

From: Brian Smith
To: internet:cpadtech.com:almc
Date: 8/26/96 12:25pm
Subject: IMS Deficiency Letter

Al,

Attached is the deficiency letter for the IMS Detector for distribution under an exempt license. The file was saved as a Word 6.0 file. If it does not work, please let me know. The document was also faxed.

File attached

CPADDEF.W60



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

August 27, 1996

Mr. Al McEachern, Director
CPAD Technologies Inc.
66 Slater Street
Ottawa, Ontario
Canada
K1P 5H1

Dear Mr. McEachern:

This concerns information about an Ion Mobility Spectrometer (IMS) Detector which was submitted with your letter received July 10, 1996, and your subsequent conversation with Ms. Kathleen Dolce of Region I. We are in the process of reviewing the information and have identified areas where additional information or clarification is needed. As requested in your conversation with Ms. Dolce, the information was reviewed for distribution of the devices under an exempt distribution license under 10 CFR 32.26. As per 10 CFR 32.26, these devices will be used by persons defined in 10 CFR 30.20. It is our understanding that a letter will be submitted explaining this change. Because 10 CFR 32.26 contains different requirements than 10 CFR 32.51, which your original submittal requested the devices to be distributed under, additional information will be necessary and some changes will be required to be made to the information originally submitted.

Devices manufactured under 10 CFR 32.26 must be designed for the purpose of protecting life or property from fires and airborne hazards. Accordingly, a case will need to be made for the IMS Detector to be manufactured under use 10 CFR 32.26.

It was noted in the engineering drawings submitted that a statement was made on each that it is considered to be the property of CPAD Technologies Inc. The NRC can handle information submitted by licensees on a company proprietary manner (i.e., not to be disclosed to the public) when the materials are submitted in accordance with 10 CFR 2.790(b). In addition to the markings on the material to be considered proprietary, an affidavit is required to be submitted requesting that the materials be considered proprietary. Once this has been received, the NRC will consider the request on its merits.

To aid in the development of this additional information, I have enclosed a copy of "Supplemental Information to Request a Safety Evaluation and Registration of Sealed Sources or Devices Containing Byproduct Material" which contains all of the regulations relevant to your submittal. Because of this, some of the following questions will only reference sections of the regulations instead of including the regulation text. In addition, I am including a copy of Regulatory Guide 10.10, "Guide for the Preparation of Applications for Radiation Safety Evaluation and Registration of Devices Containing Byproduct Material," which provides guidance on submitting requests to the U.S. NRC for radiation safety evaluation and registration of devices containing byproduct material.

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In order to complete our review, please provide the following:

1. With respect to the model number scheme that is proposed to be used, we recommend that you include IMS as a prefix (i.e., IMS-xxxx-yyyy). In your application, the "xxxx" represents the model number. Please explain the meaning of different model numbers, if used.
2. Devices distributed under 10 CFR 32.26 do not require leak testing by their users.
3. Please provide the extremes of environmental and operating conditions (e.g., temperature, humidity, corrosive atmosphere, vibration, etc.) the device may experience during normal use. In addition, please provide a brief description of the function and operation of the device.
4. Please provide the expected useful life of the device.
5. Please provide the total quantity of byproduct material expected to be distributed in the product annually.
6. Devices distributed under 10 CFR 32.26 must be labeled in accordance with 10 CFR 32.29(b). The following requests for information all pertain to labeling.
 - A label must be placed on the detector that contains the following: (1) the words "Contains Radioactive Material," (2) the name of the radionuclide and quantity of activity, and (3) the identity of the 10 CFR 32.26 licensee. The label must be durable, legible, and readily visible when the detector is removed from the analytical unit (box that contains the IMS detector). Please provide the wording or samples of the label to be placed on the detector.
 - In addition to the label that will be placed on the detector itself, a label must be placed on the outside of the analytical unit. This label must contain, as a minimum, the same information as that required to be on the detector. Additional information may be included.
 - These labels need to be permanently affixed to the device and made of a material that will retain its integrity during use. Please indicate the materials of construction of the labels. In addition, please provide information on the label adhesive, such as solubility, effective temperature range, etc.
 - In addition to these labels, the point of sale package must be labeled or marked in accordance with 10 CFR 32.29(b)(3). This label or marking must contain the following: (1) the name of the radionuclide and quantity of activity, (2) the identity of the 10 CFR 32.26 licensee, and (3) the following or similar words "This detector contains radioactive material and has been manufactured in compliance with U.S. NRC safety criteria in 10 CFR 32.27. The purchaser is exempt from any regulatory requirements." The label or marking must be legible and readily visible on the package. Please provide the wording or samples of the label or marking to be placed on the point of sale package.

7. With respect to prototype testing, please provide details on the condition of the devices tested when each test was completed (i.e., did the device fall apart, any visible damage, condition of source, etc.).
8. Please provide complete radiation profiles for the IMS Detector assembly and the analytical unit containing the maximum activity for the source. Indicate whether the radiation profiles are derived from calculation or from surveying the device. If they are derived from surveying the device, please provide a description of the instruments used to perform the surveys. The radiation profiles must be provided at 5 and 25 centimeters from the external surface of the detector. These measurements must be made with the detector inside and outside of the analytical unit.
9. 10 CFR 32.29 (a) requires that adequate quality control procedures be carried out to assure that each production lot meet the quality control standards approved by the NRC. Please provide a description of the quality control program that is used for the manufacture of the IMS Detector. Please note that your quality control program must ensure that devices meet all specifications provided in your application. Materials that do not meet the minimum specifications will not be authorized under the certificate.
10. Dose assessments must be provided that demonstrate that the device meets the safety criteria in 10 CFR 32.27. (i.e., certain dose limits under normal use and disposal conditions). Therefore, please review these requirements (see enclosure) and submit sufficient information to prove that the safety criteria can be met.
11. With respect to the degree of access to human beings to the product during normal handling and use, the device should have safety features in place to prevent the inadvertent access to the source by the user. Please provide a description of the safety features of the IMS Detector. Typical safety features include tamper resistant screws, use of adhesives, and filled screw heads.
12. Please address the potential for galvanic corrosion of the device, in particular the locations where different materials come into contact.
13. For each engineering drawing provided in your application, please provide a parts list including the materials of construction.
14. The registration certificate for the Nuclear Radiation Developments, Inc. source model number N-1001 states that the source can be made with one of several backing foils. Please provide the backing foil used for the sources to be used in the IMS Detector.

We look forward to receiving the requested information as soon as possible. If you have any questions, please contact me at (301) 415-5723 or Mr. John Lubinski at (301) 415-7868.

Sincerely,

Original Signed by

Brian W. Smith, Health Physicist
Sealed Source Safety Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

cc: Mr. Gordon Coulter, Coulter Sales
Ms. Kathleen Dolce, Region I

Distribution:

SSSS r/f

SSD-96-66

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DOCUMENT NAME: P:\SSSS\CPADDEF.LTR

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	SSSS	<input checked="" type="checkbox"/>	SSSS	<input checked="" type="checkbox"/>					
NAME	BSmith <i>BS</i>		JLubinski <i>JK</i>						
DATE	08/ /96		08/ /96 <i>21</i>						

OFFICIAL RECORD COPY

MANUFACTURER/DISTRIBUTOR:

CPAD Technologies

REGISTRATION #:

MODEL #: IMS

REFERENCES:

DESCRIPTION	OK/DEF (✓/D - RESP DATE)	COMMENTS
FIRST PAGE		
Registrant's name and address	✓	
Manufacturer's and distributor's name and address	✓	
Custom user's name and address	N/A	
Model number		
Type (from Reg. Guide 10.10 or 10.11)	✓ N	
User's authority to possess (specific, general, both, exempt)	STEL	53226
Radionuclides, activity (Max w/% error), form, manufacturer, model, NRC registered (note on registration certificate if source is registered as part of the device)	✓	LT need justification for 12 month
DESCRIPTION		
If registrant is requesting to register more than one source/device on a certificate, are designs similar enough to do so?	ns	
Device/source design with complete engineering drawings (dimensions, tolerances, list of materials)	✓	
Assembly methods (screw, welds, etc.); verify integrity	✓	verify temp resistant
Source mounting (size and integrity) and security	✓	
Is source ANSI classification sufficient: Radiography - Unprotected - 43515 Radiography - In Device - 43313 Medical - Radiography - 32312 Medical - γ Teletherapy - 53524 γ Gauges - Unprotected - 43333 γ Gauges - In Device - 43232 β Gauges, Low Energy γ Gauges, or X-ray fluor - 33222 Oil Well Logging - 56522 Portable Moist/Density - 43333 Neutron Applications - 43323 γ Irradiators (II, III, IV) - 43424 γ Irradiators (I) - 43323 Chromatography - 32211 Static Eliminators - 22222 Smoke Detectors - 32222 (from ANSI N542-1977)	✓	✓ temp, ANSI, source
Definition of shutter operation (locked in Off position, not locked in On position)	N/A	
On-Off indicators (description, qty., location)	N/A	

DESCRIPTION	OK/DEF (✓/D - RESP DATE)	COMMENTS
Safety interlocks, guards, etc. to prevent access to beam or high radiation levels	✓	
Corrosion between unlike materials (aluminum & steel, depleted uranium & steel, etc.) see "Corrosion" information		Al & SS
Well logging sources must be nondispersible and nonsoluble. (see JBCarrico for listing of sealed sources approved for well logging)	N/A	
See "ANSI and Other Standards" list for references for particular source/device designs (e.g. radiography, brachytherapy, etc.)		
LABELING		
Copy of label	✓	label on device to box box can just say C-124 this ---
Materials, dimensions, colors (note on registration certificate if labeling is exempt from the color requirements of 10 CFR Part 20)		
Permanent attachment and location(s) - visible to users?		need info on adhesive, material ✓
Contents: Model#, Serial#, Isotope, Activity, Manufacturer, Date of Assay, Trefoil, "CAUTION - RADIOACTIVE MATERIAL" (Depleted Uranium information must be included)		<ul style="list-style-type: none"> - minor wording, caution - installation, operating service - date of assay
CONDITIONS OF USE		
Expected life of the source/device (years, operations)		need ✓
Maximum allowable temperature, vibration, shock, corrosion, etc. (during operation and accidental)		- need is gas heated?
How the device will be used		
Meets dose limits of Part 32 for G and E distribution		
PROTOTYPE TESTING		
Tests methods and conditions (for source and device)		
Tests results	✓	
Years of use (incidents, failures, etc.)		need # units, the lead tests, etc. as per
Similarities to other sources/devices if they are used as basis.	N/A	

DESCRIPTION	OK/DEF (✓/D - RESP DATE)	COMMENTS
RADIATION PROFILES		
Survey instrument used (type, window, sensitivity, etc.)		
Conditions		
Distance from source/surface (per ANSI 538-1979)		
Shutter On and Off/source shielded	N/A	
Scatter (product in beam)	N/A	
Guards and shields in place		
Verify radiation surveys for γ radiation meet inv^2 law.	N/A	
Verify radiation surveys for non- γ radiation have not been calculated using inv^2 law.		
QUALITY ASSURANCE		need SHLD
Materials, subassemblies, services		
Assembly methods (screws, welding, etc.)		
Dimensions and tolerances		
Activity, radiation levels, leak tests		
QA Manual		
INSTALLATION		
Fixed, portable, movable, fixed installation but portable source housing		
Inherent shielding, inaccessibility	✓	
Interlocks, locks, barriers		
Beam access: size of air gap/opening to beam (verify size with new GL rule)	✓	
Mounting integrity		
SAFETY INSTRUCTIONS		
Operation, maintenance, calibration, damage/failure , specific warnings, leak test, and radiation surveys		get manual

DESCRIPTION	OK/DEF (✓/D - RESP DATE)	COMMENTS
ACCOMPANYING DOCUMENTATION		
Leak tests results and radiation surveys	LTR ✓, AS	
Transportation documents		for shipping back
Operation, maintenance, calibration, damage/failure, specific warnings, leak test, and radiation survey instructions if applicable		
For GL dist. Verify NRC Regions and Agreement State listing is up-to-date and copies of all pertinent regulations		need
SERVICING		
Manufacturer provides or user performs: <input checked="" type="checkbox"/> Installation <input checked="" type="checkbox"/> Calibration <input type="checkbox"/> Relocation <input type="checkbox"/> Leak Test <input checked="" type="checkbox"/> Maintenance <input checked="" type="checkbox"/> Radiation Survey <input checked="" type="checkbox"/> Repair <input checked="" type="checkbox"/> Training <input checked="" type="checkbox"/> Source Change/Installation		
FOREIGN MANUFACTURERS ✓		
Drop ship <i>Ships GL int</i>	<i>RL</i>	
Who and where is source installed <i>RL</i>		
Leak test and radiation surveys		
QA in the U.S. <i>us Dept. of</i>		

3.0 Chemical and Physical Form

3.1 Chemical and Physical Form

The sources used in the IMS cells are ^{63}Ni electroplated onto a substrate which consists of a brass cylindrical ring with a length of 7.70 mm and a diameter of 7.0 mm. The wall thickness is 0.15 mm. The ^{63}Ni is electroplated over the entire surface of the ring.

3.2 Potential Changes During Useful Life

Standard plated ^{63}Ni sources may oxidize and degrade with exposure to air and chemicals. In addition traces of air pollutants hydrogen sulfide and sulfur dioxide, react with nickel to form corrosion.

4.0 Solubility in Water and Body Fluids

4.1 Solubility in Water

The solubility of nickel compounds (CRC 1990) are shown in the following table:

Selected Nickel Compounds	Solubility Class
Carbonate (NiCO_3)	sparingly soluble in water
Oxide (NiO)	insoluble in water
Hydroxide (Ni(OH)_2)	sparingly soluble in water
Sulfate (NiSO_4)	soluble in water
Sulfide (NiS)	insoluble in water

4.1 Solubility in Body Fluids

ICRP 30 reports the following data for nickel (ICRP 1982):

The fractional gastrointestinal absorption of dietary nickel is thought to be low. The fractional gastrointestinal absorption of nickel oxide is probably less than that for dietary nickel. The value for f_1 is 0.05 for all compounds of the element.

ICRP 30 assigns oxides, hydroxides and carbides of nickel to inhalation class W. All other commonly occurring compounds of the element are assigned to inhalation class D.

5.0 Details of Construction and Design

5.1 Conditions of Use

In operation, the cell is maintained within a particular temperature range by use of a conductive coating or external heater on the cell body. A resistive ink is used on the inside of the cell within the drift region to maintain an electric field of 125 V per cm supplied by a high voltage power supply. An ambient air sample is drawn into the inlet and across a semi-permeable membrane by a pump or venturi. The materials of interest permeate through the membrane and the remaining sample is exhausted outside the instrument. On the other side of the

NRC FORM 567

U. S. NUCLEAR REGULATORY COMMISSION

(5-93)

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 <i>RI</i>		REGION/LOCATION: <input checked="" type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> HQ <input type="checkbox"/> LFDCB	
TELEPHONE NUMBER	DATE <i>7/10/96</i>	TYPE OF ACTION REQUESTED (Check as appropriate)	
APPLICANT'S NAME <i>CPAD Technologies Inc</i>		<input type="checkbox"/> SOURCE REVIEW	<input type="checkbox"/> AMENDMENT OF REGISTRATION SHEET NUMBER(S)
MAIL CONTROL NUMBER(S) <i>123410</i>		<input checked="" type="checkbox"/> DEVICE REVIEW	
LETTER/APPLICATION DATE <i>6/29/96</i>	LICENSE NUMBER(S) <i>new</i>	<input type="checkbox"/> CUSTOM REVIEW	

COMMENTS:

FOR SSSS USE ONLY

REVIEWER	MODEL NUMBERS <i>IMS</i>	NUMBER ASSIGNED <i>96-66</i>
DATE RECEIVED <i>7/10/96</i>	DATE ASSIGNED	DATE TO FEES <i>7/26/96</i>

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)
<input type="checkbox"/> NEW <input type="checkbox"/> AMENDMENT	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> AMENDMENT	<input type="checkbox"/> NEW <input type="checkbox"/> AMENDMENT	<input type="checkbox"/> NEW <input type="checkbox"/> AMENDMENT
<input type="checkbox"/> NO SAFETY EVALUATION REQUIRED <input type="checkbox"/> NO FEES REQUIRED		<input checked="" type="checkbox"/> LICENSING ACTION REQUIRED IF KNOWN	<input type="checkbox"/> YES <input type="checkbox"/> NO
<input type="checkbox"/> OTHER (Specify)			

TOTAL NUMBER OF REVIEW HOURS	NOTES <i>* Please contact Sheri Arredondo from RI when case has been assigned (610) 337-5342</i>
NUMBER OF DEFICIENCY LETTERS	
NUMBER OF DEFICIENCY CALLS	

FOR BILLING PURPOSES ONLY

<input type="checkbox"/> NAME CHANGE	<input type="checkbox"/> ADDRESS CHANGE	<input type="checkbox"/> NEW REGISTRATION -- ADD TO BILLING	<input type="checkbox"/> PRODUCT INACTIVE -- REMOVE FROM BILLING
--------------------------------------	---	---	--

FOR FEE USE ONLY

TYPE OF FEE <i>APP/3,400</i>	FEE CATEGORY <input checked="" type="checkbox"/> 9A <input type="checkbox"/> 9B <input type="checkbox"/> 9C <input type="checkbox"/> 9D
AMOUNT RECEIVED <i>\$9,000</i>	CHECK NUMBER <i>0179</i>
DATE OF CHECK <i>8/6/96</i>	LOG <i>Jul 96' SS+D</i>
APPROVED BY <i>sk</i>	DATE RETURN <i>8/13/96</i>

COMMENTS:

1.0 APPLICANT

This application is being submitted by CPAD Technologies Inc., a Canadian firm. The device referred to in this application is manufactured by CPAD and will be transferred to the U.S. through the U.S. office under a possession license issued under 32.51.

CPAD is submitting this application for a device review and a general license under provisions 31.5.

Head Office:

CPAD Technologies Inc.
66 Slater Street
Ottawa, Ontario
Canada
K1P 5H1

Contact: Mr. Al McEachern Tel: 613-230-0609
Director, Business Development Fax: 613-230-3805

U.S. Office:

Coulter Sales
444 Barney's Joy Road
South Dartmouth, Massachusetts
02748-1004

Contact: Mr. Gordon Coulter Tel: 508-636-6944
Fax: 508-636-3948

2.0 DEVICE TYPE

The device is intended for use under a general license, specifically 31.5, for the purpose of detecting organic compounds. The device is called an Ion Mobility Spectrometer (IMS) Detector. This device contains a Nickel-63 source.

3.0 MODEL NUMBER

The designated model number for a device containing the Nickel-63 source will be **xxxxxx** followed by the serial number **yyyyy**.

3. **xxxxxx yyyyy**

4.0 OTHER COMPANIES INVOLVED

CPAD Technologies Inc. of Canada purchases the Nickel source from a U.S. firm:

NRD Static Control Products
2937 Alt Boulevard North
Grand Island, NY 14072-1292

5.0 **RADIOACTIVE SOURCE MODEL DESIGNATION**

The Nickel source purchased from NRD is registered with the NRC as N1001.

6.0 **RADIONUCLIDES AND MAXIMUM ACTIVITY**

Each device contains a Nickel-63 source of 3.3 millicuries.

7.0 **LEAK TEST FREQUENCY**

A leak test will be conducted before shipment and a copy of the test results will accompany the system. Follow on leak tests will be conducted every twelve months.

8.0 **PRINCIPAL USE CODE**

The principal use code is "N." The Nickel-63 is used as an ion generating source for the IMS Detector.

9.0 **DESCRIPTION OF THE DEVICE**

The device referred to in this application is called an Ion Mobility Spectrometer (IMS). This device is used to detect organic compounds. These compounds are injected into the IMS via a carrier gas (air or nitrogen). Upon entering the IMS, the molecules contained in the carrier gas are ionized by the Nickel-63 source. These ionized molecules then drift down a drift region and are separated according to their mass.

The IMS Detector measures 1.86" in length and 2.5" in diameter. The IMS Detector is then placed inside a metal box measuring 12" in length, 6" in height, and 2" in depth. This box is referred to as the Analytical Unit.

3/4 12.5

10.0 **PURPOSE OR INTENDED USE OF THE DEVICE**

It is intended that this device will be used in a number of products manufactured by CPAD for the purpose of detecting organic compounds. CPAD currently manufactures Explosives Detection Systems and Narcotics Detection Systems, which incorporate one or two of the devices referred to in this application. Although these detection systems may change and new products will be introduced, the "device" referred to in this application, which will be used as a component in many of these systems, will not change from the description contained in this application, without an amendment request.

The device is designed to be installed in a fixed location within the system; it does not move.

11.0 RADIATION SAFETY FEATURES OF THE DEVICE

In this particular case, the safety concerns revolve around the Nickel-63 source. Specifically, its mounting, access to the source, shielding, materials of construction, its ability to withstand harsh conditions with no external radiation leaks, and the proper labelling of the device.

11.1 Method of Construction

Materials for construction are aluminium and teflon, with all screws and bolts being stainless steel. The specific materials for each component is indicated in the appropriate drawings.

Figure A (drawing number MA-A-077) depicts the final assembly of the IMS Detector. The Detector is then installed inside the Analytical Unit shown in Figure B (drawing number MA-A-078).

11.2 General Description

The IMS is composed of:

- i) The source holder sub-assembly. Drawing number IM-B-035.
- ii) The source cover sub-assembly. Drawing number IM-B-037
- iii) The base. Drawing number IM-B-001.
- iv) The source base. Drawing number IM-0-002.

The source holder sub-assembly is attached to the source base, then the base is slid over the source holder sub-assembly and firmly secured to the source base enclosing the entire IMS. See drawing number IM-B-040.

11.3 Method of Assembly

a. Source Holder Sub-Assembly

The assembly of the source is depicted in drawing number IM-0-035. A breakdown of the specific items found in this drawing are as follows:

Item # 3 reference drawing number IM-B-020

Item # 4 reference drawing number IM-B-022

Item # 5 reference drawing number IM-B-023

Item # 6 reference drawing number IM-B-024

Item # 7 stainless steel screen

Item # 10 **Nickel-63 source**

Method of assembly Reference drawing number IM-B-035.

- i) The Nickel-63 source, item # 10 is pressed into the back of the recessed hole located in the centre of item # 4, which is constructed of aluminium.
- ii) Item # 4 containing the Nickel-63 source is placed into item # 3, which is constructed of teflon.
- iii) Item # 5 is then placed on the front of item # 4.
- iv) Item # 7, the stainless steel screen, is then placed in the centre of the front face on item # 5.
- v) Item # 6, constructed of aluminium, is used to secure the Nickel-63 source firmly into item # 3. Item # 6 fits tightly into item # 3, and is secured by two stainless steel bolts, item # 15, and the nuts and washers item #s 1, 16, and 17. This process sandwiches the Nickel-63 source into a securely tight enclosure and does not allow any movement.

b. Assembly of the Source Holder Sub-assembly to the Source Base.

- i) The source base is constructed from aluminium bar stock as per drawing number IM-B-002.
- ii) The completed source holder sub-assembly is then attached to the source base. This is accomplished by inserting source holder sub-assembly item # 1 on drawing number IM-B-036 at the teflon end, into the source base item # 2 drawing number IM-B-036. These two components are then screwed together using the screws designated as item # 5 on the drawing.

c. Assembly of the Base to the Source Base.

- i) The base is constructed from aluminium bar stock as per drawing number IM-B-001.
- ii) The base is then secured to the source base as depicted in drawing number IM-B-040 with four stainless steel screws item # 7.

The completed IMS Detector showing the overall dimensions can be seen in Figure A (drawing number MA-A-077).

d. Assembly of IMS Detector in the Analytical Unit.

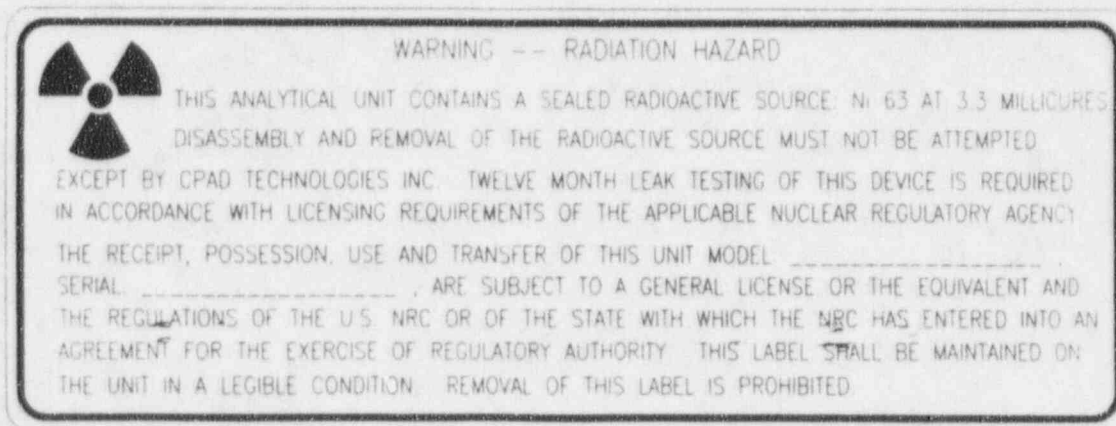
The completed IMS Detector is securely fastened inside the Analytical Unit, sandwiched between the two sides and screwed to the box using three stainless steel screws as depicted in Figure B (drawing number MA-A-078).

The method and materials of construction outlined above allows for optimal security and safety of the Nickel-63 source by:

- i) The method of mounting the Nickel-63 source in the source holder sub-assembly ensures the source will stay put in the sub-assembly even under extreme conditions.
- ii) Shielding of the source is three fold. First, in the source holder, second, in the source base assembly, and third, by placing the IMS Detector in the Analytical Unit.
- iii) Access to the source by human hands is impossible as there are no openings or orifices large enough in the Analytical Unit to allow human hands to penetrate.

11.4 Labelling

A warning label (drawing number LA-B-007) will be affixed to the device in the location depicted in Figure C (drawing number MA-A-079). This location should ensure visibility of the label in most cases regardless of the type of equipment the device will be installed in. If the installation does not allow for easy visibility, a second label will be affixed to a surface that is visible. The label will be an adhesive type with the radiation symbol being a magenta colour on a yellow background. The label will read as follows:



11.5 Manual

All manuals supplied with any systems containing a Nickel-63 source will have:

- a. On the inside of the front cover an 8 1/2" x 11" page containing the same words as depicted on the label above, and an additional sentence located at the end stating: "For additional instructions on leak testing and servicing refer to the section entitled "Radioactive Device" contained in this manual".
- b. A separate section entitled "Radioactive Device", containing the following information:

General

This equipment contains a radioactive device(s). Which is licensed under the U.S. NRC and is subject to licensing requirements. Each device contains 3.3 millicuries of Nickel-63.

There is no direct radiation hazard from this source which is sealed inside the IMS Detector. No attempt should be made to open and service the device or to remove the source.

Leak Test Requirements

Each device must be leak tested at regular intervals, not to exceed twelve months. Leak test kits and the required analysis may be obtained from the National Leak Test Centre.

Procedure for Leak Testing

Turn the system off and let stand for one hour. Using the swabs supplied with the leak test kit, wipe the entire outer surface of the device including the gas flow line labelled "EXIT" attached to the device. Handle the sampled in accordance with the instructions provided with the test kit.

Servicing

Under no circumstances should any attempt be made to open and service this device.

In the event the device requires servicing, contact the CPAD U.S. representative at:

Coulter Sales
444 Barney's Joy Rd.
South Dartmouth, Massachusetts
02748-1004

Contact: Mr. Gordon Coulter
Tel: 508-636-6944
Fax: 508-636-3948

11.6 Prototype Testing

CPAD has been manufacturing and selling Explosives Detection Systems commercially in Canada and other parts of the world for three years. To date no contamination or leakage has been recorded. As part of the prototype testing, a device which was manufactured in 1992 will be wiped, and the results submitted along with the results from an evaluation according to ANSI N542.

The designated classification code of this device is ANSI 77C32211.

The following tests have been conducted in accordance with the ANSI standard. Testing was carried out in the first instance with the IMS Detector Installed in the Analytical Unit; to get closer to the "source", the IMS was removed from the Analytical Unit.

The IMS selected for testing is identified as IMS-1-013, and contained a Nickel-63 source supplied by NRD in September 1994. (See Appendix A for test results)

1) Baseline Test

The Analytical Unit with the IMS installed was wiped tested to determine the baseline. The results are identified as Code A-1 and Code A-2.

2) External Pressure Test

A vacuum chamber was constructed, and the IMS Detector installed in the Analytical Unit was placed in the chamber. Using a vacuum pump, the pressure in the chamber was brought down to 4 psi, and held there for five minutes. The chamber was then brought back to atmospheric pressure, and the procedure repeated a second time. The IMS Detector was then wipe tested. A second set of tests was done with the IMS removed from the Analytical Unit. The results are identified as Code B-1, Code B-2, Code C-1, and Code C-2.

3) The Hammer Impact Test

A steel hammer of 50.9 g mass was constructed according to the ANSI standard and dropped once from a height of 1 m on the IMS Detector. The IMS Detector was placed on a cement floor during this test. A dry wipe test was performed. The results are identified as Code D-1 and Code D-2.

4) High Temperature Test

The IMS Detector was placed in a convection oven at 36 degrees C and was brought to a temperature of 260 degrees C in 6 minutes, and was maintained at that temperature for one hour. Air was passed through the IMS during the one hour heating period. The IMS was removed from the oven and left to cool for 40 minutes, after which a wipe test was performed. The results are identified as Code E-1 and Code E-2.

5) Low Temperature Test

The IMS Detector was placed into a styrofoam container, which was filled with dry ice, and left there for one hour. The IMS was removed from the container and was allowed to warm up for one hour and thirty minutes. Air was passed through the IMS for 10 minutes, after which a wipe test was carried out. The results are identified as Code F-1 and Code F-2.

6) The Drop Test

The IMS Detector was dropped ten times from a height of 1.5 m on a steel plate in such a way that all surfaces were impacted at least once. A dry wipe test was performed. The results are identified as Code G-1 and G-2.

7) History Test

A device similar to the one tested above that was Manufactured in September 1992, was wipe tested using the dry wipe method. In this case, the Analytical Unit containing the IMS was wiped and then a side panel was removed to expose the IMS, which was also wiped. The results are identified as Code H-1.

12.0 INSTALLATION

The IMS will be installed in the Analytical Unit by CPAD Technologies Inc. of Canada and therefore will never come in contact with any other person other than the manufacturer.

13.0 SERVICING

In the event a device requires servicing, the device will be returned to Canada where a person at the licensed facility will perform the work. No servicing or opening of the device is to be performed in the U.S. office.

APPENDIX A

LEAK TEST RESULTS



Atomic Energy
Control Board

Commission de contrôle
de l'énergie atomique

Ottawa, Canada
K1P 5S9

DIRECTORATE OF FUEL CYCLE AND MATERIALS REGULATION

Telephone: (613) 943-1568

January 31, 1996

N. Barton Radiation Protection Services
38 Auriga Drive
Suite 269
Nepean, Ontario
K2E 8A5

Dear Mr. Barton:

This is to inform you that your equipment and procedures have been assessed by Atomic Energy Control Board (AECB) staff and found to satisfy the criteria set out in regulatory guide R-116 (Requirements for Leak Testing Selected Sealed Radiation Sources). The name and location of your organization and the name of the appropriate contact person will be maintained in our database. This information will be provided to AECB licensed users of leak test services upon request and to applicants for new licences.

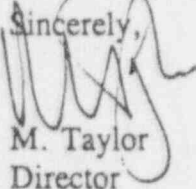
Please note that this is restricted to the isotopes specified in your submission, namely:

- | | | | |
|-----------|-----------|-----------|------------|
| 1. Co-60 | 4. Am/Be | 7. Am-241 | 10. Cd-109 |
| 2. Sr-90 | 5. Ir-192 | 8. Fe-55 | |
| 3. Cs-137 | 6. Cm-244 | 9. Ni-63 | |

Future re-assessments of your equipment and procedures will be done periodically. If future assessments continue to be positive, information on your organization will continue to be made available as described above. Future re-assessments will likely be coordinated with your regularly scheduled licence inspections.

If you have any questions regarding this matter, please forward them to the Materials Regulation Division at the above address.

Sincerely,


M. Taylor
Director

Materials Regulation Division

c.c.: CRO

ASG/MRD/96-0413

Canada

Fax/Telecopieur (613)995-5086
Envoyé AECBREG

WIPE TEST INFORMATION

CODE A	Initial test on complete Analytical Unit Counts/50 min 2096 paper Counts/50 min 2132 cotton swab	27 May 96
CODE B	Pressure test on Complete Analytical Unit Counts/50 min 2184 paper Counts/50 min 2024 cotton swab	27 May 96
CODE C	Pressure test IMS Counts/50 min 2119 paper Counts/50 min 2147 cotton swab	27 May 96
CODE D	Hammer impact test IMS Counts/50 min 2089 paper Counts/50 min 2016 cotton swab	28 May 96
CODE E	High temperature test IMS Counts/50 min 2040 paper Counts/50 min 2139 cotton swab	28 May 96
CODE F	Low temperature test IMS Counts/50 min 2103 paper Counts/50 min 2073 cotton swab	29 May 96
CODE G	Drop test IMS Counts/50 min 2213 paper Counts/50 min 2077 cotton swab	29 May 96
CODE H	History test complete Analytical Unit plus exposed surface of IMS Counts/50 min 2123 paper	29 May 96

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code A - 1

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2096

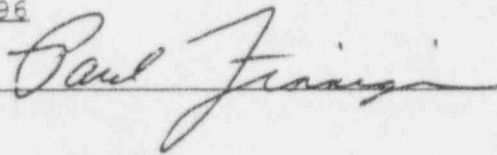
E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code A - 2
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2132

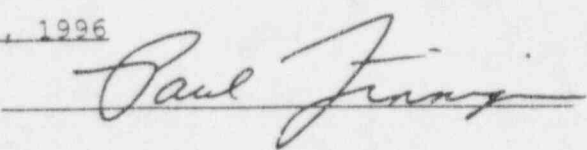
E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $\frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code B - 1
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2184

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code B - 2

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2024

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code C - 1

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2119

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code C - 2

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2147

E = detector efficiency: .003

Activity (Bq) ≤ 18.7
= $\frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code D - 1

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2089

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code D - 2

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2016

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code E - 1
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2040

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 = $\frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 10 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code E - 2

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scalar

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2139

E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.

Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8

AECB Lic.#: 5-10813-98

Telephone#: 613-224-9939

Contact Person: Al McEachern

MEASURER

Name: P. Finnigan

Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8

Telephone: (613) 731-0643

Sampling Date: May 27, 1996

Sample I.D.: Code F - 1

Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2103

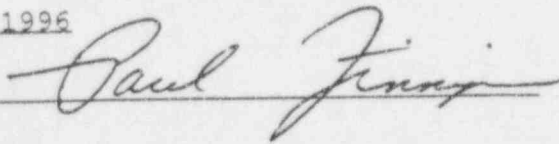
E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code F - 2
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler
Background (counts/50 min.): 2065
Sample (counts/50 min.): 2073
E = detector efficiency: .003
Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X2
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code G - 1
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2213

E = detector efficiency: .003

Activity (Bq) \leq 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: Paul Finnigan

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 27, 1996
Sample I.D.: Code G - 2
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2077


E = detector efficiency: .003

Activity (Bq) ≤ 18.7 $= \frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

Leak Test Measuring Certificate

LICENSEE

Co.Name: CPAD Technologies Inc.
Address: 40 Camelot Drive, Nepean, Ontario K2G 5X8
AECB Lic.#: 5-10813-98
Telephone#: 613-224-9939
Contact Person: Al McEachern

MEASURER

Name: P. Finnigan
Address: 1612 Drake Avenue, Ottawa, Ontario K1G 0L8
Telephone: (613) 731-0643
Sampling Date: May 29, 1996
Sample I.D.: Code H
Date of last calibration and verification check: May 1, 1996

MEASUREMENT

Measuring method: HP-260 probe with scaler

Background (counts/50 min.): 2065

Sample (counts/50 min.): 2123

E = detector efficiency: .003

Activity (Bq) < 18.7 = $\frac{\text{counts} - \text{bkgd.}}{3000 \text{ sec} \times E}$

Conclusions: < the AECB leak test criteria of 200 Bq

Actions: None required

Measuring Date: May 30, 1996

Signature of Measurer: 

APPENDIX B

ASSOCIATED DRAWINGS

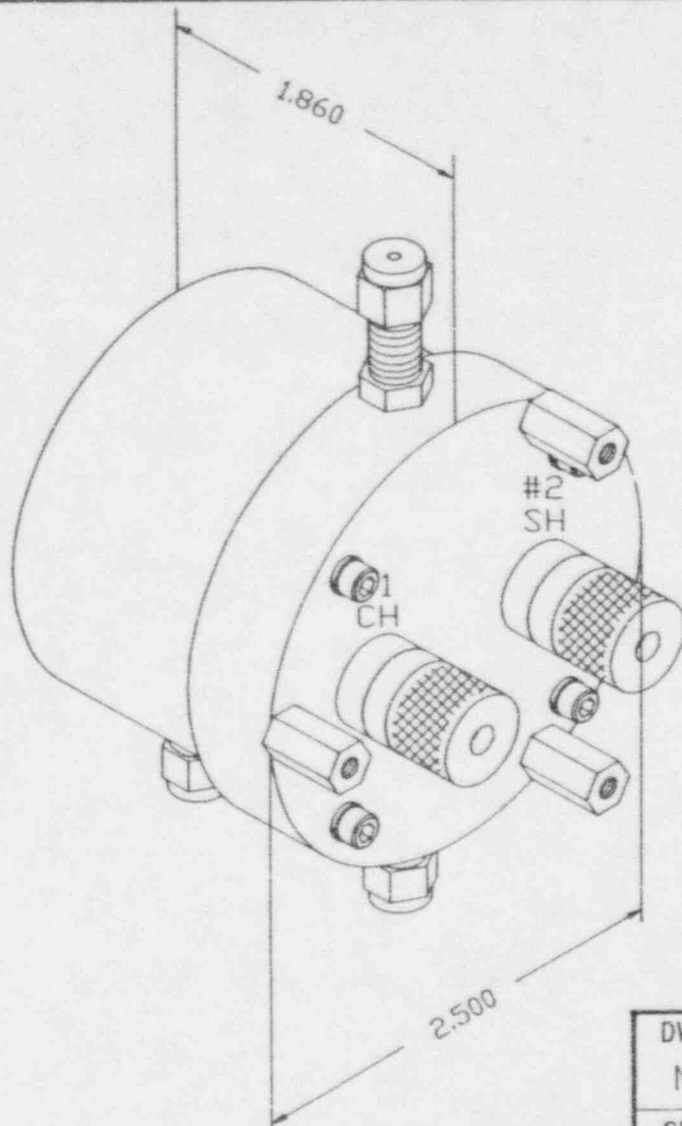



FIGURE A

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF **CPAD TECHNOLOGIES INC.** AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF **CPAD TECHNOLOGIES INC.**

SYM	REVISION	DATE	BY	CHK

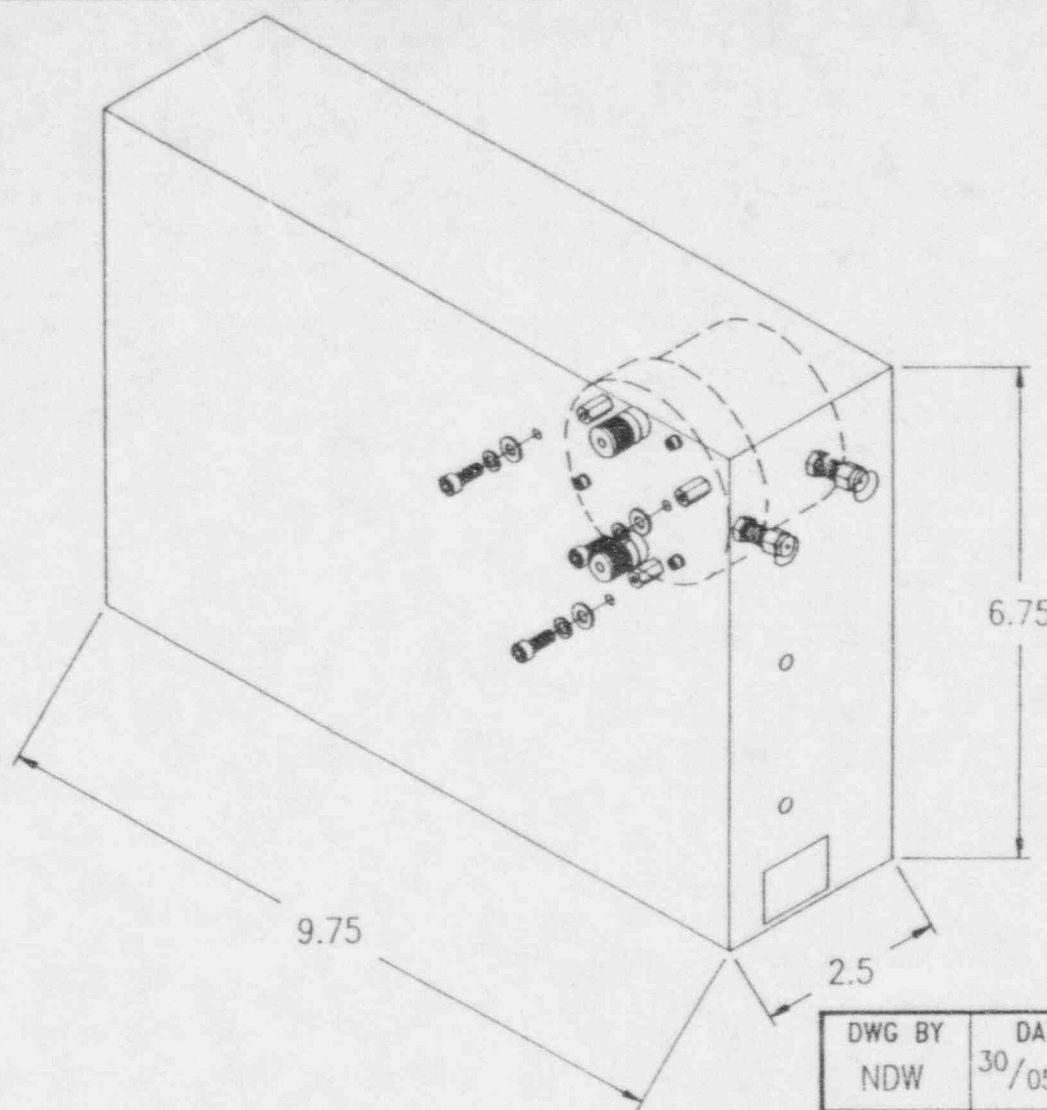
MA-A-077

ORIGINAL
Do Not Copy

DWG BY NDW	DATE 30/05/96				
CHK BY RMJ	DATE 03/06/96				
APPD BY WK	DATE 04.06.96				
SCALE NTS		TITLE IMS ASSEMBLY PICTORIAL REPRESENTATION			
SIZE A		SHEET 1 OF 1		DWG NO MA-A-077	REV -

SYM	REVISION	DATE	BY	CHK

MA-A-078



ORIGINAL
Do Not Copy

FIGURE B

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF **CPAD TECHNOLOGIES INC.** AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF **CPAD TECHNOLOGIES INC.**

DWG BY NDW	DATE 30/05/96
CHK BY RMJ	DATE 03/06/96
APPD BY WK	DATE 04.06.96

SCALE
NTS

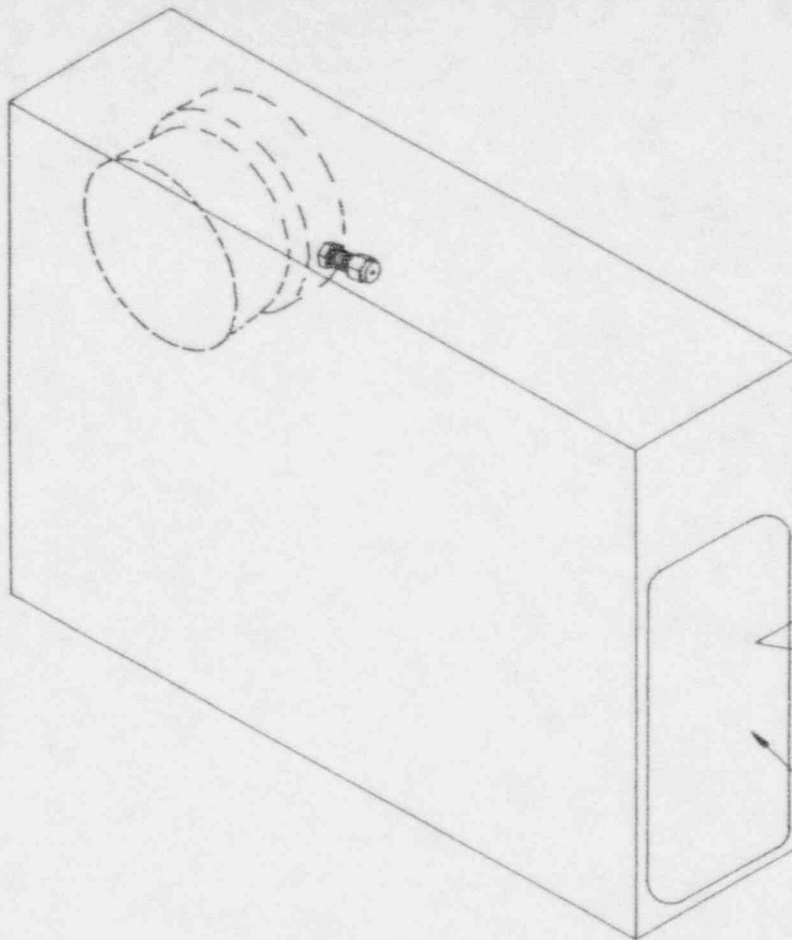


TITLE
ANALYTICAL BOX
PICTORIAL REPRESENTATION

SIZE A	SHEET 1 OF 1	DWG NO MA-A-078	REV -
------------------	--------------	---------------------------	----------

MA-A-079

SYM	REVISION	DATE	BY	CHK




SEE DWG # LA-B-007

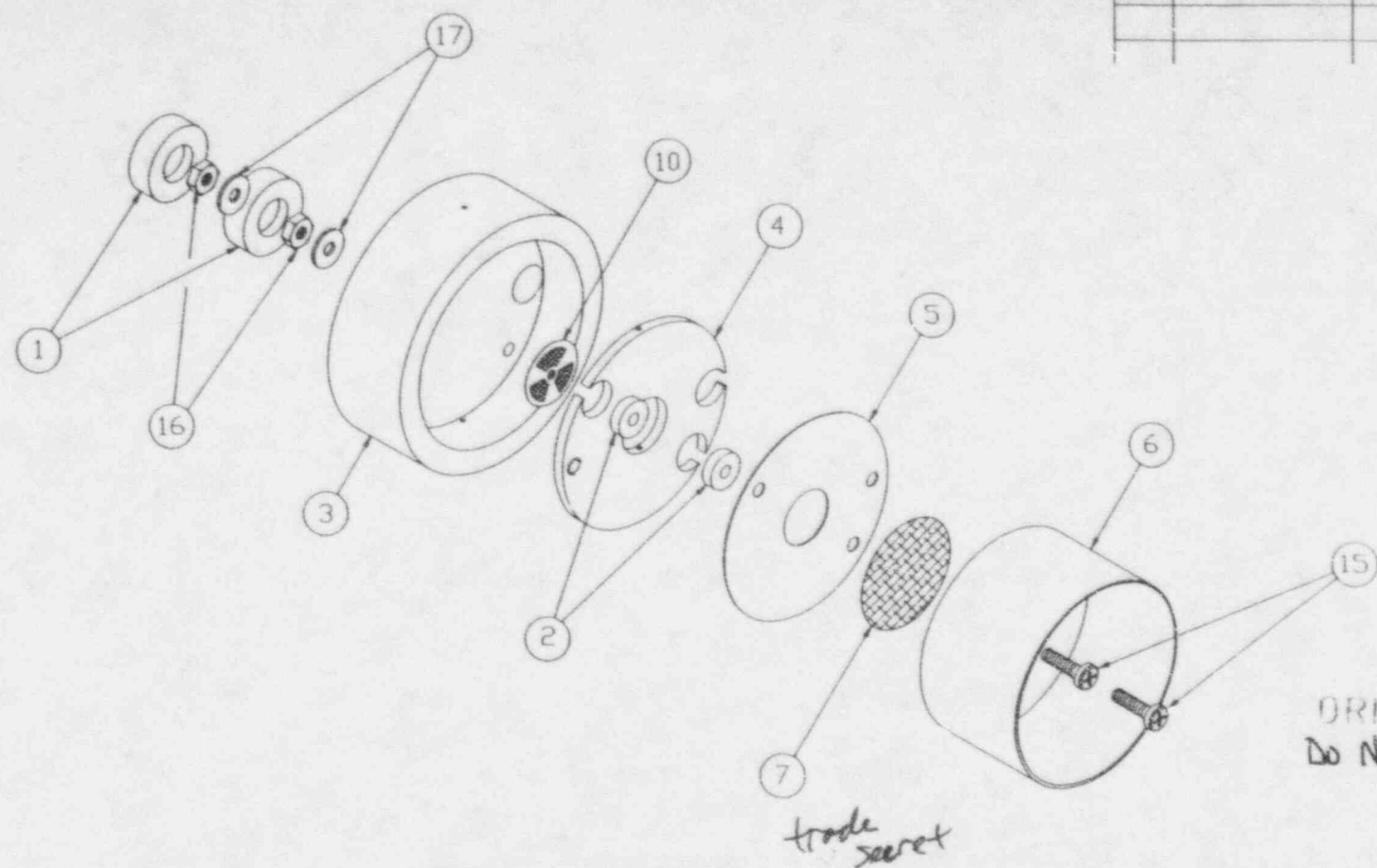
LABEL LOCATION ON BOX

FIGURE C

ORIGINAL
Do Not Copy

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF **CPAD TECHNOLOGIES INC.** AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF **CPAD TECHNOLOGIES INC.**

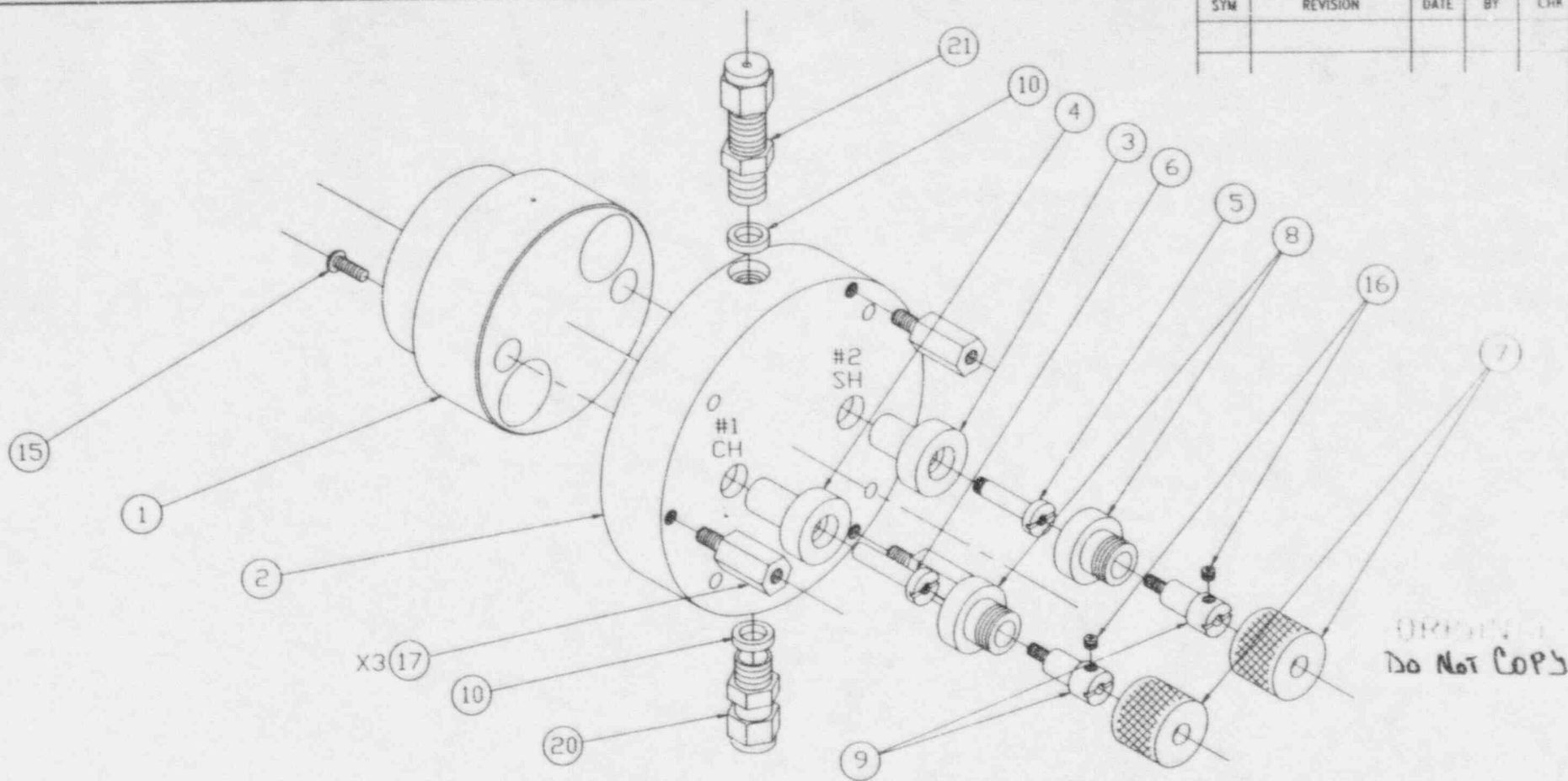
DWG BY NDW	DATE 30/05/96			
CHK BY RMJ	DATE 03/06/96			
APPD BY WK	DATE 04.06.96	TITLE ANALYTICAL BOX PICTORIAL REPRESENTATION		
SCALE NTS		SIZE A	SHEET 1 OF 1	DWG NO MA-A-079
			REV	—



UNLESS OTHERWISE SPECIFIED		THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CPAD TECHNOLOGIES INC. AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF CPAD TECHNOLOGIES INC.		DWG BY RMJ	DATE 03/10/94	<div style="font-size: 2em; font-weight: bold; margin: 0;">CPCD</div> <div style="font-size: 0.8em; margin: 0;">TECHNOLOGIES INC.</div>		
1. DO NOT SCALE DRAWING.	5. REMOVE ALL BURRS AND SHARP CORNERS <u>0.15</u> MAX.			CHK BY WK	DATE 04.06.96			
2. DIMENSIONS ARE IN <u>INCH</u>	6. ROUGHNESS OF SURFACE NOT TO EXCEED <u>63 IN</u>	APPD BY WK	DATE 04.06.96	TITLE SOURCE HOLDER SUB-ASSEMBLY				
3. THREAD LENGTH DIMENSIONS ARE FULL THREADS.	7. ALL RADII ARE <u>.125 R</u>	SCALE 1:1		SIZE B	SHEET 1 OF 1	DWG NO IM-B-035	REV -	
4. TOLERANCE ON DIMENSIONS (INCLUDING HOLES)	8. _____							
DECIMAL .xx ± <u>.01</u> .xxx ± <u>.005</u> .xxxx ± <u>.0005</u>	MATERIAL _____ FINISH _____							
FRACTIONAL ANGULAR ± <u>.1</u>								

X

*takes out + resubmit
or
propose them*



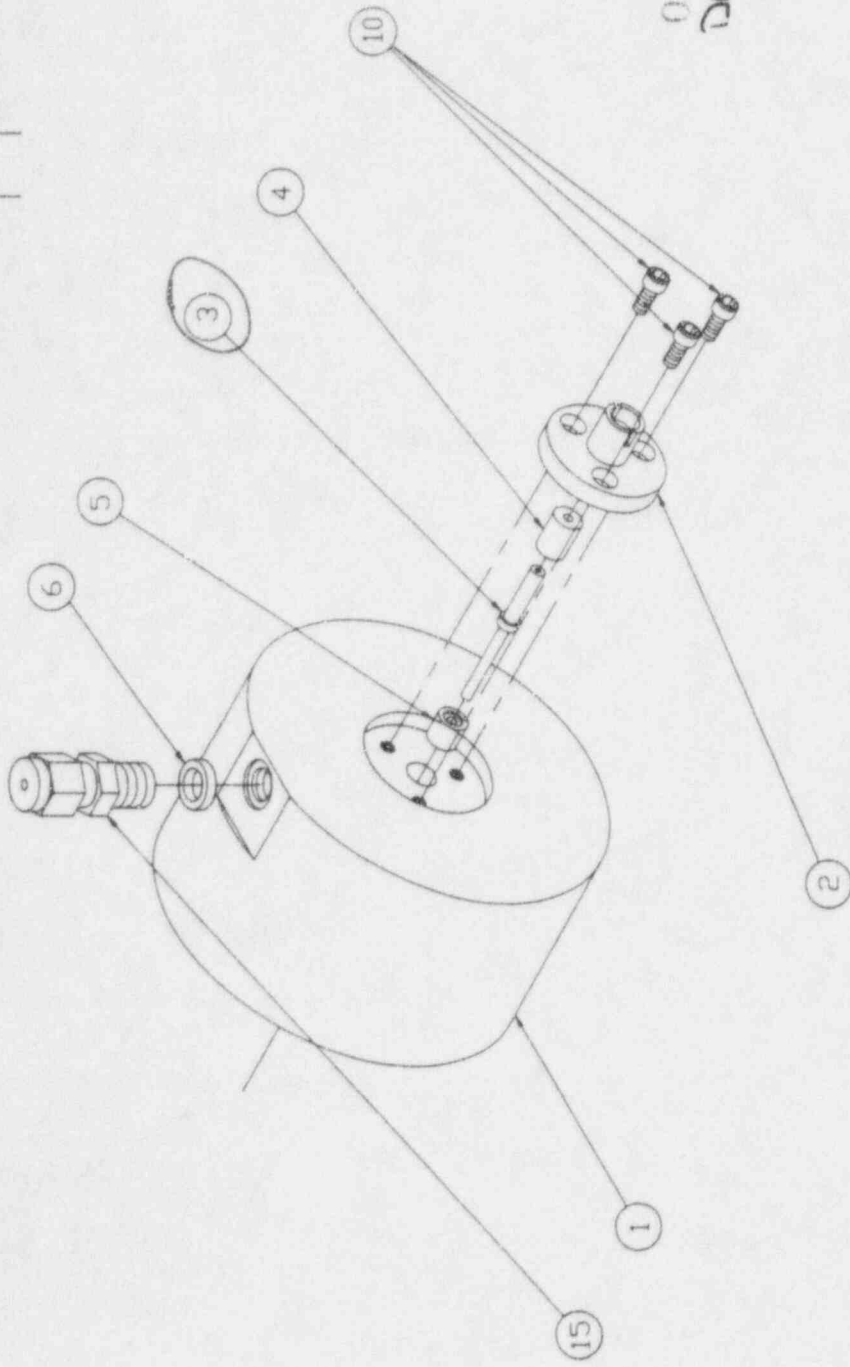
SYM	REVISION	DATE	BY	CHK

IM-B-036

<p>UNLESS OTHERWISE SPECIFIED</p> <p>1. DO NOT SCALE DRAWING.</p> <p>2. DIMENSIONS ARE IN INCH</p> <p>3. THREAD LENGTH DIMENSIONS ARE FULL THREADS.</p> <p>4. TOLERANCE ON DIMENSIONS (INCLUDING HOLES)</p> <p>DECIMAL .XX ± .01</p> <p>.XXX ± .005</p> <p>.XXXX ± .0005</p> <p>FRACTIONAL ±</p> <p>ANGULAR ±</p>		<p>5. REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.</p> <p>6. ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN</p> <p>7. ALL RADII ARE .125 R</p> <p>8.</p>		<p>THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CPAD TECHNOLOGIES INC. AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF CPAD TECHNOLOGIES INC.</p> <p>MATERIAL</p> <p>FINISH</p>		<p>DWG BY RMJ</p> <p>CHK BY WK</p> <p>APPD BY WK</p>	<p>DATE 03/10/94</p> <p>DATE 04.06.96</p> <p>DATE 04.06.96</p>	<p>CPAD TECHNOLOGIES INC.</p>		<p>TITLE</p> <p>SOURCE BASE SUB-ASSEMBLY</p>		<p>SCALE 1:1</p>	<p>SIZE B</p>	<p>SHEET 1 OF 1</p>	<p>DWG NO IM-B-036</p>	<p>REV -</p>
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IM-B-037

SYM	REVISION	DATE	BY	CHK



ORIGINAL
DO NOT COPY

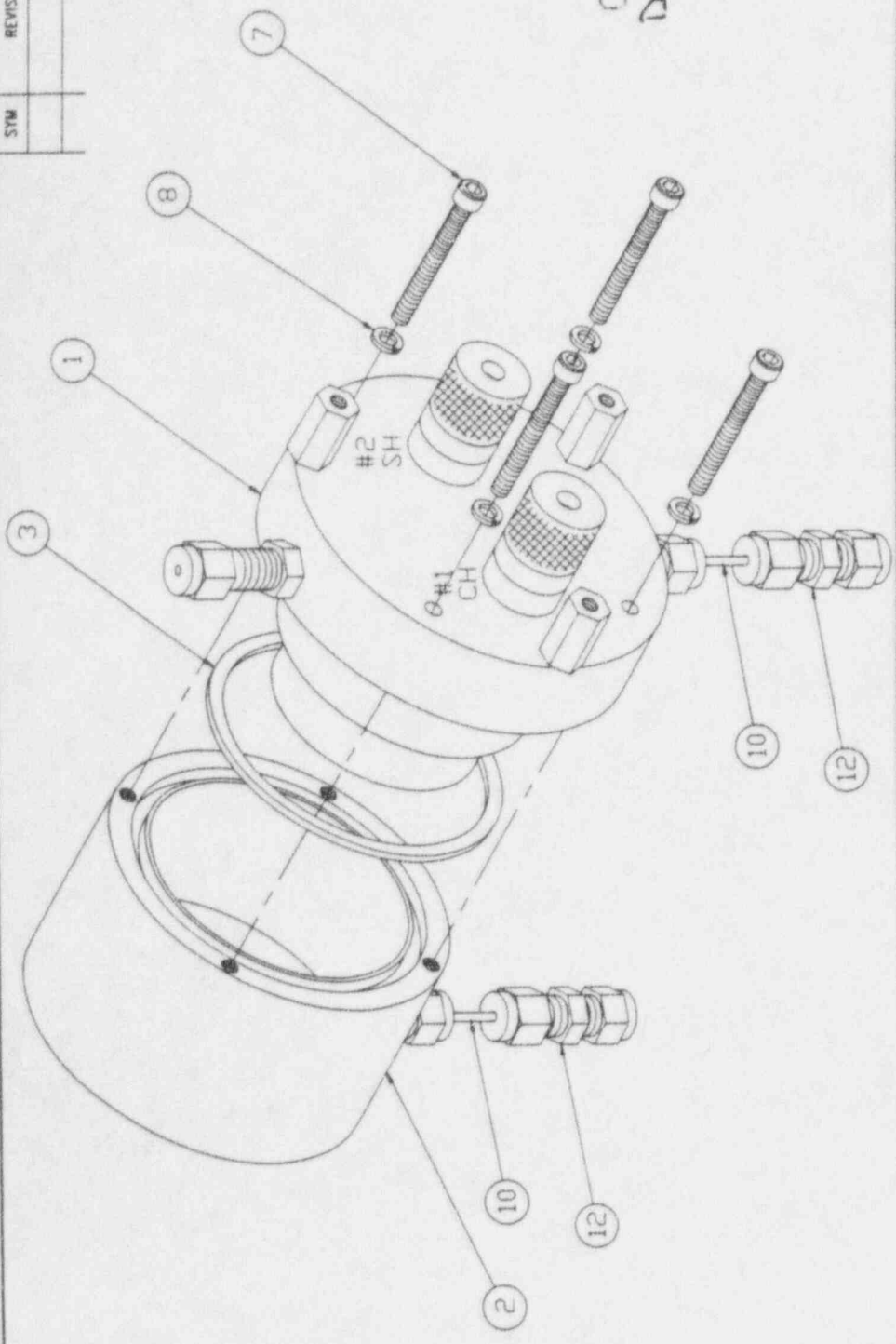
UNLESS OTHERWISE SPECIFIED		THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CPAD TECHNOLOGIES INC. AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF CPAD TECHNOLOGIES INC.		CPAD TECHNOLOGIES INC.	
1. DO NOT SCALE DRAWING.	5. REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.	DWG BY	DATE	TITLE	
2. DIMENSIONS ARE IN INCH	6. ROUGHNESS OF SURFACE NOT TO EXCEED 6.3 IN	RMJ	11/10/94	SOURCE COVER	
3. THREAD LENGTH DIMENSIONS ARE FULL THREADS.	7. ALL RADII ARE .125 R	CHK BY	DATE	SUB-ASSEMBLY	
4. TOLERANCE ON DIMENSIONS (INCLUDING HOLES)	8.	W/K	04/06/96		
DECIMAL		APPD BY	DATE		
FRACTIONAL		W/K	04/06/96		
ANGULAR		SCALE 1:1			
		SIZE B		SHEET 1 OF 1	
		DWG NO		REV	
		IM-B-037		-	

X

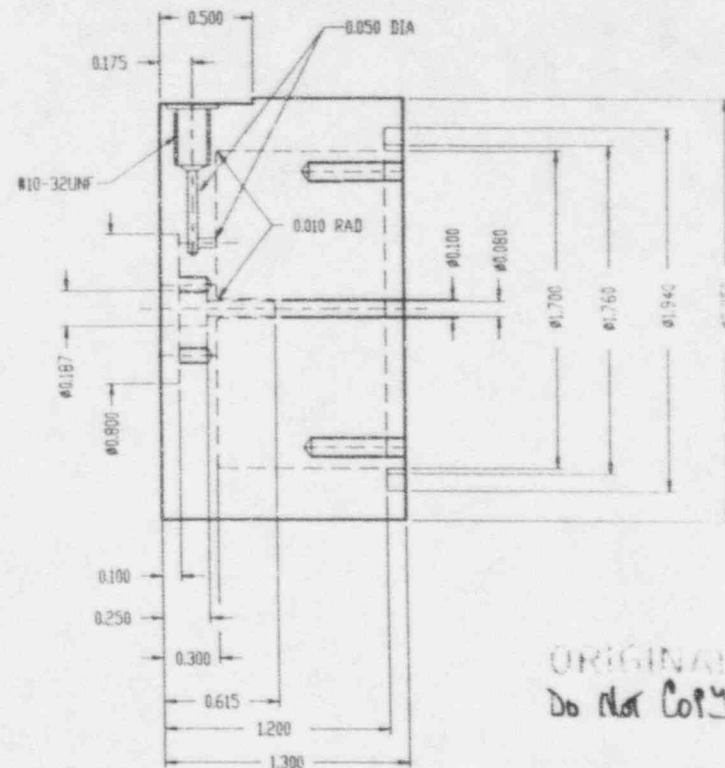
IM-B-040

SYM	REVISION	DATE	BY


ORIGINAL
Do Not Copy



CPAD TECHNOLOGIES INC.		TITLE IMS ASSEMBLY		SIZE B	SHEET 1 OF 1	DWG NO IM-B-040	REV -
DWG BY RMJ	DATE 03/11/94	CHK BY W/K	DATE 06/06/96	APPD BY W/K	DATE 06/06/96	SCALE 1:1	
THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF CPAD TECHNOLOGIES INC. AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT THE WRITTEN PERMISSION OF CPAD TECHNOLOGIES INC.							
MATERIAL							
FINISH							
UNLESS OTHERWISE SPECIFIED							
1. DO NOT SCALE DRAWING.							
2. DIMENSIONS ARE IN INCH							
3. THREAD LENGTH DIMENSIONS ARE FULL THREADS.							
4. TOLERANCE ON DIMENSIONS (INCLUDING HOLES)							
.XX ± .01							
.XXX ± .005							
.XXXX ± .0005							
FRACTIONAL ANGULAR							
.1							
5. REMOVE ALL BURRS AND SHARP CORNERS							
.015 MAX.							
6. ROUGHNESS OF SURFACE NOT TO EXCEED							
6.3 IN							
7. ALL RADII ARE .125 R							
8.							

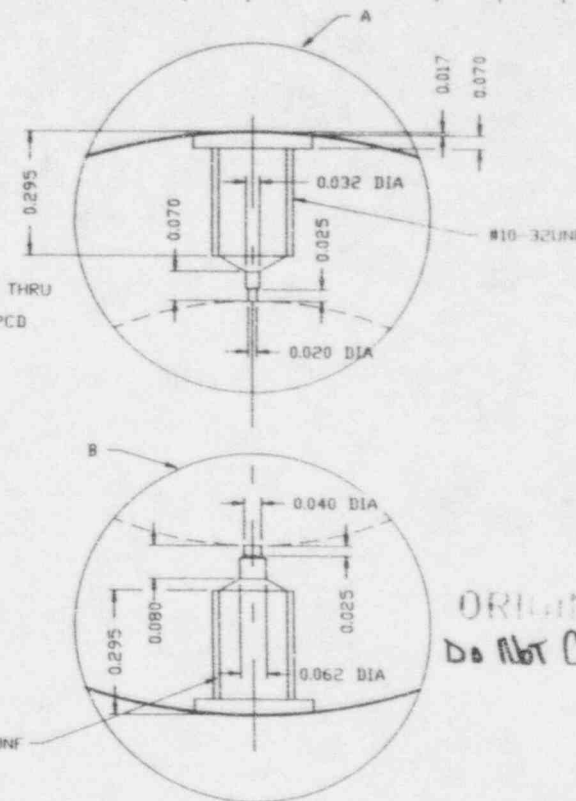
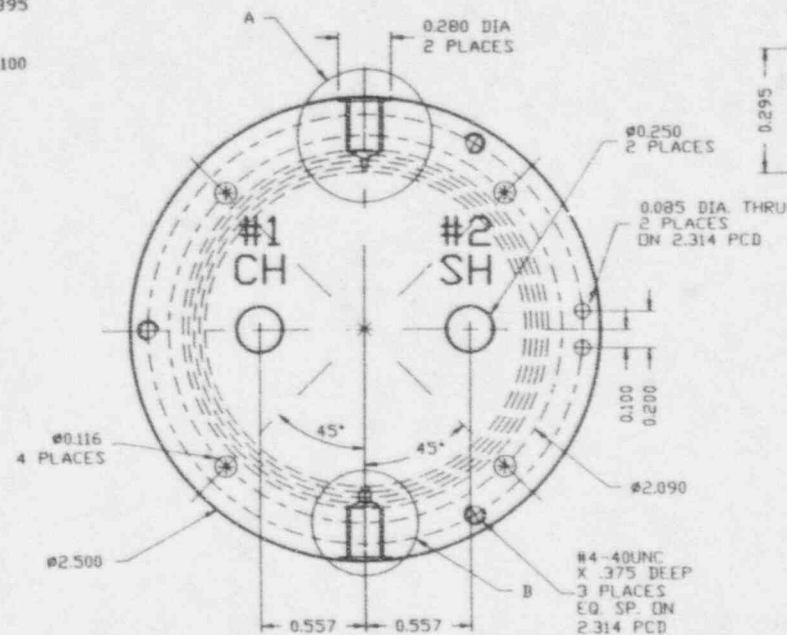
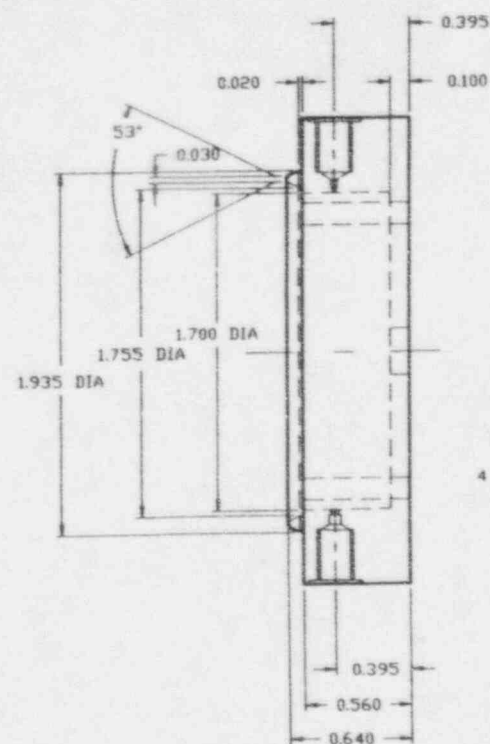
IM-B-001

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1. DO NOT SCALE DRAWING.	5. REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.	MATERIAL ALUMINUM BAR FINISH NONE		DWG BY RMJ	DATE 14/07/94	
2. DIMENSIONS ARE IN INCH	6. ROUGHNESS OF SURFACE NOT TO EXCEED 632 IN			CHK BY WK	DATE 04.06.96	TITLE
3. THREAD LENGTH DIMENSIONS ARE FULL THREADS.	7. ALL RADII ARE .125 R			APPD BY WK	DATE 04.06.96	
4. TOLERANCE ON DIMENSIONS (INCLUDING HOLES)				SCALE 1.5:1		
DECIMAL .XX ± .01				SIZE B	SHEET 1 OF 1	
.XXX ± .002				DWG NO IM-B-001		
.XXXX ± .0005				REV A		
FRACTIONAL						
ANGULAR ± °						

SYM	REVISION	DATE	BY	CHK

IM-B-002



ORIGINAL
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UNLESS OTHERWISE SPECIFIED

- DO NOT SCALE DRAWING.
- DIMENSIONS ARE IN INCH
- THREAD LENGTH DIMENSIONS ARE FULL THREADS.
- TOLERANCE ON DIMENSIONS (INCLUDING HOLES)
DECIMAL .XX ± .01
.XXX ± .002
.XXXX ± .0005
FRACTIONAL ±
ANGULAR ± .1
- REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.
- ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN
- ALL RADII ARE .125 R
-

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MATERIAL ALUMINUM ROD
FINISH NONE

DWG BY RMJ
CHK BY WK
APPD BY WK
DATE 14/07/94
DATE 04.06.96
DATE 04.06.96

SCALE
1.5:1

CPAD
TECHNOLOGIES INC.

TITLE

SOURCE BASE

SIZE
B

SHEET 1 OF 1

DWG NO

IM-B-002

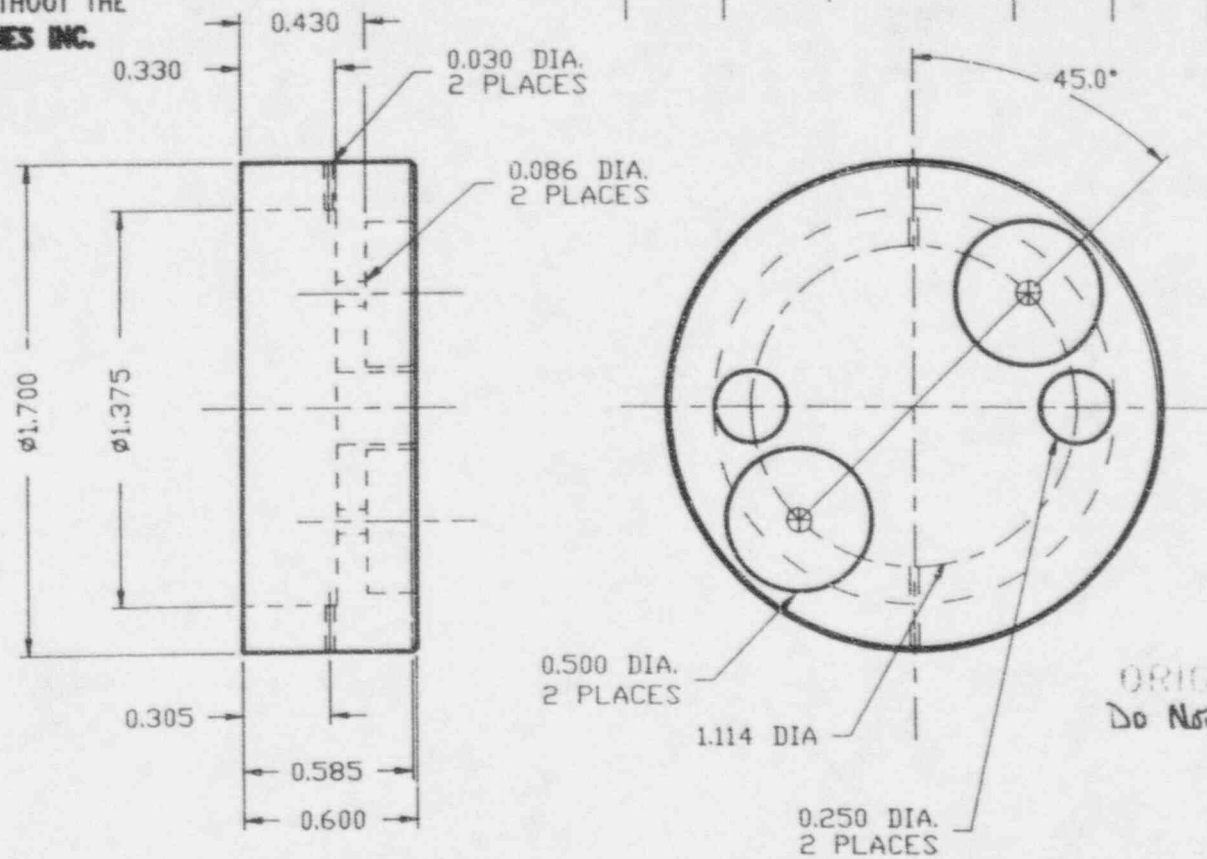
REV

-

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SYM	REVISION	DATE	BY	CHK

IM-B-020



UNLESS OTHERWISE SPECIFIED

- DO NOT SCALE DRAWING.
- DIMENSIONS ARE IN INCH
- THREAD LENGTH DIMENSIONS ARE FULL THREADS.
- TOLERANCE ON DIMENSIONS (INCLUDING HOLES)
DECIMAL .XX ± .01
XXX ± .002

- FRACTIONAL ANGULAR ± .1
- REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.
- ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN
- ALL RADII ARE .125 R

DWG BY RMJ	DATE 14/07/94
CHK BY WK	DATE 04.06.96
APPD BY WK	DATE 04.06.96



TITLE TEFLON SOURCE BASE			
SIZE A	SHEET 1 OF 1	DWG NO IM-B-020	REV -

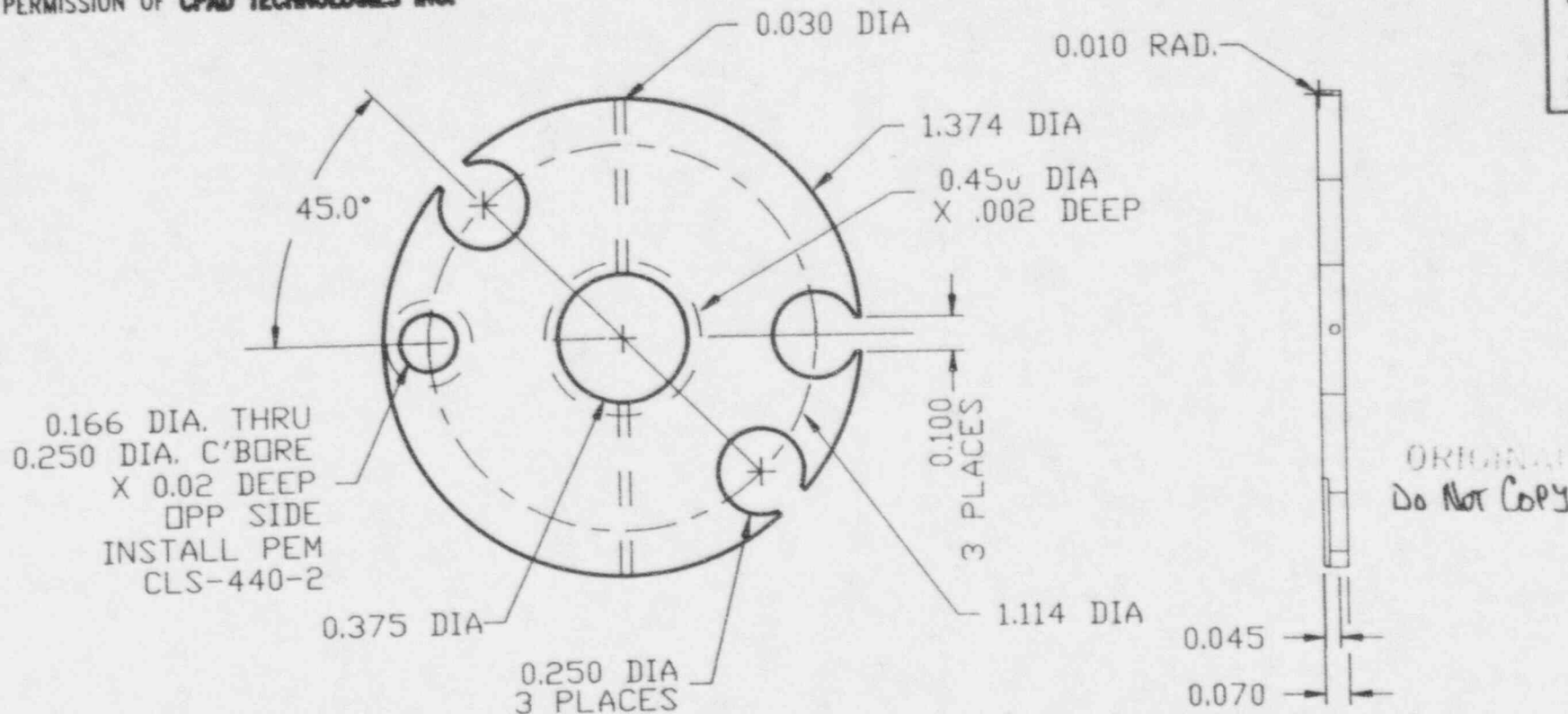
MATERIAL TEFLON
FINISH

SCALE 1.5 : 1

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SYM	REVISION	DATE	BY	CHK

IM-B-022



UNLESS OTHERWISE SPECIFIED

- DO NOT SCALE DRAWING.
- DIMENSIONS ARE IN INCH
- THREAD LENGTH DIMENSIONS ARE FULL THREADS.
- TOLERANCE ON DIMENSIONS (INCLUDING HOLES)
DECIMAL .XX ± .01
XXX ± .002

- REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.
- ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN
- ALL RADII ARE .125 R

MATERIAL ALUMINUM SHEET
FINISH

DWG BY RMJ DATE 12/07/94
CHK BY WK DATE 04.06.96
APPD BY WK DATE 04.06.96

SCALE
2:1

CPAD
TECHNOLOGIES INC.

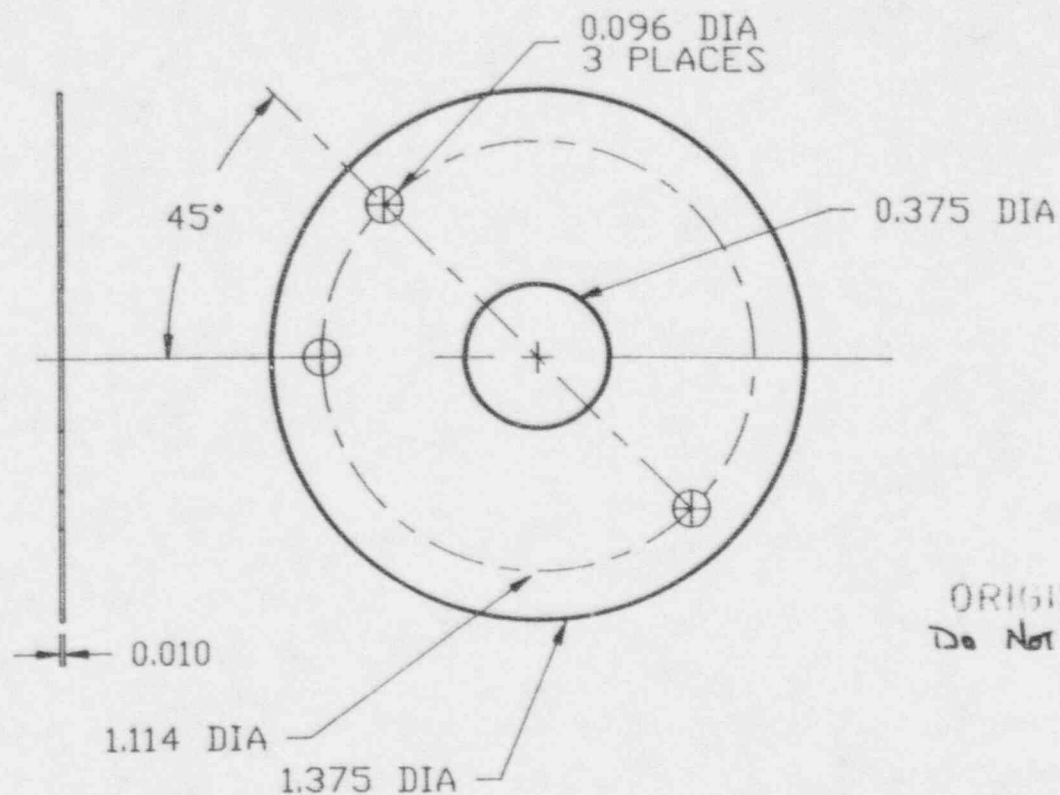
TITLE
SOURCE HOLDING WASHER

SIZE A SHEET 1 OF 1 DWG NO IM-B-022 REV -

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SYM	REVISION	DATE	BY	CHK

IM-B-023



UNLESS OTHERWISE SPECIFIED

- DO NOT SCALE DRAWING.
- DIMENSIONS ARE IN INCH
- THREAD LENGTH DIMENSIONS ARE FULL THREADS.
- TOLERANCE ON DIMENSIONS (INCLUDING HOLES)
DECIMAL .XX ± .01
XXX ± .002

- FRACTIONAL ANGULAR ± .1
- REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.
- ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN
- ALL RADII ARE .125 R

MATERIAL
TEFLON

FINISH

DWG BY RMJ	DATE 13/07/94
CHK BY WK	DATE 04.06.96
APPD BY WK	DATE 04.06.96

SCALE
2:1

CPAD
TECHNOLOGIES INC.

TITLE

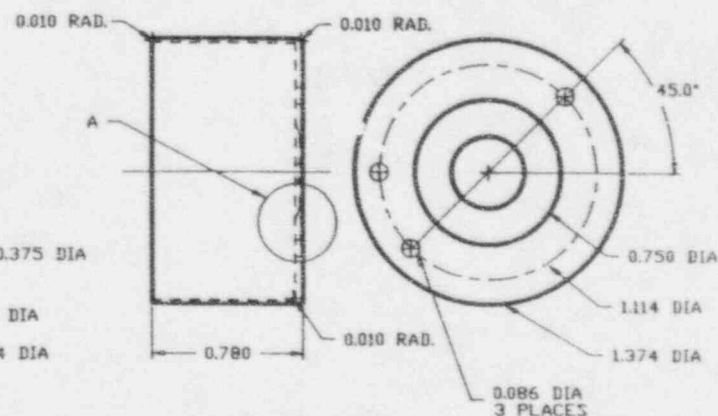
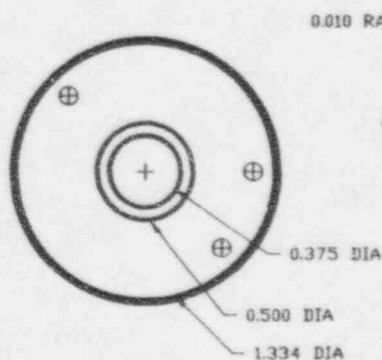
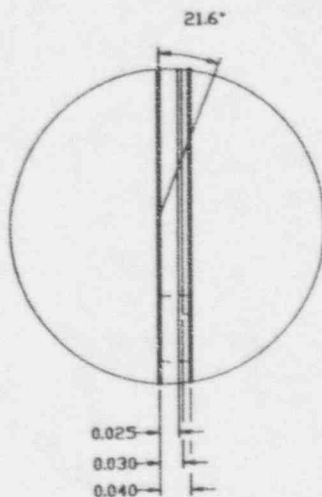
CUP
WASHER SEPERATOR

SIZE	SHEET 1 OF 1	DWG NO	REV
A		IM-B-023	-

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SYM	REVISION	DATE	BY	CHK

IM-B-024



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- DO NOT SCALE DRAWING.
- DIMENSIONS ARE IN INCH
- THREAD LENGTH DIMENSIONS ARE FULL THREADS.
- TOLERANCE ON DIMENSIONS (INCLUDING HOLES)
DECIMAL .XX ± .01
XXX ± .002

- FRACTIONAL ANGULAR ± .1
- REMOVE ALL BURRS AND SHARP CORNERS .015 MAX.
- ROUGHNESS OF SURFACE NOT TO EXCEED 63 IN
- ALL RADII ARE .125 R

MATERIAL ALUMINUM ROD

FINISH

DWG BY RMJ	DATE 13/07/94
CHK BY WK	DATE 04.06.96
APPD BY WK	DATE 04.06.96

SCALE
1:1

CPAD
TECHNOLOGIES INC.

TITLE

CUP
SCREEN HOLDER

SIZE A	SHEET 1 OF 1	DWG NO IM-B-024	REV -
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SYM	REVISION	DATE	BY	CHK

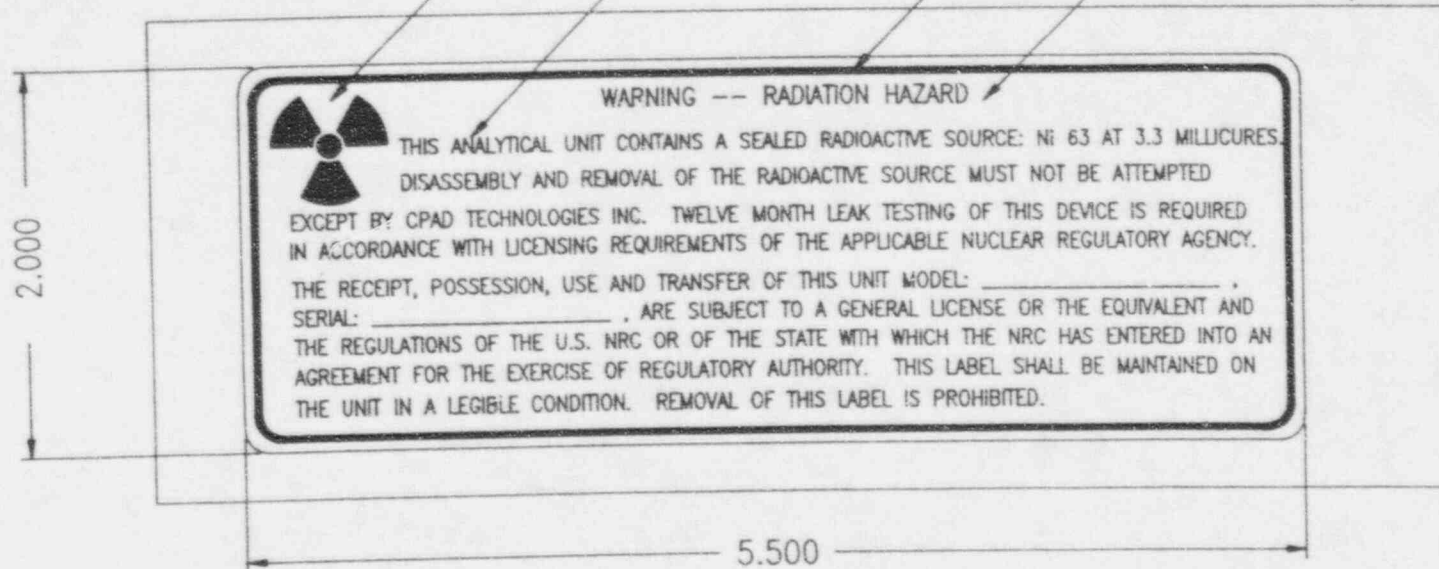
LA-B-007

ATOMIC ENERGY STD.
RADIATION SYMBOL
C.365, SCHEDULE III

FONT .08 (NEW TIMES ROMAN 8)

BORDER .035 WIDE


FONT .095 (TIMES NEW ROMAN 10)



ORIGINAL
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NOTE : THE LABEL WILL BE AN ADHESIVE TYPE.
WITH THE RADIATION SYMBOL AND TEXT COLORED
MAGENTA ON A YELLOW BACKGROUND

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MANUFACTURE OR SALE OF APPARATUS WITHOUT THE
WRITTEN PERMISSION OF **CPAD TECHNOLOGIES INC.**

DWG BY NDW		DATE 30/05/96			
CHK BY RMJ		DATE 03/06/96			
APPD BY WK		DATE 04/06/96			
SCALE 1:1				TITLE RADIATION HAZARD IMS WARNING LABEL	
SIZE A		SHEET 1 OF 1		DWG NO LA-B-007	REV -