1) The provisions of Def Stan 05 - 30 (as applicable) are to apply. Batching is to be agreed between the manufacturer and the Quality Assurance Authority.

(2) Measurements are to be at Standard atmospheric conditions in accordance with BS 2011. (See clause 10d (2) of this Standard).

b. The following tests are to be applied in the order specified

(1) Visual (see clause 11a)
(2) Luminance (see clause 11b and Note below)
(3) Colour (see clause 11c)

Note: At the discretion of the user or the Quality Assurance Authority this requirement can be waived or confined to samples taken from the production batch.


100
80
60
40
20
0
LUMINANCE (%)
1
2
3
4
5
6
TIME (YEARS)
Maximum permissible decay of lamps, nuclear, normalized for unit initial luminance.

NBS HANDBOOK 116

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

American National Standard N540; Classification of Radioactive Self-Luminous Light Sources

AMERICAN NATIONAL STANDARD N540-1975

American National Standard N540, Classification of Radioactive Self-Luminous Light Sources

American National Standards Institute
Subcommittee N43-2

Under the sponsorship of the
National Bureau of Standards
Washington, D.C. 20234

Approved February 21, 1975
American National Standards Institute
New York, N.Y. 10018

ANSI N540-1975

U.S. DEPARTMENT OF COMMERCE, Rogers C. B. Morton, *Secretary*

James A. Baker, III, *Under Secretary*

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Issued January 1976

American National Standard

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Preface

(This Preface is not a part of American National Standard Classification of Radioactive Self-Luminous Light Sources, N540.)

The radiation from radioactive material is used as a source of energy for activating phosphors to produce light in self-luminous watches and clocks, instrument dials, aircraft exit markers, luminous switches, etc. Safety in the design and use of radioactive materials in self-luminous products continues to be of concern to the industry, regulatory bodies and the general public.

In 1967 a standard for Classification of Sealed Radioactive Sources [1][1] was issued by the USA Standards Institute Committee N-5.4 in which some performance requirements for self-luminous devices were given.

Also in 1967 Committee N43 was organized under the sponsorship of the National Bureau of Standards to replace Sectional Committee Z54. The scope of the new committee is "standards pertaining to products and equipment, for nonmedical scientific, industrial, and educational uses, involving ionizing radiation sources including radioactive materials, accelerators, and x-ray equipment but excluding nuclear reactors."

The responsibility to develop standards for self-luminous sources was assigned to Subcommittee N43-2. This standard is an elaboration and refinement of the N5.4 standard for self-luminous sources.

Realizing that questions may arise from time to time concerning interpretations of this standard, provisions have been made for an Interpretations Committee in order that uniform handling of questionable cases may be provided. It is recommended that anyone using this standard and desiring an interpretation of a questionable case communicate with the American National Standards Institute.

Suggestions for improvement gained in the use of this standard will be welcome. They should be sent to the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

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[1] Figures in brackets refer to the references listed in Section 10 of this standard.

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American National Standard

Classification of Radioactive Self-Luminous Light Sources

This standard establishes the classification of certain radioactive self-luminous light sources according to radionuclide, type of source, activity, and performance requirements. The objectives are to establish minimum prototype testing requirements for radioactive self-luminous light sources, to promote uniformity of marking such sources, and to establish minimum physical performance for such sources. This standard is primarily directed toward assuring adequate containment of the radioactive material. Testing procedures and classification designations are specified for discoloration, temperature, thermal shock, reduced pressure, impact, vibration, and immersion. A range of test requirements is presented according to intended usage and source activity.

Key words: Clasification; designation; containment; light sources; national standard; radiation source; radioactive; radioluminous products; self-luminous sources; test procedures.

1. Scope

This standard establishes the classification of certain radioactive self-luminous light sources according to radionuclide, type of source, activity and performance requirements. The standard does not attempt to establish design standards, but leaves the design features to the judgment of the supplier and user, provided that the performance requirements are met.

Note: Radioactive self-luminous light sources used in or on timepieces are not covered by this standard.

The objectives of this standard are to establish minimum prototype testing requirements for radioactive self-luminous light sources, to promote uniformity of marking such sources, and to establish minimum physical performance for such sources.

This standard is primarily directed toward assuring adequate containment of the radioactive material. Other factors, such as quality control, external radiation levels, radiotoxicity of the isotope and its form, and quantity of radioactive material in the source, also will require consideration in view of the ever present objective of keeping exposures as low as practicable. Compliance with this standard does not necessarily satisfy all requirements for manufacture and use which may be imposed by governmental regulatory agencies.

2. Definitions

The definitions and terms contained in this standard, or in other American National Standards referred to in this document, are not intended to embrace all legitimate meanings of the terms. They are applicable only to the subject treated in this standard.

activity—the number of spontaneous nuclear disintegrations occurring in a given quantity of material during a suitably small interval of time divided by that interval of time. It is commonly expressed in curies. (also called disintegration rate)

capsule—a protective envelope used to prevent leakage of the radioactive material.

container—a general term to designate any enclosure which surrounds the encapsulated radioactive material.

device—any piece of equipment designed to utilize self-luminous light source(s).

distributor—any person or organization supplying self-luminous light sources.

fixed sources—sources intended for usage at a specific location(s), designed for environmental conditions existing at the intended location(s), and to be used, except for accidental or unavoidable circumstances, under environmental conditions for which the source was designed.

leakage—a transfer of radioactive material from the self-luminous light source to the environment.

manufacturer—any person or organization fabricating a self-luminous light source(s).

mobile sources—sources designed to meet certain anticipated environmental conditions, not necessarily intended for usage at any specific location(s), and known to be subject to possible frequent or severe environmental changes.

model—descriptive term or number to identify a specific self-luminous light source design.

prototype source—the original of a model of a source which serves as a pattern for the manufacture of all sources identified by the same model designation.

prototype test—the performance testing of a new source design before sources of such design are put into actual use.

quality control—such tests and procedures as are necessary to establish that the sources comply with the performance characteristics for that source design as defined in Table 3 of this standard.

self-luminous light source—a source consisting of a radioactive nuclide(s) firmly incorporated in solid and/or inactive materials, or sealed in a protective envelope strong enough to prevent any leakage of the contained radioactive substances to the environment under ordinary circumstances of use and incorporating a phosphor for the purpose of emitting light. Self-luminous light sources include:

dry powder sources in which the activated phosphor is introduced into a sealed container without the use of any binding medium,

gaseous sources in which the phosphor is coated on the inside wall of or on a component within the container in which the radioactive nuclide, in gaseous form, is contained,

painted sources in which a radioactive nuclide is intimately mixed and bound with the phosphor and incorporated into a capsule, and

separable sources in which the radioactive nuclide, bonded to or in a supporting strata, and the phosphor constitute independent elements which can be isolated from each other.

shall—where "shall" is used for a provision specified herein, that provision is intended to be a requirement.

should—"should" is used to indicate provisions which are not required but which are here recommended as good practice.

source holder—a mechanical support for the self-luminous light source.

3. General Conditions

3.1 Activity Level (Table 1)

Self-luminous light sources, considered in this standard, are of four general types: dry powder sources, gaseous sources, painted sources and separable sources.

Table 1 establishes the maximum activity of an individual self-luminous source for classification of that type of source under this standard. The radioactive nuclides most commonly used and those exhibiting potential use in self-luminous sources are listed.

3.2 Self-luminous Light Source Performance Tests (Table 2)

Table 2 is a listing of the tests for evaluating the physical performance of self-luminous sources under average environmental conditions in which a self-luminous source, or source-device, will be used. The tests are based on normal and abnormal use (typical accidents considered) but do not include exposure to fire or explosion. The tests shall be run consecutively, in the order shown in table 2.

TABLE 1. *Maximum Activity in Curies of an Individual Self-Luminous Light Source*

Radionuclide	Dry Powder	Painted	Separable	Gaseous
Tritium H-3	1	5	5	50[a]
Carbon C-14	0.06	0.3	0.3	30 (CO_2)
Chlorine Cl-36	.006	.03[b]	.03	3
Nickel Ni-63	.06	.3	.3	–
Krypton Kr-85	.006[c]	.03[c]	.03[c]	30
Technetium Tc-99	.06	.3	.3	–
Promethium Pm-147	.06	.3	.3	–
Thallium Tl-204	.006	.03	.03	–
Lead Pb-210	.0003	.0015	.0075	–
Radium Ra-226	.00002	.0001	.0006	–
Thorium Th-230	.00002	.0001	.0005	–
Americium Am-241	.00002	.0001	.0005	–

[a] Tritium oxide content shall not exceed the greater of (a) 1 percent of tritium in source, or (b) 1 mCi.
[b] ClBaK
[c] Kryptonate

TABLE 2. *Self-luminous light source performance tests*

Type of Test	Test Levels				
	1	2	3	4	X
Discoloration	12 h lamp	—	—	—	Special
Temperature	No test	0 °C and 50 °C	−30 °C and 65 °C	−55 °C and 80 °C	Special
Thermal Shock	No Test	0 °C to 50 °C	−30 °C to 65 °C	−55 °C to 80 °C	Special
Pressure (Reduced)	No test	226 mm Hg abs.	175 mm Hg abs.	87 mm Hg abs.	Special
Impact	No test	Free fall to steel plate 1 m 2x	Free fall to steel plate 1 m 20x	Free fall to steel plate 1 m 20x and 2 m 2x	Special
Vibration	No test	Simple harmonic motion having an amplitude of 0.75 cm (0.03") (4 a maximum total excursion of 0.15 cm (0.06"), the frequency being varied uniformly between the approximate limits of 10 and 55 Hertz (Hz). The entire frequency range, between 10 and 55 Hz and return to 10 Hz, shall be traversed in approximately one (1) minute.			
		10 minutes	30 minutes	60 minutes	Special
Immersion	No test	Immerse in cold bath, 15 minutes. Immediately (one minute max), transfer to hot bath, 15 minutes. Immediately (one minute max), transfer to cold bath. A dye may be used to observe obvious, gross penetration.			
		0 °C to 50 °C 2 cycles	0 °C to 65 °C 2 cycles	0 °C to 80 °C 5 cycles	Special

Tests to be performed in the order shown. All temperatures specified ±3 °C

Table 2 does not cover all source-use situations. If the environmental conditions to which a source is expected to be exposed in use differ from the particular environment shown, the specifications for the source and the test requirements shall be considered on an individual basis by the supplier, the user, and the regulating authority. If the environmental conditions are more severe than the test conditions of Level 4 in table 2, "special" tests shall be developed by the supplier which satisfy the user and the regulating agency.

3.3 Performance Standards for Classification of Self-Luminous Light Sources (Table 3)

Table 3 establishes test requirements for self-luminous light sources according to intended usage and source activity. These performance requirements are minimums for applications involving normal usage (including typical accidents). Where generally extreme environmental conditions may be encountered a "special" test appropriate to that situation shall be developed. There also may be situations where a source in its intended usage will encounter only one extreme environmental condition. Under such conditions the general classification shall be modified to accommodate the abnormal condition.

3.4 Fire and Explosion

Table 2 does not consider exposure of the source or source-device to fire and explosion. In the evaluation of self-luminous light sources and source-devices, the manufacturer and user shall consider the probability of fire and explosion and the possible results. Factors which should be considered in determining the need for tests more stringent than those suggested for specific classes in table 3 are; consequences of loss of activity, quantity of material in the source, radiotoxicity, physical form of the material, environment in which the source is used, and protection afforded the source or source-device combination.

It is recognized that the possibility of fire or explosion exists in many areas where light sources are used. However, light sources, because of certain inherent characteristics, cannot always be constructed so as to completely resist the effects of fire or explosion. Therefore, special test requirements shall be specified where the probability of fire or explosion is known to be abnormally high. These special tests shall include temperature, thermal shock, pressure and impact resistance.

TABLE 3. *Performance standards for classification of self-luminous light sources*

Source activity	Intended usage	Classification	Performance test level (table 2)						
			Discoloration	Temperature	Thermal shock	Pressure (reduced)	Impact	Vibration	Immersion
<0.1% of Table 1	any	1	1	1	1	1	1	1	1
≥0.1% to <1% of Table 1	any	2	1	2	2	2	2	2	2
≥1% to ≤10% of Table 1	fixed	3	1	3	3	3	2	2	2
	mobile	4	1	3	3	3	3	3	3
≥10% to ≤100% of Table 1	fixed	5	1	3	3	3	3	3	3
	mobile	6	1	3	3	3	4	4	4
Does not exceed Table 1	maximum normal environment	7	1*	4*	4*	4*	4*	4*	4*

NOTE: The above figures are minimum requirements for applications involving normal usage. Where special environmental conditions are involved, either more or less stringent than what might be considered normal, the user shall specify the abnormal condition or conditions, or request the necessary class change.

*Or special, as required for specific abnormal environmental conditions. Use an X where applicable to indicate the special testing.

3.5 Radiotoxicity and Solubility

Except as limited by paragraph 3.4, radiotoxicity of the radioactive material and its solubility shall be considered only when the activity of the source exceeds the value shown in table 1. If the activity exceeds the value shown in table 1, the classification of the source shall be considered on an individual basis. If the activity does not exceed the values shown in table 1, table 3 may be used without consideration of either radiotoxicity or solubility.

4. Classification and Testing

4.1 Classification Procedures

The performance classification of a specific type of self-luminous source or source-device shall be determined as follows:

4.1.1 Determine from table 1 the activity allowable for that type of source.

4.1.2 If the desired quantity of radioactive material does not exceed the allowable quantity of table 1 and no abnormal fire or explosion hazard exists, the performance requirements for classification of that type of source may be taken directly from table 3. If a significant fire or explosion hazard exists, the factors listed in paragraph 3.4 shall be evaluated and applied.

4.1.3 If the desired quantity of radionuclide exceeds the allowable limits of table 1, a separate evaluation of the specific source use and source design shall be made in accordance with paragraph 3.5.

4.1.4 Performance requirements may be determined directly from table 3 for normal usage. When conditions of use indicate that abnormal resistance to one or more environmental conditions is necessary or desirable, suitable test conditions may be selected from table 2 and substituted for those normally specified in table 3. Since table 3 is arranged in order of increasing severity, sources of an established classification may be used in any application having less severe specific performance requirements.

4.2 Testing

The verification of the classification (sec. 5) of each source type shall be determined by subjecting a minimum of two prototype or production sources consecutively to the performance tests specified or by evaluation of prior test data on sources of comparable size and identical materials of construction.

For self-luminous light sources normally mounted in devices, the complete device may be tested. Where the source constitutes a part of a complete assembly which may not adapt to the performance tests, the source only or the source in its holder may be subjected to the specified tests.

Compliance with the tests shall be determined by the ability of the self-luminous light source to maintain its integrity and brightness after each test is performed, i.e., retain its radioactive material and maintain, within the limits specified in section 8, its physical and operating characteristics.

In the event any of the source units tested fails the test series, the source design shall be considered unacceptable.

5. Classification Designation

The classification of a self-luminous light source shall be designated by a series of letters and digits in accordance with the following designation scheme:

5.1 The first one or two characters will designate the radionuclide and, with the exception of tritium, shall consist of the chemical symbol of the element, using the letter "T" for tritium, "Kr" for krypton-85, "Pm" for promethium-147, etc.

5.2 The first character following the radionuclide identification shall be a digit, from 1 to 7, taken from table 3, which will indicate the classification assigned on the basis of the tests to which the source has been subjected. For emphasis, that digit shall be underlined whenever used.

5.3 The first character following identification of the general classification test will designate the type of source, as classified in table 1, using the letter "D" to identify a dry powder source, "P" for painted, "S" for separable and "G" for gaseous.

5.4 The first character following identification of the type of source will indicate whether the curie content does or does not exceed the maximum amounts given in table 1. Use the letter "C" to indicate that the amount does not exceed table 1 limits and "E" to indicate that the activity exceeds table 1 limits.

5.5 If the source testing involved any specific tests more or less stringent than normal for the indicated classification, the curie content designation ("C" or "E") shall be followed by seven additional digits to indicate the level at which each specific test was made. Table 2 shows seven tests and five test levels for each. Using the applicable designator for test levels (1 to 4 or X), indicate the deviation from the general test level in the manner illustrated in the following example:

Assume that a source under consideration is one containing two curies of gaseous tritium, is intended for a mobile type application involving abnormal shock resistance, and has been tested in accordance with classification 4, except for the more severe impact test requirements of test level 4. The proper designation for such a source would be:

T4GC1333433

The proper designation for a similar source involving no abnormal conditions and tested in accordance with the requirements of the performance standards classification 4 would be:

T4GC

6. Product Identification

The ANSI classification designation shall be marked on the self-luminous light source, source container or source holder. If space limitation does not permit such marking, the classification designation shall appear on accompanying documents.

7. Performance Testing Procedures

7.1 General

The testing procedures described below are acceptable and recommended procedures for conducting the performance tests prescribed in table 2. Procedures demonstrated to be at least equivalent are also acceptable.

Tests shall be run consecutively on the same source, in the order shown in table 2. Unless otherwise specified the tests shall be performed at 23 °C ±10 °C, at barometric pressure of 710-790 mm (28-31") mercury and at a maximum relative humidity of 80 percent. Temperature changes, unless otherwise specified, shall be gradual to reduce the possibility of thermal shock.

7.2 Discoloration

7.2.1 Equipment. Weatherometer or S-4 Sunlamp, Corex D filter, calcium chloride, 8 liters or larger, glass container.

7.2.2 Procedure.(a) Expose sources in weatherometer for twelve hours, alternating one-half hour wet and dry cycles or, (b) expose sources for twelve hours to the light from an S-4 lamp, filtered by a Corex D filter, at a distance of 20 centimeters from the S-4 lamp. All tests shall be performed in air with an ambient temperature of 27 °C ±10°C and a relative humidity of 95 to 100 percent. The samples shall be irradiated with the light impinging on the translucent surface of the source.

7.2.3 Evaluation. Test sources shall be examined visually and any discoloration or other effects observed. The light spectrum and output after the test shall be compared with that before the test. When measured with a visual photometer or a color corrected photocell, no greater loss of luminosity than 20 percent shall be observed.

7.3 Temperature Test

7.3.1 Equipment. The heating or cooling equipment shall have a test zone volume (that volume at essentially constant temperature) of at least five times the volume of the test specimen. The temperature of the test chamber shall be determined by at least two recently calibrated temperature measuring instruments, and the average of the readings shall be taken as the true temperature.

If a gas or oil fired furnace is used for the temperature test, an oxidizing atmosphere must be maintained at all times.

7.3.2 Procedure. All temperature tests shall be performed in air. All test sources shall be held at or above the maximum (or at or below the minimum for low temperature tests) test temperature for a period of at least one hour. The test sources shall be allowed to remain in the test chamber until they return to ambient conditions.

Sources to be subjected to temperatures below ambient shall be cooled to the test temperature in less than 45 minutes.

Sources to be subjected to temperatures above ambient shall be heated to the test temperature within a 5 minute period.

7.3.3 Evaluation. Test sources shall be examined visually for any evidence of failure and, in the absence of any evident failure, shall be used in the succeeding thermal shock test. In the event of any uncertainty regarding possible failure, the person performing the test may, at his option, subject the source(s) to the final immersion test before proceeding with the next test.

7.4 Thermal Shock Test

7.4.1 Equipment. Same as 7.3—Temperature test.

7.4.2 Procedure. Use the sources used in temperature test. Heat the source(s) to the maximum test temperature (required for that particular class)and hold at this temperature for at least 15 minutes. Transfer the source, in 15 seconds or less, to the cold chamber, held at or below the minimum temperature required for the particular class. If water is used for the cold test, it shall be flowing at a rate of at least ten times the source volume per minute, or, if the water is stationary, it shall have a volume of at least twenty times the source volume.

7.4.3 Evaluation. Test sources shall be examined visually for any evidence of failure and, in the absence of any evident failure, shall be used in the succeeding pressure test. In the event of any uncertainty regarding possible failure, the person performing the test may, at his option, subject the source(s) to the final immersion test before proceeding with the next test.

7.5 Pressure (Reduced) Test

7.5.1 Equipment. The apparatus used for the pressure test shall consist of a vacuum pump, vented to a suitable exhaust system, and a suitable sealed chamber having means for visual observation of the sources under test. The pressure gauge shall be recently calibrated and should have a range at least 10 percent greater than the test pressure.

7.5.2 Procedure. The test sources shall be put into the chamber and exposed to the test pressure for four periods of 15 minutes each, the pressure being returned to atmospheric between each period.

7.5.3 Evaluation. Test sources shall be examined visually for any evidence of failure and, in the absence of any evident failure, shall be used in the succeeding impact test. In the event of any uncertainty regarding possible failure, the person performing the test may, at his option, subject the source(s) to the final immersion test before proceeding with the next test.

7.6 Impact Test

7.6.1 Equipment. Rigid steel plate. Support or shelf for spurces. The steel plate shall be rigidly mounted on an unyielding surface so that it will not deflect appreciably during the test.

7.6.2 Procedure. Mount the source support above the steel plate at the appropriate height. Place the source to be tested on the support and, using any device or means which will not have a tendency to orient the source, push the source from the support and allow it to free fall and impact the steel plate in a random manner. Repeat the required number of times specified for the particular test level.

7.6.3 Evaluation. Each test source shall be examined visually for any evidence of failure and, in the absence of any evident failure, shall be used for the succeeding vibration test. In the event of uncertainty regarding possible failure, the person performing the test may, at his option, subject the source(s) to the final immersion test before proceeding with the next test.

7.7 Vibration Test

7.7.1 Equipment. The equipment shall be capable of providing a simple harmonic motion having an amplitude of 0.075 centimeter (0.03") and a maximum total excursion of 0.15 centimeter (0.06"), the frequency being varied uniformly between the approximate limits of 10 and 55 hertz (Hz).

7.7.2 Procedure. Test sources shall be subjected to the above simple harmonic motion for the time interval indicated for the specific test level. The entire frequency range, between 10 and 55 Hz and return to 10 Hz, shall be traversed in approximately one (1) minute.

7.7.3 Evaluation. Test sources shall be examined visually for any evidence of failure and, in the absence of any evident failure, shall be used for the succeeding immersion test.

7.8 Immersion Test

7.8.1 Equipment. Hot and cold baths.

7.8.2 Procedure. Immerse the test sources(s) in a water bath, maintained at 0 °C, and allow to remain for 15 minutes. Immediately (one minute maxi-

mum) transfer the source(s) to a hot water bath, maintained at the temperature specified for the particular test level (±3 °C), and allow to remain for 15 minutes. Immediately (one minute maximum), transfer to the cold bath and allow to remain for 15 minutes. Repeat the cycle as indicated for the specific test level. A dye may be used to observe any gross penetration.

Bath volume, or temperature control, shall be such that bath temperature does not change by more than ±3 °C during the test cycle.

7.8.3 Evaluation. The radioactivity in the hot and cold baths shall be determined. The radioactivity in the liquid shall not exceed 1 microcurie for painted tritium sources, 50 nanocuries for gaseous tritium sources, or 5 nanocuries for other sources.

8. Evaluation

Determination of compliance with the performance test requirements shall be made on all sources in accordance with the procedures described below, after the sources have been subjected to the entire test sequence. These evaluations shall be made in addition to the evaluation procedures specified for the individual tests.

8.1 The test sources shall be examined visually for any evidence of failure, visible leakage or degradation.

8.2 The test sources shall be subjected to brightness measurements and the loss of luminosity shall not exceed 20 percent of that observed prior to this series of tests. And

8.3 The test sources shall be tested for loss of radioactive contents as follows:

8.3.1 Each source shall be wet wipe tested. An acceptable wipe (smear) test consists of wiping all external surfaces of the source thoroughly with a piece of filter paper or other suitable material of high wet strength and absorbent capacity, moistened with a solvent which will not attack the material of which the outer surfaces of the source are made and which, under the conditions of this test, has been demonstrated to be effective in removing the radionuclide involved. Measure the total activity on the paper. It shall not exceed 1 microcurie for painted tritium sources or 5 nanocuries for other sources. Wipe tests are not required for gaseous sources.

8.3.2 Each source shall be soak tested for 24 hours in a volume of water about equal to 10 times the volume of the source. The source shall be removed and the activity in the solution measured. The activity in the solution shall not exceed 1 microcurie for painted tritium sources, 50 nanocuries for gaseous tritium sources, or 5 nanocuries for other sources. Gaseous krypton sources are exempted from the soak test.

8.3.3 Leakage of gas from gaseous sources shall be monitored by enclosing the source in a closed system or through suitable means to determine rate of leakage. Leakage shall not exceed 5 nanocuries in 24 hours. Tritium sources shall be exempted from this test.

Additional Tests for Special Uses

Under certain environmental conditions, additional tests, not applicable to all sources, may be required or desirable. The following covers one such additional test. Other additional tests should be developed and applied as special situations become evident.

9.1 Dust Resistance

9.1.1 Equipment. Humidity chamber, heat source, dusting chamber, carbon black, MgO, or other opaque powder.

9.1.2 Procedure

9.1.2.1 Prepare test sources as follows:

9.1.2.1.1 Rub surface of source to create surface charge. Dust source using the procedure described under 9.1.2.2.

9.1.2.1.2 Expose test source for one hour in air with a relative humidity of 95 to 100 percent. Dust source using the procedure described under 9.1.2.2.

9.1.2.1.3 Expose source for one hour in air at 80 °C ±10 °C to drive plasticizer or residual solvent to surface. Dust source using the procedure described under 9.1.2.2.

9.1.2.2 Sources prepared under each procedure above should be mounted or suspended in the dusting chamber, in the position in which it is to be used, and dusted with opaque powder, to simulate dust laden air, or atmosphere. Dusting powder should be introduced in an air stream, in such a manner that the air stream does not impinge directly on the translucent surface of the source but creates a dust suspension, resembling a dust laden atmosphere. Expose the source for thirty minutes in such an atmosphere.

9.1.3 Evaluation. Remove the source, without disturbing the surface, and measure brightness through any accumulated dust, or make such measurement without removing the source from the chamber. Surface brightness shall not be less than 90 percent of pretest brightness.

10. References

Publication 1 listed below is referred to in the Preface in this standard. Publication 2 is an international standard for radioluminous timepieces recommended by the European Nuclear Energy Agency and the International Atomic Energy Agency.

[1] USA Standard Classification of Sealed Radioactive Sources, (ANSI N5.10-1968, August 29, 1967).

[2] Radiation Protection Standards for Radioluminous Timepieces, Safety Series No. 23, International Atomic Energy Agency, Vienna, Austria (1967).

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

This standard establishes the classification of certain radioactive self-luminous light sources according to radionuclide, type of source, activity, and performance requirements. The objectives are to establish minimum prototype testing requirements for radioactive self-luminous light sources, to promote uniformity of marking such sources, and to establish minimum physical performance for such sources. This standard is primarily directed toward assuring adequate containment of the radioactive material. Testing procedures and classification designations are specified for discoloration, temperature, thermal shock, reduced pressure, impact, vibration, and immersion. A range of test requirements is presented according to intended usage and source activity.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Classification; designation; containment; light sources; national standard; radiation source; radioactive; radioluminous products; self-luminous sources; test procedures.

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ATTACHMENT

NUMBER

FIVE (5)

PROTOTYPE TESTING: Sight devices manufactured by Innovative Weaponry Inc. containing sealed source inserts.

PROTOTYPE TESTING: Sealed source inserts installed into original equipment manufacturers (OEM) sight devices.

I. **PROTOTYPE TESTING:** Description

II. **PROTOTYPE TESTING:** Criteria

III. **PROTOTYPE TESTING:** Evaluations

IV. **PROTOTYPE TESTING:** Summary

PROTOTYPE TESTING DESCRIPTION

P-T machined steel sight sets containing sealed source inserts in a Bar-Dot and 3-Dot arrangement were subjected to a battery of test procedures.

P-T application of sealed source inserts were installed into original manufacturers iron sights (OEM) in a Bar-Dot and 3-Dot configuration and were subjected to a battery of test procedures.

The purpose of these applications and test procedures was to evaluate the integrity of these devices for safe and sound distribution.

Prototype Tests:

(A) Hot Acid

(B) Thermal

(C) Drop

(E) Shock

(F) Chemical

These particular prototype tests were selected because of their similarity to actual environmental conditions in which devices would be or could be subject to.

Special attention was paid to adherence criteria to better underscore safety requirements.

Prototype Testing Description: Continuation

HOT ACID TEST: [Common Hot Bluing (Black Oxide) procedure] This is a standard procedure used frequently and is applied to firearms and firearm related parts. This procedure is used to coat bare metals to protect against rust, wear etc. and also acts as an esthetic <synonym - finish>. The solution consists of water, Sodium Nitrate, Hydrochloric Acid and Sulfuric Acid. Ingredients are heated to 250 degrees F - 280 degrees F for a period not to exceed 25 minutes. Prototypes were subjected to this procedure in varying applications.

THERMAL: Prototypes were subjected to temperature variations to evaluate thermal influences. A battery of tests involving Refrigerant R-502 was introduced to prototypes to exemplify **cold** conditions.
In correlation with the hot acid test, prototypes were introduced to **hot** environments which typified normal to beyond normal conditions.

DROP: Prototypes mounted and unmounted to firearms were dropped from heights ranging from 3 feet to 10 feet onto a hard unfinished concrete surface. Inspections and evaluations were preformed initially and after 1 week of elapsed time.

Shock: This battery of testing was indeed the most extensive. P-T manufactured sight set with sealed source inserts were mounted onto firearms for test fire and recoil evaluations. P-T sealed source inserts and applications were also applied to original manufacturers sights. P-T sealed source insert configurations, Bar-Dot and 3-Dot were evaluated for any evidence that these applications would not withstand shock and detrimental forces experienced in firearm usage both normal and excessive. Firearms and ammunitions that were selected, depict the **highest degree** of pressures and recoil that could be experienced.

Chemical: Prototype sight set were subjected to chemical solutions designated for firearm cleaning and maintenance Evaluations were made to determine the effects if any to the sight device and the application of the sealed source insertions.

PROTOTYPE TESTING CRITERIA:

(A) ADHERENCE

(B) ILLUMINATION

(C) LENSING

(D) SEALED SOURCE ENCLOSURES

(E) IRON SIGHT

(F) SEALED SOURCE INTEGRITY VERIFICATION TEST

(A) ADHERENCE - This test is devised to provide information regarding adhesives (BlackMax, Dow Corning 734) used to bond sealed sources to iron sights. Sights are inspected under microscopic magnification (30X) for visual of bonding stress, adhesive deterioration or other signs of failure. Insert areas are then probed with dental pick or similar device, to check bonding qualities. Results are then classified as **Positive** or **Negative.** Positive denoting acceptable results. Negative denoting unacceptable results.

(B) ILLUMINATION - Sights are inspected in lighting conditions that vary from normal room lighting to total darkness. Inserts are inspected with the naked eye and under 30X magnification. Inserts are compared with new sealed source inserts that have passed the QA/QC procedures for new sealed source inspection. Results are then classified as **Positive** or **Negative.** Positive

denoting acceptable results. Negative denoting unacceptable results.

(C) **LENSING** - This test is designed to offer data concerning the condition of sealed source lensing procedure. Lens area is inspected under 30X magnification for signs of discoloration, fatigue, surface pitting or any other visually detectable breakdown.
Results are then classified as **Negative Effect** or **Positive Effect**. Positive Effect denoting unfavorable or unacceptable results, Negative Effect denoting favorable or acceptable results.

(D) **SEALED SOURCE ENCLOSURES** - This procedure consists of inspection of sealed source enclosures. Visible area of enclosure is inspected under 30X magnification for signs of cracking, fatigue and any other visually detectable breakdown. Results are then classified as **Negative Effect** or **Positive Effect**. Positive Effect denoting unfavorable or unacceptable results, Negative Effect denoting favorable or acceptable results.

(E) **IRON SIGHT** - Sight set is inspected for any signs of defect. Articulations or mounting specifications are checked for correct tolerance. Tension of set screws are measured. Results are then classified as **Negative Effect** or **Positive Effect**. Positive Effect denoting unfavorable

or unacceptable results, Negative Effects denoting favorable or acceptable results.

(F) SEALED SOURCE INTEGRITY VERIFICATION TEST [SSIVT]

Sights are places in Acetone. This chemical removes the Impruv lensing material and the Loctite BlackMax so the sealed source may be removed for microscopic inspection. The tube is immersed in water containing a high concentration of purple dye, the water & dye mixture is approximately 70 degrees F. The temperature of the tube, dye & water is then brought to approximately 34 degrees F. If the integrity of the sealed source vile has been compromised then internal pressure of the vile will have equalized with atmospheric conditions. The cooling of the vile will cause a contraction of the molecules inside the vile i.e. drawing the tainted solution into the vile making readily visible under microscopic conditions. Results are classified as **PASS** or **FAIL**.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 4506

DATE OF TEST: 8-05-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar-Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson .45 ACP model 4506. 1000 rounds of factory loaded Winchester 230 grain Ball were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 4506

DATE OF TEST: 8-05-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "3-Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson .45 ACP model 4506. 1000 rounds of factory loaded Winchester 230 grain Ball were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines.

INSPECTION:

(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "3-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 1006

DATE OF TEST: 8-05-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson 10MM Mod. 1006. 1000 rounds of factory loaded Federal 155 grain SJHP were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 5906

DATE OF TEST: 8-06-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson 9MM Model 5906. 1000 rounds of factory loaded Winchester 115 grain FMJ were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: ALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 4006

DATE OF TEST: 8-06-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson 40 S&W Model 4006. 1000 rounds of factory loaded Winchester 155 grain STHP were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 629

DATE OF TEST: 8-06-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson 44 Magnum Model 629(Revolver). 1000 rounds of factory loaded Winchester 240 grain JHP were fired in a continuous process. Pauses were facilitated to reload.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage. Characteristic of.44 Magnums, **severe recoil** was displayed.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Smith & Wesson Model 36-2

DATE OF TEST: 8-07-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Smith & Wesson Ladysmith .38 Special (Revolver). 1000 rounds of factory loaded Winchester 125 grain silvertip were fired in a continuous process. Pauses were facilitated to reload.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Smith & Wesson sights. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Colt Model 1911

DATE OF TEST: 8-09-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Colt Model 1911 .45 ACP semi-auto pistol. 1000 rounds of factory loaded Winchester 230 grain ball were fired in a continuous process. Pauses were facilitated to reload magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Colt sight sets. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Colt Python

DATE OF TEST: 8-09-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Colt Python .357 Revolver. 750 rounds of factory loaded Winchester 125 grain SJHP were fired in a continuous process. Pauses were facilitated to reload.

INSPECTION:
(A) ADHERENCE - Positive
(B) ILLUMINATION - Positive
(C) LENSING - Negative Effect
(D) SEALED SOURCE ENCLOSURES - Negative effect
(E) IRON SIGHT - Negative Effect
(F) SEALED SOURCE INTEGRITY VERIFICATION TEST - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Colt. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING: SEALED SOURCE INSTALLATIONS INTO ORIGINAL MANUFACTURERS STEEL SIGHT SETS [OEM].

DESCRIPTION OF SIGHT SET: OEM Beretta 92F

DATE OF TEST: 8-09-91

CATEGORY: Shock

DESCRIPTION OF TEST: The objective of this testing procedure is to evaluate our sealed source installations into original sight set which are delivered on firearms from major manufacturers. P-T "Bar Dot" sealed source configuration was installed into front and rear sight set of the Beretta Model 92F, 9mm. semi-auto pistol. 1000 rounds of factory loaded Winchester 115 grain FMJ were fired in a continuous process. Pauses were facilitated to reload magazines.

INSPECTION:
(A) **ADHERENCE** - Positive
(B) **ILLUMINATION** - Positive
(C) **LENSING** - Negative Effect
(D) **SEALED SOURCE ENCLOSURES** - Negative effect
(E) **IRON SIGHT** - Negative Effect
(F) **SEALED SOURCE INTEGRITY VERIFICATION TEST** - Pass

CONCLUSIONS: Given the results of this test, we conclude that the "Bar-Dot" configuration sealed source insertion sustained no detrimental effects when installed into OEM Beretta sight sets. The sealed sources withstood shock forces during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

Note This weapon is used extensively by Law Enforcement and is the official side-arm of the U.S. Military.

PROTOTYPE TESTING SUMMARY

P-T Sealed Source Applications to Original Manufacturers Sight Sets [OEM].

Original manufacturers sight set prototypes used for evaluation were as followed: Smith & Wesson Model 4506, Smith & Wesson Model 1006, Smith & Wesson 5906, Smith & Wesson Model 4006, Smith & Wesson Model 629, Smith & Wesson Model 36-2, Colt Model 1911, Colt Python Revolver, Beretta 92F.

Summary: P-T sealed source applications in Bar-Dot and 3-dot configuration were applied to these common original manufacturers sight sets. Sight sets were subjected to a variety of conditions both normal and extreme. Conditions which were used best typify realities of actual exposure. Extreme conditions were also subjected to sight sets in order to detect any weakness in the area of application of sealed sources. In no instance did sealed source inserts ever become dislodged from sight devices in accordance with application to original manufacturers sights or devices manufactured by Innovative Weaponry Inc.

PROTOTYPE TESTING

MODEL DESCRIPTION: Glock"Bar-Dot"/Sig 3-Dot/AR-15/HK

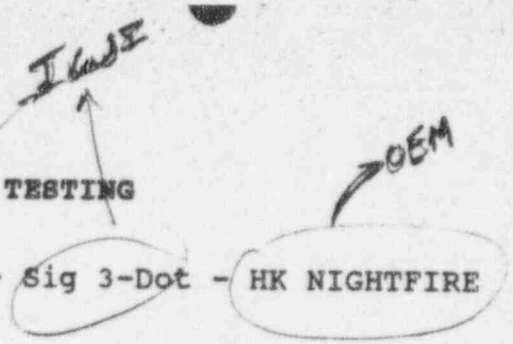
DATE OF TEST: 8-26-91 - 8-27-91 - 8-28-91

CATEGORY: Thermal

DESCRIPTION OF TEST: Sights were placed in a insulated canister. Refrigerant R-502 [an azeotrope refrigerant which is a mixture of 48.8% R-22(monochlorodifluoromethane) and 51.2% R-115(chloropentafluoroethane) was introduced into canister. At 14.7 lbs. (Atmospheric pressure) this refrigerants temprature equals -50 degrees F. Sights were subjected to these conditions for a period of 8 hours. Sights were allowed to graduate to room temperature (approx. 70 degrees F)].
This test was repeated using 1 hour, 2 hour, 3 hour and 4 hour control period exposure.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative effect
(D) Sealed Source Enclosures - Negative effect
(E) Iron Sight - Negative effect
(F) Sealed Source Integrity Verification Test - Passed

CONCLUSIONS: Sight sets subjected to extreme cold temperatures sustained no detrimental effects. Sight sets were subjected to various duration control periods with no detrimental effects to sealed sources, application materials or iron sight housings. We do not expect products to be exposed to conditions exceeding the control of -50 degrees F. According to ASHRAE(American Society of Heating, Refrigerating, and Air-Conditioning Engineers) tables of outside design conditions, the average winter Dry-Bulb temperature for United States and Canada does not range below -50 degrees F. If products are exposed to conditions and temperatures lower than control standard, we would suspect that no detrimental effects would occur.



PROTOTYPE TESTING

MODEL DESCRIPTION: Sig Bar-Dot - Sig 3-Dot - HK NIGHTFIRE

DATE OF TEST: 3-26-91

CATEGORY: Thermal Part II

DESCRIPTION OF TEST: Prototypes sight sets containing Bar-Dot and 3-Dot inserts were placed into oven to expose them to unusual heat ranges for varying durations of time. Sight sets were allowed to cool and initially inspected. subsequential inspections were conducted 24 hours later.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Test temperatures ranged from 150 degrees F. to 295 degrees F. These control temperatures depect beyond normal exposures. There was absolutely no damage to any aspect of the prototype sight device.

PROTOTYPE TESTING

MODEL DESCRIPTION: Glock Bar-Dot - Glock 3-dot

DATE OF TEST: 3-22-91

CATEGORY: Chemical

DESCRIPTION OF TEST: Prototype sights were subjected to chemical solutions designated for firearm cleaning and maintenance to determine the effects of these common cleaning agents to sight device and to application of sealed source inserts.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Eleven of the most common commercial firearm cleaning agents were introduced to sight devices. These agents include: Hopps#9, Outers Nitro Solvent, WD-40, BC-1 Bore Cleaner, Break Free, Accubore, LPS Engine Degreaser, Oxpho-Blue, Gun Scrubber, AmsOil. The average exposure to these agents was approximately 30 minutes which exceeds normal exposure. No detrimental effect was noted upon inspection to the sight device, the sealed source inserts or any application procedures.

IWL

PROTOTYPE TESTING

Gun & sights

MODEL DESCRIPTION: Glock Bar-Dot - Glock 3-Dot/OEM Sights

DATE OF TEST: 2-22-91

CATEGORY: Drop

DESCRIPTION OF TEST: Prototype sight devices containing sealed source inserts and also applications of sealed sources to original manufacturers sight sets were dropped from varying distances of 3 feet to 10 feet to a hard concrete surface. This test would depect a probable accidental event. Drop test was introduced to sight devices mounted and unmounted to firearms.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Sight device design would appear to shield sealed source insert from any external direct blow or force therefore sealed sources would not experience any damage. The only damage which would occur would be to the external characteristics (corners and edges) of the sight device. No effects to the sealed sources or the bonding of the sealed sources. Subsequential inspections 1 week later noted negative effect to integrity of device.

IWI

PROTOTYPE TESTING

MODEL DESCRIPTION: Glock 3-Dot/Sig Sauer"Bar-Dot"/AR-15.

DATE OF TEST: 8-25-91

CATEGORY: Hot Acid Test {Common Hot Bluing Solution}

DESCRIPTION OF TEST: Sights are placed into hot acid bath. Temperature measured **@300 degrees F.** Duration of immersion **30 minutes.** Remove and allow to cool. Clean with Trichloroethane and note effects.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Slight surface discoloration
(D) Sealed Source Enclosures - Negative effect
(E) Iron Sight - Major metal erosion noted
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: [Normal bluing (black oxide) process is not recommended to exceed 25 minutes @280 degrees F. Please note these requirements are optimum in obtaining uniform quality results]. To exceed these limits will severely damage the steel sight. Causing erosion of all exterior surfaces i.e. surface pitting, deterioration of exterior edges, shallowing of thread bearing surfaces and a general deterioration of sight. However, sealed sources and sealed source related applications were not affected by extended time and temperature. [Lensing showed a slight cloudy appearance. Light buffing with cotton cloth removed "hazy" condition]. Please note: Due to the variations of bluing preperation procedures [sandblasting, buffing, sanding, polishing and burnishing] we do not recommend bluing process to finished sight product. (See Product User's Brochure).

OEM
Probably
Removable

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Colt AR-15/M16

DATE OF TEST: Reprint of previous test (09-09-91)

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Colt AR-15/M16 semi-automatic rifle. 2000 rounds of factory loaded Winchester 55 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: We felt the need to increase the amount of test rounds fired due to the fact that this particular firearm is used extensively by the United States Government and Law-Enforcement, we feel these weapons may be subject to longer durations of sustained fire.

Note This is an extended evaluation of initial prototype sight test. There was no differentiation between the sights that endured 1000 rounds and the sights that were subjected to 2000 rounds. The **SSIVT** showed no adverse effects.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Colt AR-15/M16

DATE OF TEST: Reprint of previous test (09-09-91)

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Colt AR-15/M16 semi-automatic rifle. 1000 rounds of factory loaded Winchester 55 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

Note This is part one of a two part test.

PROTOTYPE TESTING OEM

MODEL DESCRIPTION: P-T Heckler & Koch "NightFire"

DATE OF TEST: Reprint of previous test (09-12-91)

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Heckler & Koch, SP-89 semi-automatic rifle. 1000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

Note This is part one of a two part test.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Heckler & Koch "NightFire"

DATE OF TEST: Reprint of previous test (09-12-91)

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Heckler and Koch, SP-89 semi-automatic rifle. 2000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: We felt then need to increase the amount of test rounds fired due to the fact that this particular firearm is used extensively by the United States Government and Law-Enforcement, we feel these weapons may be subject to longer durations of sustained fire.

Note this is an extended evaluation if initial prototype sight test. There was no differentiation between the sights that endured 1000 rounds and the sights that were subjected to 2000 rounds. The **SSIVT** showed no adverse effects.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Glock Steel 3-Dot

DATE OF TEST: 10-06-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Glock 19, 9MM semi-automatic pistol. 1000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherance - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "3-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Glock Steel "Bar-Dot"

DATE OF TEST: 10-06-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Glock 19, 9MM Semi-Automatic pistol. 1000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "Bar-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Glock Steel "Bar-Dot"

DATE OF TEST: 10-07-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Glock 21, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherance - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "Bar-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight sets.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Sig "Ultimate Combat" 3-Dot

DATE OF TEST: 10-07-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Sig-Sauer model P-226, 9MM semi-automatic pistol. 1000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) **Adherence** - Positive
(B) **Illumination** - Positive
(C) **Lensing** - Negative Effect
(D) **Sealed Source Enclosures** - Negative Effect
(E) **Iron Sight** - Negative Effect
(F) **Sealed Source Integrity Verification Test** - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "3-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Glock Steel "3-Dot"

DATE OF TEST: 10-07-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Glock 21, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "3-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight set.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Sig "Ultimate Combat" Bar-Dot

DATE OF TEST: 10-07-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Sig-Sauer model P-226, 9MM semi-automatic pistol. 1000 rounds of factory loaded Winchester 115 grain FMJ cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "Bar-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Sig "Ultimate Combat" 3-Dot

DATE OF TEST: 10-08-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Sig-Sauer model P-220, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "3-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight set.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Sig "Ultimate Combat" Bar-Dot

DATE OF TEST: 10-08-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Sig-Sauer model P-220, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "Bar-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight set.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Colt 1911/2000 "3-Dot"

DATE OF TEST: 10-09-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Colt 1911, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "3-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight set.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T Colt 1911/2000 "Bar-Dot"

DATE OF TEST: 10-09-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Colt 1911, 45 ACP semi-automatic pistol. 1000 rounds of factory loaded Winchester 230 grain ball cartridges were fired in a continuous process. Pauses were facilitated to reload ammunition into magazines. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight set with "Bar-Dot" sealed source insert configuration withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage.
Note In this test we utilized a .45 caliber weapon because of its great degree of recoil. Extreme recoil had no detrimental effects to the sight set.

PROTOTYPE TESTING

MODEL DESCRIPTION: P-T "NIGHTLINER"

DATE OF TEST: 08-03-91

CATEGORY: Shock

DESCRIPTION OF TEST: Prototype was mounted onto Remington, model 1100 semi-automatic shotgun. 750 rounds of factory loaded Winchester 12 gauge 00 Buckshot were fired in a continuous process. Pauses were facilitated to reload ammunition into magazine tubes. The purpose of this test was to simulate normal to beyond normal firearm shooting and inspect the integrity of sealed source applications.

INSPECTION:
(A) Adherence - Positive
(B) Illumination - Positive
(C) Lensing - Negative Effect
(D) Sealed Source Enclosures - Negative Effect
(E) Iron Sight - Negative Effect
(F) Sealed Source Integrity Verification Test - Pass

CONCLUSIONS: Given the results of this test, we conclude that this prototype sight withstood shock forces incurred during normal and beyond normal up to and including excessive usage. Normal is termed relative in accordance with established standards and natural procedures i.e. natural or usual usage. Recoil experienced in this test procedure was rated at **extreme.**

PROTOTYPE TESTING SUMMARY

P-T Machined Steel Night Sight Sets:

Colt AR-15/M16
Heckler & Koch "NIGHTFIRE"
Glock "Steel" Bar-Dot
Glock "Steel" 3-Dot
Sig Sauer "ULTIMATE COMBAT" Bar-Dot
Sig Sauer "ULTIMATE COMBAT" 3-Dot
Colt 1911/2000 Bar-Dot
Colt 1999/2000 3-Dot
Shotgun "NIGHTLINER"

Summary: These particular machined steel, sealed source contained sight sets were subjected to a variety of conditions both normal and extreme. Conditions which were used best typify realities of actual exposure. Also extreme conditions were subjected to prototype sight sets in order to detect any weakness in any area of application. These devices were taken to the threshold and beyond in testing. The integrity of the design and construction of the sight set devices, the application and bonding of the sealed sources to the sights and the overall procedures associated with this product exemplifies the highest of quality.

I.W.I. RESPONSE TO 10 CFR 32.22 (A) (1)

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION

RADIOACTIVE MATERIAL LICENSE

Pursuant to the New Mexico Radiation Protection Act of 1971, and the Radiation Protection Regulations Part 3, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect, of the New Mexico HED Environmental Improvement Division and to any conditions specified below.

1. LICENSEE NAME	3. LICENSE NUMBER
Innovative Weaponry, Inc.	NM-IWI-GS-03
2a. ADDRESS	**4. EXPIRATION DATE**
337 Eubank N.E. Suite 103 Albuquerque, NM 87123	January 31, 1993
	5. PREVIOUS/OTHER LICENSE NUMBER
	NM-IWI-GS-00 through NM-IWI-GS-02

2b. TELEPHONE NO.	2c. ACTUAL LOCATION OF OPERATION
(505)296-4645	337 Eubank N.E. Suite 103, Albuquerque, NM 87123.

6. RADIOACTIVE MATERIALS (element and mass number)	7. CHEMICAL or PHYSICAL FORM	8. MAXIMUM QUANTITY Licensee may possess at any one time
A. Hydrogen 3.	A. Sealed sources (Saunders-Roe Model PRH-880/G/200 or MB Microtec A.G. Model 400 series).	A. Not to exceed 250 curies total. Not to exceed 30 millicuries per source or 90 millicuries per weapon.

9. Authorized use.

A. For possession and installation of sealed inserts to be used in gun sights.

10. The licensee shall comply with the provisions of Parts 3, 4 and 10, New Mexico Radiation Protection Regulations.

11. Licensed material shall be used by, or under the supervision of Barry Mowry, President.

12. The Director of the Division or his authorized representatives shall be allowed to enter the premises and inspect the radiation related activities at all times. Failure of the licensee to admit the Director or his authorized representatives shall constitute grounds for issuance of an immediate cease and desist order.

13. Sealed sources containing licensed material shall not be opened.

NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION

RADIOACTIVE MATERIAL LICENSE

License Number NM-IWI-GS-03

14. The licensee shall conduct a physical inventory every six (6) months to account for all sources received and possessed under the license. The records of the inventories shall be maintained for two years from the date of the inventory for inspection by the Division, and shall include the quantities and kinds of radioactive material, location of sealed sources and the date of the inventory.

15. Except as specifically provided otherwise by this license, the licensee shall possess and use licensed material described in Items 6., 7., and 8. of the license in accordance with statements, representations, and procedures contained in application with attachments dated October 14, 1987, signed by Barry Mowry, President.

For the New Mexico Health & Environment Dept.
Environmental Improvement Division
Radiation Licensing and Registration Section

Date: February 18, 1991

William M. Floyd

William M. Floyd, Program Manager (DB)

I.W.I. RESPONSE TO 10 CFR 32.22 (A) (2)

32.22 (A)(2)(i) Description of the Product and intended use.

REPLY The product for which we are making application to distribute is a sighting system for the user of a weapon to see his sights in low light conditions. (registered trade name P-T Night Sight) The answer to part (v) will give complete descriptions and drawings of design and construction.

32.22 (A)(2)(ii)	Type and Quantity of byproduct material in each unit (See Answer #3 letter Response)
REPLY	The by product material encapsulated in the sealed source is tritium (Hydrogen 3) Our requirements will be not to exceed 30 millicuries per source/90 millicuries per weapon.

32.22 (A)(2)(iii) Chemical and physical form of by product material in the product and any change which may occur during the useful life of product.

REPLY The byproduct material is Tritium(3H2). As tritium decays within the sealed source, it changes to Helium H3 which is more stable than tritium and is non-radioactive.

32.22 (A)(2)(iv)	Solubility in water and body fluids of material in product.
Reply	If directly contacted, Tritium has 100% solubility in water and body fluids. However, the containment within the body is approximately a (12) day half-life.

32.22 (A)(2)(v) Details of construction and design of the product for containment and shielding under normal and severe conditions

REPLY For construction of sealed source installation, refer to letter of response dated August 8, 1991. For drawings and details, refer to Attachment Number One (1).

32.22 (A)(2)(vi)	Maximum external radiation levels at 5 and 25 centimeters from any external surface of product, averaged over an area not to exceed 10 square centimeters. Method of Measurement
REPLY	Using a pressurized ion chamber, there was no measurable external radiation. Conclusion: external radiation-0 Dose Rate-0

32.22 (A)(2)(vii) Degree of access (How easily are you exposed to the source) during normal use.

REPLY Since our product becomes part of a weapon, unless an individual is carrying or using the weapon, access of or exposure to the product, does not occur. A Law Enforcement officer would have access to the product while carrying his weapon on duty. If the weapon is kept in a safe storage area then an individual would have little access to the product. The external dose for an individual during normal handling and use is shown in response of 32.24 column I.

32.22 (A)(2)(viii) Total quantity expected to distribute annually.

REPLY According to our recent marketing surveys, the amount of tritium distributed within our products annually would be approximately 2,500 curies.

32.22 (A)(2)(ix)	Expected useful life of product
REPLY	Since tritium has a half-life within a sealed source of approximately 12.5 years, we warranty our product for 15 years, but feel its useful life will exceed 15 years

32.22 (A)(2)(x)	Marking or labeling (co. and byproduct)
REPLY	See NRC letter number 4 Reply.

32.22 (A)(2)(xi)	Prototype testing-normal and severe conditions. Show effectiveness for containment and shielding.
32.22 (A)(2)(xii)	Prototype testing Results
REPLY (xi-xii)	See Attachment Number Five(5)

32.22 (A)(2)(xiii) and (xiv)

Refers to 32.23 and 32.24 estimates of a basis for.

32.22 (A)(xiv) Refers to 32.23 and 32.24 Determine that we meet or are under the allowable amount of dose 32.24

REPLY (xiii) and (xiv) Refer to IWI Reply 32.23

32.22 (A)(2)(xv) Quality control procedures

REPLY See Attachment Number Three(3)

I.W.I. RESPONSE TO 10 CFR PART 32.23

Because of the thickness of the borosilicate glass and the mounting system of the sealed source, the Beta rays of the Tritium do not penetrate. Since there is no displacement there is no measurable external radiation dosage or intake of radioactive material. Therefore the response to the chart in 32.24 Column I and column II would be: **External Radiation Dose-0**. In response to part (d) since our failure rate is less than one (1) for every 20,000 exempt units, the maximum accumulated units in one location (involving any scenario with installation, distribution marketing, or armory storage) will be less than 10,000 units. Even under extreme conditions, the effectiveness for containment and shielding in our product(see prototype tests Attachment Number Five(5)) show the low failure rate. The most extreme scenario we could create would be the fracturing (complete rupturing of the source of 50 units. Because of the delusional of the H3 into the atmosphere. No registerable amount of external radiation was detected. Therefore the response to the chart in 32.24 Column III and Column IV would be: **External Radiation Dose-0.**

I W I RESPONSE TO 10 CFR PART 32.24

COLUMN 1

PART OF BODY	TABLE IN 32.24	IWI
Whole body; head and trunk active blood-forming organs, gonads, or lens of eyes.....	0.001	0
Hands and forearms feet and ankles localized area of skin averaged over area no longer than 1 square centimeter	0.015	0
other organs.....	0.003	0

COLUMN 2

PART OF BODY	TABLE IN 32.24	IWI
whole body head and trunk active blood-forming organs, gonads, or lens of eyes.....	0.01	0
Hands and forearms feet and ankles localized area of skin averaged over area no longer than 1 square centimeter	0.15	0
other organs.....	0.03	0

COLUMN 3

PART gF BODY	TABLE IN 32.24	IWI
Whole body head and trunk active blood forming organs, gonads, or lens of eyes.....	0.5	0
Hands and forearms feet and ankles localized area of skin averaged over area no longer than 1 square centimeter	7.5	0
other organs.....	1.5	0

COLUMN 4

PART OF BODY	TABLE IN 32.24	IWI
whole body head and trunk active blood-forming organs, gonads, or lens of eyes.....	15	0
Hands and forearms feet and ankles localized area of skin averaged over 1 square centimeter	200	0
other organs.....	50	0

IWI INNOVATIVE WEAPONRY INC.

P•T. NIGHT SIGHT
Mowry Custom Handguns
Specialty Shotgun Systems

Date: August 8, 1991

To: U.S. Nuclear Regulatory Commission

Attn: Susan Green Fax #: (301) 492-0260

From: Barry Mowry, President, Innovative Weaponry, Inc.

Ref: 021159

For: License Amendment on License # 30-23697-01

Contents: Written Demonstration for Changes Applied For

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

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Section C - Sealed Source Manufacturer's Standards and Testing

Section D - Innovative Weaponry, Inc.'s Tests and Evaluations

Section E - MSD Sheets of Materials Used for Construction

337 Eubank NE • Albuquerque, N.M. 87123
Toll-Free 1-800-334-3573 • (505) 296-4645 • FAX (505) 271-2633

Innovative Weaponry, Inc. receives Betalights (sealed sources) in sealed canisters from the manufacturer (see appendix 1). Inside the canister, the betalights are packed in styrofoam and in a plastic bag. The canister label notes the quantity of sealed sources, amount of gigabequerels and the radioactive group (VII).

When personnel open the canister and inspect the betalights, safety glasses and rubber gloves are worn. Inspection consists of a visual count, appearance check, dark room and dimensional checks. These sealed sources are then placed in an unlighted vault for a minimum of 24 hours before reinspection. Dimensionally unacceptable betalights are put aside in the original canister and placed in the vault.

All work is done with state-of-the-art equipment in super clean, laboratory-like conditions. I W I requires the highest in safety standards.

SIGHTS - INSTALLATION INTO EXISTING SIGHTS
AND SIGHTS MANUFACTURED BY IWI

Construction method for handgun front sights, dot rear sights and shotgun sights are as follows:

> Sealed sources are placed in PVC sleeves and injected with Dow Corning 734 Sealant. This sealant has shock absorbing and buffering properties as does the sleeve itself. After curing four hours, sealed sources are then sealed with Loctite Brand IMPRUV (tm) Optically Clear U.V. (ultra-violet) Adhesive which has non-shattering, shock absorbing and buffering properties also. This completely encases the sealed source (insert) which is now ready to install into the sight cavity. The cavity is the appropriate size for the finished insert. Black Max (tm) Tough Adhesive is applied to the cavity to bond the insert into the sight. Black Max is a tough bonding agent that also has shock absorbing and buffering properties.

Construction methods for bar rear sights and rifle front sights are as follows:

> Sight cavities are the appropriate size to mount the sealed source. Black Max is applied to the cavity. The sealed source is placed into the cavity. After the Black Max is cured, IMPRUV is applied to fill recess and protect sealed source.

Construction methods for rifle rear sights are as follows:

> Sight holes are appropriate diameter and length for mounting of sealed source. Black Max is applied to bottom and walls of hole, as to totally insulate the sealed source. IMPRUV is then applied to the exposed end for lensing and to complete the total encapsulation and protection of the sealed source.

These methods totally encase and seal the Tritium sources for maximum strength, shatter resistance and shock absorbency. These adhesives have been chosen expressly to insure the highest quality product possible.

APPENDIX # 1

Purchase of Sealed Sources

Supplier/Manufacturer: Saunders-Roe Development Ltd.
Millington Road, Hayes
Middlesex UB3 4NB, England

Part Numbers:
251030-100 A
252050-150 A
252050-200 A
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Ministry of Defence

Defence Standard

62-4/Issue 3 14 September 1976

LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

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LAMPS, NUCLEAR

(GASEOUS TRITIUM LIGHT SOURCES)

This Defence Standard supersedes DEF STAN 62 - 4, Issue 2, dated 29 March 1972

1. This Defence Standard specifies material, manufacturing and other requirements for gaseous tritium light sources for Ministry of Defence use.

This Defence Standard has been written to conform wherever possible with the OECD Nuclear Energy Agency document 'Radiation Protection Standards for Gaseous Tritium Light Devices'.

2. The title 'Lamps, Nuclear' has been used to conform to the NATO Supply System Approved Item Name for this type of light source. The term preferred by the member countries of the OECD is Gaseous Tritium Light Sources (GTLSs). This term is now used throughout this Standard. See section 1 'Definition of Terms Used.

3. Table IA lists the Standard Range of GTLSs to be used in all future designs of equipment. Table IB lists GTLSs which have been introduced for a specific purpose. They are not to be used for any other application without the approval of the DELSC Electric and Nuclear Lamps Sub-Committee.

4. Because new Service applications are constantly being developed for GTLSs there are no Table II (Maintenance Range) or Table III (Obsolete) items.

5. This Standard contains all necessary technical information and it is the definitive specification for these items. It must be invoked for all tender and contract purposes.

6. Users of this Standard should note that these items may be claimed to be subject to patent rights in this and other countries.

7. This Standard has been prepared because there is no suitable national or any other standard acceptable to the Ministry of Defence available.

8. This Standard has been agreed by all authorities concerned who are to implement it from its date of issue.

9. If this Standard should be found unsuitable for a particular requirement the Director of Standardization shall be informed of the circumstances. Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is invoked should be addressed to the Quality Assurance Authority named in that invitation to tender or contract.

THE ATTENTION OF DESIGNERS CONSIDERING USING GTLSs IN SERVICE EQUIPMENT IS DRAWN TO SECTION 15 'SAFETY CONSIDERATIONS'

SPECIFICATION FOR

LAMPS, NUCLEAR,

(GASEOUS TRITIUM LIGHT SOURCES)

1. DEFINITION OF TERMS USED

a. Gaseous tritium light source (GTLS): A GTLS consists of a sealed glass container filled with gaseous tritium and coated internally with a phosphor.

b. Gaseous tritium light device (GTLD): A GTLD is an instrument, piece of equipment, article or sub-assembly containing one or more GTLS.

2. SCOPE

a. This Standard covers the technical requirements for gaseous tritium light sources suitable for use over the temperature range of -60 to + 70°C. It is emphasized that tritium filled sources are the only light source of this type authorized for Service use.

b. Lamps may be used at temperatures above 70°C, up to a maximum of 100°C, provided a shorter half life and lower luminance are accepted.

c. Over a period of time the luminance of a GTLS decays irrespective of whether in use or storage. (See section 7d) A warning is therefore given against buying and storing excess quantities.

d. Safety considerations governing production, storage, and use of GTLSs in Service equipments or installations are set out in Section 15 of this Standard.

3. RELATED DOCUMENTS

a. Reference is made in this Standard to:

BS 3G100: Part 2,	'General requirements for equipment in aircraft'
BS 2011	'The environmental testing of electronic components and electronic equipment'
BS 1376	'Colours of light signals'
BS 3510	'A basic symbol to denote the actual or potential presence of ionizing radiation'
UK/AID/944	'Specification for metal foil labels for aircraft use'
Def Stan 05-30	'Sampling procedures and charts for inspection by variables'
Def Stan 05-34	'Marking of Service Materiel'
HQPO/56	'Specification for the packaging of instruments containing radioactive materials'

3. a. (CONTD)

Radio Active Substances (Luminous Articles) Exemption Order 1962 (SI2644)

Explanatory Memorandum to the Radioactive Substances Act, 1960.

Radiation Protection Standards for Gaseous Tritium Light Devices.

Code of Practice for the Carriage of Radioactive Material by Road.

b. Copies of these documents are available as follows:

British Standards	British Standards Institution Newton House 101 Pentonville Road London N1 9ND
UK/AID/944	Ministry of Defence (PE) Materials Division AQD Harefield Uxbridge, Middlx, UB9BB
Defence Standards	Ministry of Defence D Stan First Avenue House High Holborn London WC1V 6HE
HQPO/56	Ministry of Defence (PE) MQAD Central Packaging Unit, Garland Road Plumstead, SE18 2PW
Radiation Protection Standards for Gaseous Tritium Light Devices	National Radiological Protection Board Harwell, Didcot, Oxfordshire OX11 ORQ
Explanatory Memorandum to the Radioactive Substances Act, 1960	HMSO
Radioactive Substances (Luminous Articles) Exemption Order 1962 (SI2644)	HMSO
Code of Practice for the Carriage of Radioactive Material by Road	HMSO

3. c. The Related documents listed above are those applicable at the date of publication of this Standard. Their current applicability must be confirmed by all users of the Standard. The Quality Assurance Authority will supply on request, information concerning any changes that may be necessary due to the cancellation, supersession or amendment of any related document.

Note: Any questions relating to 'approved' materials or processes should be referred to the Qualification Approval Authority.

4. DRAWINGS

a. Drawings giving dimensions of the standard range of GTLSs are reproduced in Figs 2 to 15. Special purpose lamps are reproduced in Fig 16.

b. These drawings are an integral part of this Standard.

5. PATENTS

Patent or design rights or copyright may subsist in connection with items defined as standard, and the issue of this Standard does not convey or imply any licence to use information which is the subject of such rights. Authority to use such rights, for UK Government purposes, must be obtained through the issue of an authorization in writing which will be incorporated in any contract placed by a Department of the said Government for such purposes.

6. MATERIALS

a. Capsule.

The capsule is to be of a clear borosilicate (hard) glass. The wall thickness is to be in accordance with the dimensions quoted in Figs 2 to 16.

b. Radioactive material.

(1) Only tritium in the form of $^{3}H_{2}$ or H ^{3}H shall be allowed in a GTLS except for small amounts of tritiated water which may be present provided that, during the mission lifetime of the GTLS, the activity in the form of tritiated water does not exceed 2% of the total tritium activity and, for sources containing less than 50 mCi of tritium, does not exceed 1mCi. Purity of the tritium is essential particularly in respect of:

(a) gamma emitting isotopes which would result in external radiation.

(b) alpha emitting isotopes which would result in radiation damage to binder, phosphor, or glass.

(c) chemical impurities which can damage the phosphor or accelerate radiation damage.

6. b. (2) In order to meet the above requirements the manufacturer must ensure that a certificate of purity from the supplier of the tritium used, in any batch of lamps submitted for inspection, is to be available to the Quality Assurance Authority.

c. Phosphor.

The zinc/cadmium sulphide phosphor is preferred.

d. Binder.

Any binder used to cement the phosphor to the wall of the capsule is to be unaffected by radiation, temperature (within the limits of -60 and + 70°C), and vibration.

7. MANUFACTURE

a. Gas pressure.

The nominal gas pressure inside the capsule is to be between 660 mbar (0.66 atm) and 2500 mbar (2.5 atm) as appropriate to the desired luminance.

b. Painting.

(1) When a GTLS is to be viewed from one side only, the luminous intensity may be increased by externally painting the reverse side of the lamp as indicated on the appropriate lamp drawing (Figs 2 to 16).

(2) One coat of high reflectance titanium dioxide base paint and one coat of semi-gloss air drying white paint shall be applied. Alternatively two coats of high reflectance titanium dioxide base paint may be applied.

(3) The paint shall be of best commercial quality and shall remain unaffected by the temperature tests specified in sections 11g and 14. The paint shall not exceed a total thickness of 0.4 mm.

c. Luminance

The minimum initial luminance is to be in accordance with Table I.

d. Rate of luminance decay.

The rate of luminance decay is to be such that after six years from the date of manufacture of a GTLS luminance is to be not less than 50 per cent of its initial value.

Note: The rate of decay is to be taken into account when specifying minimum acceptable levels of illumination in the design of equipments incorporating GTLSs See Fig 1.

e. Sealing test.

During manufacture all GTLSs are to be heated to between 450 and 480°C for a period of five minutes after sealing.

7. f. Colour of light.

Colours are to be determined in terms of BS 1376 chromaticity co-ordinates. Table A gives the co-ordinates of the corners of the areas within which the chromaticity co-ordinates of the respective colours are to fall. Where these boundary points lie on the pure spectrum curve the corresponding dominant wave length in nanometers is indicated.

TABLE A

COLOUR	CO-ORDINATES		DOMINANT WAVELENGTH nm
	X	Y	
RED	0.688	0.312	618.5
	0.66	0.28	
	0.59	0.356	
	0.64	0.36	603.0
ORANGE	0.603	0.396	595.0
	0.566	0.388	
	0.508	0.45	
	0.532	0.467	583.0
YELLOW	0.5	0.5	578.0
	0.468	0.47	
	0.396	0.546	
	0.408	0.592	565.0
GREEN	0.302	0.692	550.0
	0.31	0.48	
	0.22	0.48	
	0.014	0.744	510.0
BLUE	To BS 1376, Signal Blue Class A		481.0 450.0
WHITE	To be determined		

8. MARKING AND LABELLING

To enable GTLD's subject to recovery or disposal requirements to be identified the Design Authority and Procurement Branch are to ensure that marking and labelling shall be carried out as described in section 7 of NEA document 'Radiation Protection Standards for Gaseous Tritium Light Devices'

Note: Para 7.3 of this document requires that individual GTLS's containing over 500mCi shall be marked with a spot of colour in international use to denote hazard. At the moment this colour has not been decided. The requirement can therefore, for the time being, be ignored.

9. PACKAGING

a. GTLSs are to be supplied in a transparent polyethylene envelope. Each GTLS is to be provided with sufficient individual protection to prevent damage to or from other GTLSs in the envelope. Each envelope is to contain and show the following labels:

(1) an ungummed label giving the full NATO Stock Number (eg 6260-99-995-9769) and Defence Standard type number, (eg Def Stan 62-4/3 Type ZA2G), the quantity of GTLS's and the total radioactive content (curies).

(2) an ungummed label marked with the Trefoil symbol in accordance with BS 3510 and Def Stan 05-34.

Each envelope is also to contain the equivalent number of approved self-adhesive labels of 9.5mm maximum diameter giving the month and year of manufacture of the GTLS in figures. The label is to comply with UK/AID/944 and is to be gold in colour with red markings.

b. When a military level of packaging is specified in the tender or contract packaging shall be in accordance with HQ/PO56 and the Services Packaging Instruction Sheet (Form 673)

c. To comply with the 'Code of Practice for the Carriage of Radioactive Material by Road,' the maximum number of lamps in one package is to be governed by the total radioactive content of that package.

(1) A package, wherein the radioactive content does not exceed 200 curies may be classified as 'Exempt' from the more rigorous packaging and labelling requirements of the international regulations providing the applicable requirements listed in the 'Specification for the packaging of instruments containing radioactive materials', HQPO/56, are fulfilled.

(2) Requirements for 'Exempt' packages containing tritium are detailed at paragraphs 3.4 and 4.1 to 4.4 of Specification HQPO/56.

10. QUALIFICATION APPROVAL PROCEDURE

a. The Qualification Approval Authority for GTLSs is the Defence Electrical and Electronics Standardization Committee, Electric and Nuclear Lamps Sub-Committee. Manufacturers are to apply to the Secretary of the Electric and Nuclear Lamps Sub-Committee Stan 3, First Avenue House, High Holborn, WC1V 6HE for Qualification Approval. Applications are to be accompanied by a statement that the manufacturer is satisfied that the articles comply with this specification.

b. After receipt of the application, the Secretary of the Qualification Approval Authority is to notify the manufacturer if it has been decided to accept the application, or give reasons for refusing it. If it has been decided to proceed with the Qualification Approval, the Secretary is to request the provision of samples. The manufacturer is to state whether or not the samples are from normal current production and, if requested, is to provide evidence that he has adequate facilities to produce, test, and inspect the articles in quantity.

10. c. Tenders for the supply of GTLSs to this Standard are to be accompanied by a quotation of the appropriate Qualification Approval certificate number and a statement that the articles offered conform in every detail to the sample Qualification Approved and that the place of manufacture is the same.

d. The Qualification Approval tests are to be carried out under standard atmospheric conditions of measurement (BS 2011).

(1) at the manufacturer's premises under the supervision of the Quality Assurance Authority, or,

(2) by a Government Quality Assurance Authority if the manufacturer is unable to provide or arrange for testing in the above way.

(a) If Qualification Approval tests are carried out by method 1, five copies of the test certificate are to be forwarded to the Secretary of the above Qualification Approval Authority.

(b) Initial and final measurements are to be carried out at any combination of temperature, and pressure within the following limits.

Temperature 15 to 35°C

Air Pressure 860 to 1060 mbar

Note 1: Where it is impracticable to carry out measurements under these conditions a note to this effect stating the actual conditions is to be added to the test report.

Note 2: The temperature is to be substantially constant during measurements carried out as part of one test on one batch of components:

e. If the Qualification Approval Authority decides that the testing of any of the articles which the manufacture wishes to submit for Qualification Approval is to be carried out at the manufacturer's premises, the manufacturer is to give to the representative of the Qualification Approval Authority full and free access to the said premises as and when required for that purpose and, at the manufacturer's expense, afford to such representative all such reasonable accommodation and facilities as may be required by him therefore and all appliances, materials, and labour required for testing purposes.

f. The manufacturer will be notified whether or not Qualification Approval has been granted and if successful a Qualification Approval certificate (normally for a period of five years) will be issued.

g. If, after receiving Qualification Approval, a manufacturer wishes to introduce any changes in the materials, construction, processes, finish, or place of manufacture of the Qualification Approved GTLSs he is first to notify the Qualification Approval Authority, who will decide whether a repetition of any or all of the Qualification Approval tests is necessary, and the number of samples to be tested before the change is approved.

10. h. Qualification Approval will be reviewed periodically by the Qualification Approval Authority and will also be reviewed when defects have been reported or other circumstances make this desirable. Should the result of repeat Qualification Approval tests be unsatisfactory, Qualification Approval may be withdrawn.

i. The Qualification Approval Authority reserve the right to carry out any or all of the Qualification Approval Tests on any design of GTLS not in the standard range.

11. QUALIFICATION APPROVAL

The number of GTLSs to be submitted for Qualification Approval is to be a minimum of twenty six and shall include the GTLSs from each group as indicated in Table B. These lamps are to be supplied at the manufacturer's expense and are to be manufactured from materials and by methods similar to those adopted for production.

TABLE B

QUANTITY	SELECTED FROM	GROUP	REMARKS
5	MB2, UB2, UG2, UE2 or UH2	1	High Pressure Painted One of each colour quoted in Table A
7	Figs 4, 5, 8, 9, 10, 12.	2	Low Pressure, non painted
7	Figs 2, 3, 6, 7, 11.	3	High Pressure, non painted
7	Figs 2, 3, 6, 7, 8, 9, 10, 11, 12.	4	Low Pressure, Painted

GTLSs are to be subjected to the following tests in the order specified.

a. Visual inspection.

All GTLSs are to be visually inspected for defects and dimensions checked.

b. Luminance.

(1) Initial luminance measurement is to be made 21 to 28 days after manufacture following a period of storage in total darkness for a minimum of 24 hours.

(2) Each GTLS is to be inspected visually in darkness to ensure that the whole of the area, shown in the appropriate figures as coated with phosphor, is emitting light. The area appearing brightest and the area appearing dimmest to the eye are to be noted.

11. b. (3) The GTLS is to be mounted with the brightest area immediately behind a sharp edged aperture which for tubular lights is to be a slit 0.6 mm by 2.5 mm (approx), and for all other types is to be a circle 1.4 mm diameter (approx) (see note). When viewed from the front the whole of the aperture is to appear illuminated. Luminance of the aperture is to be measured by comparison with a calibrated light source of the same colour. Geometry of the measurement is to be such that the angle subtended by the sensing element at the source does not exceed 10 degrees. The luminance is to be not less than that specified.

Note: When measuring very small GTLSs eg Type CW, it may be necessary to reduce this diameter to 1.0 mm (approx).

(4) The GTLS is to be mounted with the dimmest area behind the same aperture, and the luminance measured as before. If the luminance is not less than 90 per cent of that specified the GTLS is to be accepted. If the luminance is less than 75 per cent of that specified the GTLS is to be rejected.

(5) If on test (4) the luminance is between 90 and 75 per cent of the specified luminance the GTLS is to be inspected thoroughly to determine the area below the 90 per cent level, if this area is more than 10 per cent of the total luminous area, the GTLS is to be rejected.

c. Colour.

The GTLS as indicated in group 1 of Table B shall be subjected to tests to demonstrate that the colour of the light emitted by the lamps fall within the limits given in clause 7f. For this any technique approved by the Quality Assurance Authority may be used.

d. Purity.

A certificate of purity for the gas is to be submitted to the Qualification Approval Authority at the time that Qualification Approval for the GTLS is sought.

e. Vibration.

(1) Two samples from the groups 2, 3 and 4 (Table B) shall be selected at random and fixed to a suitable metal plate for attachment to a vertical thrust vibrator. The GTLSs are fixed into suitable grooves in the plate using silicon rubber cement.

(2) The amplitude of vibration shall be measured on the plate. The vibration need be applied in one plane only.

(3) The GTLS shall be subjected to three complete test cycles in the range of 25 to 500 Hz at 5g. The Test shall be conducted by sweeping through all the frequencies in the range at a uniform rate from the minimum to the maximum frequency and return to minimum frequency in 10 minutes or longer. In addition the tester shall dwell for 30 minutes at each resonance frequency found.

(4) After the vibration period the luminance of each light shall be measured. The deterioration is not to have exceeded 10 per cent of the original value.

11. f. External pressure test.

(1) An external pressure test is to be performed on three of the remaining GTLSs of each Group (2, 3 and 4).

(2) The GTLSs shall be put into a test chamber and exposed to 0.25 and 2.0 bars for four periods of 15 minutes each, the pressure being returned to atmosphere between each period. The test shall be conducted in air.

(3) After the pressure test the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

g. Thermal cycling.

(1) Three rapid thermal cycles are to be performed on the GTLSs used for the pressure test.

(2) The GTLS shall be heated in air to + 80°C within 5 minutes, kept at this temperature for one hour, then cooled to - 30°C within 15 minutes and kept at this temperature for one hour.

(3) After the thermal cycling the luminance of each light shall be measured. The deterioration is not to have exceeded 5 per cent of the original value.

h. Life.

(1) The GTLSs from Group 1 together with three samples from the vibration tests and three samples from the thermal cycling tests shall be mounted behind apertures, or mounted in a suitable jig to align with an aperture for the measurement of luminance.

(2) The luminance is to be measured after mounting and remeasured after three and six months storage at a temperature and pressure within the limits detailed in para 10d (b).

(3) The rate of decay of luminance is to be not greater than that specified in clause 7d and figure 1.

(4) Limited Qualification Approval may be granted pending the results of these decay measurements.

12. PRODUCTION INSPECTION

a. (1) The provisions of Def Stan 05 - 30 (as applicable) are to apply. Batching is to be agreed between the manufacturer and the Quality Assurance Authority.

(2) Measurements are to be at Standard atmospheric conditions in accordance with BS 2011. (See clause 10d (2) of this Standard).

b. The following tests are to be applied in the order specified

(1) Visual (see clause 11a)
(2) Luminance (see clause 11b and Note below)
(3) Colour (see clause 11c)

Note: At the discretion of the user or the Quality Assurance Authority this requirement can be waived or confined to samples taken from the production batch.

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Product Name:	Black Max(TM) Black Tough Adhesive
Item No.:	38061
Product Type:	Cyanoacrylate
Formula No.:	LO-863B

II. COMPOSITION

Ingredients	CAS No.	%
Ethyl cyanoacrylate	7085-85-0	85-90
Ethylene copolymer rubber	54545-50-5	7-12
CARBON BLACK	1333-86-4	1-3
PHTHALIC ANHYDRIDE*	85-44-9	0.1-1
HYDROQUINONE	123-31-9	0.1-0.5

* This component is listed as a SARA Section 313 Toxic Chemical.

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	Less than 0.2mm
Vapor Density:	Approximately 3
Solubility in Water:	Polymerized by water
Specific Gravity:	1.1
Boiling Point:	More than 300°F
Volatile Organic Compound (ASTM D2369)	Not available
Evaporation Rate (Ether = 1)	Not available
pH:	Does not apply
Appearance:	Viscous, black liquid
Odor:	Sharp, irritating

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	150 - 200°F Method: Tag Closed Cup
Estimated NFPA Code:	
Health Hazard:	2
Fire Hazard:	2
Reactivity Hazard:	2
Specific Hazard:	No water
Estimated HMIS Code:	
Health Hazard:	2
Flammability Hazard:	2
Reactivity Hazard:	2
Personal Protection:	See Section X.
Explosive Limits:	
(% by volume in air)Lower	1.7% Phthalic anhydride
(% by volume in air)Upper	10.5% Phthalic anhydride
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical
Hazardous Products Formed by Fire or Thermal Decomp	Irritating organic vapors
Unusual Fire or Explosion Hazards:	None
Compressed Gases:	None
Pressure at Room Temp.:	Does not apply

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak:	Flood with water to polymerize completely. Solid polymer is non-hazardous.
Recommended methods of disposal:	After polymerization as above, incinerate following EPA and local regulations. Phthalic anhydride is listed by EPA as hazardous waste.

VI. STORAGE AND HANDLING PROCEDURES

Storage:	Store below 75°F to maximize shelf life.
Handling:	Avoid contact with skin and eyes. Avoid breathing vapor.

VII. SHIPPING REGULATIONS

Type or Class	DOT: Not restricted (Less than or = 1 pint); ORM-A (1 pint to 110 gallons); Combustible liquid (Greater than 110 gallons) IATA: Unrestricted; DOT regulations apply in U.S.
Proper Shipping Name	DOT: Not restricted (Less than or = 1 pint); ORM-A, n.o.s. (One pint to 110 gallons); Combustible liquid, n.o.s. (More than 110

Product Name: Black Max(TM) Black Tough Adhesive
Item No.: 38061

VII. SHIPPING REGULATIONS (continued)

gallons)(Ethyl Cyanoacrylate Solution)
IATA: Unrestricted; DOT regulations apply in U.S.

Identification Number:
DOT: NONE NA 1693 >1pt; NA 1993 >110gals
IATA: NONE ID8027 (NA1693 Domestic Air Only) >16oz

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will Not Occur
Hazardous Decomposition Products (non-thermal): None
Incompatability: Polymerized by contact with water, alcohols, amines, alkalies.

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: See supplemental page for emergency procedures. Obtain medical attention.
Inhalation: Remove to fresh air. Treat symptomatically.
Skin Contact: See supplemental page for emergency procedures.
Eye Contact: See supplemental page for emergency procedures. Obtain medical attention.

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles.
Skin: Polyethylene gloves recommended. Do not use cotton gloves.
Ventilation: Positive down-draft exhaust ventilation should be provided to maintain vapor concentration below TLV.

XI. HEALTH HAZARD DATA

Toxicity: Bonds skin rapidly and strongly.
Skin and eye irritant.
Estimated oral LD 50 more than 5000 mg/kg
Estimated dermal LD50 more than 2000 mg/kg.
Primary Routes of Entry: None known
Signs and Symptoms of Exposure: Vapor is irritating to eyes and mucous membranes above TLV. Prolonged and repeated overexposure to vapors may produce allergic reactions with asthma-like symptoms in sensitive individuals.
Existing Conditions Aggravated by Exposure: None known

Exposure Limits Ingredients	ACGIH (TLV)	OSHA (TLV)	OTHER
Ethyl cyanoacrylate	None	None	2 ppm TWA
Ethylene copolymer rubber	None	None	None
CARBON BLACK	3.5 mg/m3 TWA	3.5 mg/m3 TWA	5ppm
PHTHALIC ANHYDRIDE	1 ppm TWA 6.1 mg/m3	1 ppm TWA 6 mg/m3	None
HYDROQUINONE	2 mg/m3 TWA	2 mg/m3 TWA	None

Ingredients	Literature Referenced Target Organ and Other Health Effects	Carcinogen NTP	IARC	OSHA
Ethyl cyanoacrylate	LUN	NO	NO	NO
Ethylene copolymer rubber	No Data	NO	NO	NO
CARBON BLACK	No Data	NO	N/A	NO
PHTHALIC ANHYDRIDE	IRR	NO	NO	NO
HYDROQUINONE	No Data	NO	N/A	NO

Abbreviations

N/A Not Applicable
LUN Lung
IRR Irritant

XII. PREPARATION INFORMATION

Prepared By: Stephen Repetto
Title: Research Chemist, Environmental Health & Safety
Company: Loctite Corp., 705 N. Mt. Rd, Newington, CT 06111
(24hr.) Phone: (203) 278-1280
Revision Date: January 28, 1991 Revision: 0014

Product Name: Black Max(TM) Black Tough Adhesive
Item No.: 38061

Supplement

INFORMATION FOR FIRST AID AND CASUALTY ON TREATMENT FOR ADHESION OF HUMAN SKIN TO ITSELF IF CAUSED BY CYANOACRYLATE ADHESIVES

Cyanoacrylate adhesive is a very fast setting and strong adhesive. It bonds human tissue including skin in seconds. Experience has shown that accidents due to cyanoacrylates are handled best by passive, non-surgical first aid. Treatment of specific types of accidents are given below.

SKIN ADHESION
First immerse the bonded surfaces in warm soapy water. Peel or roll the surfaces apart with the aid of a blunt edge, e.g. a spatula or a teaspoon handle; then remove adhesive from the skin with soap and water. Do not try to pull surfaces apart with a direct opposing action.

EYELID TO EYELID OR EYEBALL ADHESION
In the event that eyelids are stuck together or bonded to the eyeball, wash thoroughly with warm water and apply a gauze patch. The eye will open without further action, typically in 1-4 days. There will be no residual damage. Do not try to open the eyes by manipulation.

ADHESIVE ON THE EYEBALL
Cyanoacrylate introduced into the eyes will attach itself to the eye protein and will disassociate from it over intermittent periods, generally covering several hours. This will cause periods of weeping until clearance is achieved. During the period of contamination, double vision may be experienced together with a lachrymatory effect, and it is important to understand the cause and realize that disassociation will normally occur within a matter of hours, even with gross contamination.

MOUTH
If lips are accidentally stuck together, apply lots of warm water to the lips and encourage maximum wetting and pressure from saliva inside the mouth. Peel or roll lips apart. Do not try to pull the lips with direct opposing action.
It is almost impossible to swallow cyanoacrylate. The adhesive solidifies and adheres in the mouth. Saliva will lift the adhesive in 1/2 to 2 days. In case a lump forms in the mouth, position the patient to prevent ingestion of the lump when it detaches.

BURNS
Cyanoacrylates give off heat on solidification. In rare cases a large drop will increase in temperature enough to cause a burn.
Burns should be treated normally after the lump of cyanoacrylate is released from the tissue as described above.

SURGERY
It should never be necessary to use such a drastic method to separate accidentally bonded skin.

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Product Name:	Impruv(TM) Optically Clear UV Adhesive
Item No.:	34931
Product Type:	UV Curing Adhesive
Formula No.:	FMD-21B

II. COMPOSITION

Ingredients	CAS No.	%
Polyurethane methacrylate resin	Unknown	45-50
Hydroxyalkyl methacrylate	868-77-9	15-20
Higher boiling methacrylate	75662-22-5	20-25
Alkyl methacrylate	142-90-5	5-15
ACRYLIC ACID*	79-10-7	5-7
Alkyl methacrylate	2549-53-3	3-5
Substituted silane	2530-83-8	1-3
Photoinitiator	947-19-3	1-3

* This component is listed as a SARA Section 313 Toxic Chemical.

III. CHEMICAL AND PHYSICAL PROPERTIES

Vapor Pressure:	Less than 10mm at 75°F
Vapor Density:	Not Available
Solubility in Water:	Slight
Specific Gravity:	1.02 at 68°F
Boiling Point:	More than 300°F
Volatile Organic Compound (ASTM D2369)	54.5%
Evaporation Rate (Ether = 1)	Not available
pH:	Not Applicable
Appearance:	Optically clear
Odor:	Sharp, irritating

IV. FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point:	More than 200°F Method: Tag closed cup
Estimated NFPA Code:	
Health Hazard:	2
Fire Hazard:	1
Reactivity Hazard:	1
Specific Hazard:	Does not apply
Estimated HMIS Code:	
Health Hazard:	2
Flammability Hazard:	1
Reactivity Hazard:	1
Personal Protection:	See Section X.
Explosive Limits:	
(% by volume in air)Lower	2.0% Acrylic acid
(% by volume in air)Upper	8.0% Acrylic acid
Recommended Extinguishing Agents:	Carbon dioxide, foam, dry chemical
Hazardous Products Formed by Fire or Thermal Decomp	Irritating organic vapors.
Unusual Fire or Explosion Hazards:	None
Compressed Gases:	None
Pressure at Room Temp.:	Does not apply

V. SPILL OR LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case of spill or leak:	Soak up with an inert absorbent. Store in partly filled, closed container until disposal. Residue may be cleaned with solvent.
Recommended methods of disposal:	Incinerate following EPA and local regulations.

VI. STORAGE AND HANDLING PROCEDURES

Storage:	Store below 110°F to preserve shelf life. Protect from light.
Handling:	Keep away from eyes. Avoid prolonged skin contact. Avoid prolonged breathing of vapors.

VII. SHIPPING REGULATIONS

Type or Class	DOT: Unrestricted
	IATA: Unrestricted

Product Name: Impruv(TM) Optically Clear UV Adhesive
Item No.: 34931

VII. SHIPPING REGULATIONS (continued)

Proper Shipping Name Identification Number: DOT and IATA: Unrestricted

DOT: None
IATA: None

VIII. REACTIVITY DATA

Stability: Stable
Hazardous Polymerization: Will Not Occur
Hazardous Decomposition Products (non-thermal): None
Incompatability: None

IX. EMERGENCY TREATMENT PROCEDURES

Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention.

Inhalation: Remove to fresh air. If symptoms persist, obtain medical attention.

Skin Contact: Flush with water.

Eye Contact: Flush at least 15 minutes with water. Obtain medical attention.

X. PERSONAL PROTECTION

Eyes: Safety glasses or goggles mandatory.
Skin: Rubber or plastic gloves recommended.
Ventilation: Sufficient to maintain vapor concentration below TLV.

XI. HEALTH HAZARD DATA

Toxicity: Eye irritant. Possible skin irritant.
Estimated Oral LD greater than 5000 mg/kg.
Estimated Dermal LD50 greater than 2000 mg/kg.

Primary Routes of Entry: Not Available

Signs and Symptoms of Exposure: May cause dermatitis on prolonged contact in sensitive individuals.

Existing Conditions Aggravated by Exposure: None known

Exposure Limits Ingredients	ACGIH (TLV)	OSHA (TLV)	OTHER
Polyurethane methacrylate resin	None	None	None
Hydroxyalkyl methacrylate	None	None	3 ppm ceiling
Higher boiling methacrylate	None	None	None
Alkyl methacrylate	None	None	50ppm
ACRYLIC ACID	2 ppm TWA 5.9 mg/m3	10 ppm TWA skin 30 mg/m3 skin	2ppm
Alkyl methacrylate	None	None	50 ppm
Substituted silane	None	None	None
Photoinitiator	None	None	None

Ingredients	Literature Referenced Target Organ and Other Health Effects	Carcinogen NTP	IARC	OSHA
Polyurethane methacrylate resin	No Data	NO	NO	NO
Hydroxyalkyl methacrylate	No Data	NO	NO	NO
Higher boiling methacrylate	No Data	NO	NO	NO
Alkyl methacrylate	No Data	NO	NO	NO
ACRYLIC ACID	IRR REP	NO	N/A	NO
Alkyl methacrylate	No Data	NO	NO	NO
Substituted silane	No Data	NO	NO	NO
Photoinitiator	No Data	NO	NO	NO

Abbreviations

N/A Not Applicable
REP Reproductive
IRR Irritant

XII. PREPARATION INFORMATION

Prepared By: Stephen Repetto
Title: Research Chemist, Environmental Health & Safety
Company: Loctite Corp., 705 N. Mt. Rd, Newington, CT 06111

Product Name: Impruv(TM) Optically Clear UV Adhesive
Item No.: 34931

XII. PREPARATION INFORMATION (continued)

(24hr.) Phone: (203) 278-1280
Revision Date: March 05, 1991
Revision: 0012

DATE: 02-20-1991 PAGE 1 of 1

TEST NAME: Recoil Shock test METHOD: Firing Gun w/sights in place

SIGHT IDENT #: F: G-200 X.093-002/F R: G-100-001/R

SIGHT TYPE/CONFIG: Glock/ BAR Dot COND: 60°, Aprox 27% R.H.

OBJECTIVES: Fire 2000 Rounds Note EFFECT OTHER: American Eagle 115gr. FMJ Ammo.

****

7:00 Am Start test

8:45 Am 250 Rounds fired, Visual INSP. finds No Changes

10:20 Am 500 Rounds fired, " " " " "

2:00 pm 1,000 Rounds fired. " " " " "

3:30 pm 1,500 Rounds fired. " " " " "

5:00 pm 2,000 Rounds fired " " " " "

* Note Shots fired Both Rapid & Slow fire.
Inspected visually in Light & Dark conditions found no change!

COMMENTS: Sights G-200 X.093"-002/F & G-100-001/R were left on gun for Aprox 4 weeks after testing. Upon visual Insp. found No evidence of failure of any kind.

TEST DONE BY: ~~Pete~~ Wright

DATE: 02-21-91 PAGE 1 of 1

TEST NAME: Chemical (Commercial) Test METHOD: Immersion / Time

SIGHT IDENT #: F: 6200X.093"-006/F R: 6-100-007/R

SIGHT TYPE/CONFIG: Glock / ~~BAR Dot~~ COND: Room temp Above 70°

OBJECTIVES: Test sight & materials for Corrosion Abuses OTHER:

****

Chemical	Duration	Pass/Fail
~~Hoops #9~~	30 min	P
Outers Nitro Solvent	32 min	P
WD-40	30 min	P
BC-1 Bore Cleaner	30 min	P
Break Free CLP	30 min	P
Accubore	31 min	P
Fantastic	34 min	P
Windex	30 min	P
LPS Engine degreaser	32 min	P
Lin-Speed	30 min	P
Oxpho-Blue	35 min	P

All chemical components

COMMENTS: I Feel these are the most common cleaning agents in the home & Gun Cleaning field, None of the products Show Any effect on the Sights or Construction materials

TEST DONE BY: Bob Wade

DATE: 02-22-91 PAGE 1 of 1

TEST NAME: Drop test METHOD: Free drop onto Concrete

SIGHT IDENT #: F: G-200 X .093"-005/F R: G-100-004/R

SIGHT TYPE/CONFIG: Block / Bar dot COND: Room temp 70° / unpainted concrete

OBJECTIVES: Subject sights to Abnormal shock OTHER:

****

(1) measured A distance from floor of 3 feet. Droped sights onto concrete from this distance

(2) Stored sights IN dark vault for 1 week

(3) Visually Inspected sights for dAmage & Illumination All ok.

(4) Repeated steps (1) thru (3) for heights of 6 & 10 feet

Note* Unless the physical properties of the sights Are ammaged (IN A MANOR to crush or Alter the dimmensions of the sight Inserts) I feel that these sights Are Not going to fracture under Normal or even upto AND Including Severe treatment.

COMMENTS:

TEST DONE BY: Pete Wrighton

DATE: 02-25-91 PAGE 1 of 1

TEST NAME: Thermal Abuse METHOD: Oven / Pyrometer

SIGHT IDENT #: F: G-200X.093-006/F R: G-100-007/R

SIGHT TYPE/CONFIG: Glock / Bar dot COND: 70° F and up

OBJECTIVES: See Line (A) OTHER:

****

(A) To find out @ what temp. damage occurs to sights.

Sights Are placed in cool oven, temp is set @ 150° F

Oven Reaches 150° F, No visible effects

Set oven to 185°, " " "

Set oven to 200°, " " ", let sights stay

At this temp for 15 min, Removed sights for Insp. All ok,

Place sights back in oven,

Set oven to 250°, No visible Effects.

Set oven to 280°, " " "

Oven temp @ 295°, Impkr Appears to seperated

from sight. but is still in place.

COMMENTS: The sight set withstands far greater

temp. than will be incured by Normal usage.

TEST DONE BY: Pete Wright

DATE: 02-28-91 PAGE 1 of 1

TEST NAME: Hot Acid Tank METHOD: Immersion

SIGHT IDENT #: F: 6-200x.093"-005/F R: 6-100-010/R

SIGHT TYPE/CONFIG: Clock / Bar Dot COND: 250°F for 20 min

OBJECTIVES: See Line (A) OTHER: Black Oxide finish Process

****

(A) Test Construction materials for bonding strength or break-down during "Blueing"

Chemical Bath At 250°F. Sights Are placed in hot Chemicals, Allowed to ~~soak~~ for 20 min, then Removed. Surface coating of Imprint® A little cloudy, Allowed to cool, cleaned with Eco Scrubber®, Inspected, All ok No visible effects, ~~detected~~ detected Inspected for Illumination, All ok.

I feel that this process did not harm, the Imprur, the sleeve material, the Black Mark or the sealed-source itself However, In some blueing tanks the temp may exceed 300°F & blueing duration Can Vary from 15 to 35 min. I feel we must advise the consumer to avoid this exposure.

COMMENTS: Chemicals used in this Process Are As follows. Sulfuric Acid, Hydrochloric Acid, Sodium Nitrate & Sodium Nitrite (Common to most blueing Processes)

TEST DONE BY: Pete Wright