CFCLOGISTICS

MS 16
Q-2

June 28, 2004

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U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

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RECEIVED
REGION 1

SUBJECT: Mail Control No. 135003
CFC LOGISTICS, INC., REQUEST FOR ADDITIONAL INFORMATION CONCERNING APPLCIATION FOR AMENDMENT TO LICENSE NUMBER 37-30804-02

03036239

Dear Dr. Lodhi:

This is in reference to your letter of June 9, 2004 requesting additional information on our request to authorize individuals at CFC Logistics, Inc. to be able to move sources in and out of the source plenum.

Your letter of June 9, 2004 specifically requests certificates that confirm that each of the three submissions has "received specific training in the handling of the sources (removing the sources from the casks, and load them in the plenum of the irradiator)".

1. In our letters of May 25, 2004 and June 1, 2004 we supplied to the NRC copies of both a certificate and a "Record of Training" provided by REVISS Services, Ltd. for each of the three individuals under review. You will note that the training is for two specific types of transport containers AS WELL AS a section entitled "And covered the following aspects". Within this section is "OP 309 Issue 4". I have attached a copy of "OP 309 Issue 4, "Safety Instructions for unpacking and use of Cobalt-60 Sources for Irradiators" which is a section of the training manual. All

135003

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three individuals have read this section and have been tutored on the subject during a classroom training session provided by REVISS on October 2, 2003.

2. In addition to the above, GRAY*STAR, Inc. provided hands on training for the handling of the sources including placement in and out of the Source Plenum. This was an ongoing process prior to the receipt of cobalt-60. The training included the use of the actual source handling tools on "dummy" sources. The training also included a review of three Genesis procedures for the handling of sources, GI-201, GI-202 and GI-203 as well as safety guidelines when handling cobalt-60 sources. I have attached Certificates from GRAY*STAR, Inc. on this training.

3. GRAY*STAR, Inc. is presently providing refresher training, including the handling of "dummy" sources (independent of the irradiator) to the three individuals and initial training to two other employees of CFC Logistics, Inc.

Your letter of June 9th. also specifies that "each can perform these tasks without the supervision of another authorized user".

1. We believe that each of the three individuals can perform source handling tasks without the supervision of "another authorized user". However, our procedures state that "The Radiation Safety Officer directly supervises this procedure: the RSO has prior experience, either with radioactive or 'dummy' sources, prior to performance of this procedure." (GI-201, 5.5.1.) and "The Radiation Safety Officer directly supervises this procedure: the RSO has prior experience in loading or unloading shipping casks or has attended a shipping cask manufacturer's training course (or equivalent), prior to performance of this procedure." (GI-202 & GI-203, 5.5.1.).

Item #2. of your letter requests records of Precision Materials Corporation and "the name(s) of the authorized individual(s) under whose supervision" the tasks were performed.

1. Neither CFC Logistics, nor Mr. Stein have the records of Precision Materials Corporation. Precision Materials Corporation no longer exists. Therefore, there is no access to these records. Mr. Stein's training on the handling of radioactive material was performed by Eugene Nestor who was the Training Coordinator of the Operator Training and Certification Board of Precision Materials Corporation. Mr. Nestor passed away several years ago. A copy of his resume which was submitted to the NRC in 1984 is attached.

2. At the time that Precision Materials Corporation received a Materials License, it was common for the licensee to handle the cobalt-60 sources. This was usually the case in irradiators that were built by the licensee which was the case for Precision Materials Corporation. Unlike CFC Logistics' current license, there were no NRC "conditions" specifying that the handling must be performed by a person "specifically licensed" by the NRC. Source handling operations were performed by Precision Materials Corporation. The initial source loading was attended by Dr. Friedman of the Nuclear Regulatory Commission, Region I. There were no items of non-compliance.

Please review the attached documents and let us know if you require further support information.

Sincerely,

James B. Wood
President

CONTROLLED DOCUMENT
(when in red)

REVISS SERVICES

SAFETY INSTRUCTIONS FOR UNPACKING AND USE OF COBALT-60 SOURCES FOR IRRADIATORS

READ ME FIRST

For reasons of safety and to ensure correct usage you must read these instructions carefully together with the specific container instructions before unpacking, using, installing, storing, transporting or disposing of Cobalt-60 radiation sources. If instructions for the specific container are not available, you must obtain them from us before starting the work — or ask us to open the container.

Use only suitably trained, competent and authorised persons to handle or use Cobalt-60 radiation sources, or trainees working under their direct supervision.

Ensure these instructions always accompany the Cobalt-60 sources and are readily available to all persons using them.

If you transfer the sources to another person these instructions must be transferred too.

You should be aware of the following:

- **Cobalt-60 radiation sources emit harmful radiation.**
- **Potentially dangerous radioactive material may be released if a Cobalt-60 source is damaged.**
- **Cobalt-60 sources must not be used under operating conditions or for purposes other than those agreed with us.**
- **Cobalt-60 sources must never be modified without our specific agreement in writing.**

If in doubt get advice from a competent person.

THIS DOCUMENT IS NOT AN OPERATIONS MANUAL

FEEDBACK

If you do not understand anything in this document please let us know so that we can try to help you.

We strive at all times to provide products and services that are suitable for the required applications together with information which will ensure safe use of these products. Information from you regarding the performance of the sources in their specified or agreed applications is important to us in our continuing programme of development and we welcome such information.

REVISS Services (UK) Ltd., 6 Chiltern Court, Asheridge Road, Chesham, Buckinghamshire HP5 2PX, United Kingdom
Telephone +44 (0) 1494 77 7444
Registered in England and Wales number 3050679

1.0 DEFINITIONS

In this document the following words have the specific meanings as given:

"you"
"your"
"yourself"
means the Operator of the plant or facility in which the sources will be put, the Operator's staff and also the Owner/Occupier of the premises.

"we"
"us"
"our"
means REVISS Services (UK) Ltd, its overseas Companies and its staff and agents working under its instruction.
PURIDEC™ Irradiation Technologies is a division of REVISS Services.

"employer"
means a person who is in managerial control of any group of people. This may not be the same person as the Operator or Owner/Occupier.

"adviser on radiation protection"
means a person who has sufficient theoretical, relevant and practical knowledge of ionising radiations and technical knowledge of the processes and working practices being undertaken to be able to give you adequate advice on good radiation protection practice and regulatory compliance. In some countries this may be a legal appointee.

2.0 PURPOSE AND SCOPE

This document gives general guidance on how you can safely handle, install, use, store, transport and dispose of Cobalt 60 radiation sources as used in research and industrial irradiators.

The intention of this document is to ensure compliance with the United Kingdom's Health and Safety at Work Act 1974 and Health and Safety Regulations in Member States which flow from EC Framework Directives 89/391/EEC and 91/383/EEC.

Outside of the UK it is your responsibility to comply with all relevant local and national regulations.

This document is for guidance only. It does not give specific operational instructions for tasks such as installation of sources into plant or equipment, unloading and loading of containers, return procedures for containers. We issue operational instructions for these tasks separately and you will find them in the documentation dossier with each shipment.

CONTROLLED DOCUMENT
(when in red)

REVISS SERVICES

3.0 BEFORE YOU BEGIN

BEFORE RECEIVING, INSTALLING OR USING RADIATION SOURCES OR ANY RADIOACTIVE MATERIAL ENSURE THAT:

- **YOU HAVE TAKEN ADVICE FROM YOUR ADVISOR ON RADIATION PROTECTION**
- **YOU ARE COMPLYING WITH YOUR NATIONAL OR STATE REGULATIONS**
  (see section 4)
- **YOU ARE AWARE OF THE NECESSARY PRECAUTIONS REQUIRED FOR:-**

  SAFE HANDLING
  (see sections 5,6 and 7)

  SAFE USE
  (see section 7.8)

  SAFE MAINTENANCE
  (see sections 7 and 8.3)

  SAFE STORAGE
  (see section 7.7)

  SAFE TRANSPORTATION
  (see sections 4 and 6.4)

  SAFE DISPOSAL
  (see section 7.11)

- **YOU HAVE YOUR OWN OPERATIONAL AND CONTINGENCY PROCEDURES IN PLACE FOR ALL THE TASKS YOU WILL UNDERTAKE, THAT YOUR ADVISER ON RADIATION PROTECTION HAS REVIEWED THESE PROCEDURES FOR ADEQUACY AND HAS APPROVED THEM WHERE NECESSARY, AND THAT OPERATORS HAVE BEEN TRAINED IN THEM.**
- **IF MORE THAN ONE EMPLOYER IS ENGAGED ON THE WORK THAT ALL EMPLOYERS HAVE MUTUALLY AGREED EACH OTHER'S PROCEDURES AND THAT RESPONSIBILIITES FOR TASKS ARE CLEARLY DEFINED**

4.0 REGULATIONS AND LEGISLATION

Before ordering, receiving or using Co 60 radiation sources you must take whatever actions are necessary to ensure that you comply with your National or State laws and regulations governing the acquisition, storage, use and eventual disposal of such materials.

In most countries (except the USA) regulations for use are closely related to the International Atomic Energy Agency (IAEA) regulations and codes of practice.

If you have to transport radiation sources you will need to comply with the version of the IAEA Regulations for the Safe Transport of Radioactive Material as ratified by each country through which transit it is to take place.

In the USA you will need to comply with the relevant chapter of the Codes of Federal Regulations

Depending on the mode of transport you may also need to comply with the regulations of:

- IATA, the International Air Transport Association

and

- ICAO, the International Civil Aviation Organisation

or

- IMO, the International Maritime Organisation

5.0 ON RECEIPT OF A SHIPMENT

5.1 As soon as the shipment arrives inspect each container and if you see any significant then you must not open the container. You should implement your contingency plan (see section 7.2), seek advice from your adviser on radiation protection and notify us promptly. You may also need to inform your National or State Transport and Licensing Regulatory Auhorities.

5.2 If the container is undamaged, check that the documents and labels agree in their description with the product dossier. If there are differences do not open the container, place it in a secure area and notify us promptly.

5.3 Notify the person responsible in your organisation for radiation protection that the shipment has arrived. Update your inventory for radioactive substances noting the identification, activity and date.

5.4 Place the container in a suitable secure store if it is not to be opened immediately (refer to section 7.7 of these instructions).

WARNINGS

The shielding provided by transport containers is adequate to comply with the requirements of the IAEA Transport Regulations but may not be sufficient to allow storage in places of work without additional shielding or segregation from personnel. Consult your adviser on radiation protection for appropriate action to take.

Co 60 sources generate significant quantities of heat; for more information refer to section 7.6 of these instructions.

6.0 UNLOADING AND INSTALLATION

6.1 GENERAL INSTRUCTIONS

You must never attempt to unload a container and install sources unless:

- The superviser holds a current Reviss Services Ltd certificate to operate.
- You have read these instructions and have understood them fully.
- You are fully trained, competent and authorised to handle gamma radiation sources of high intensity.

Read carefully and understand section 7.0 of this document. This section contains valuable information on general and radiological safety precautions.

6.2 UNLOADING, LOADING AND INSTALLING SOURCES IN A WET-STORAGE POOL.

For wet-storage type irradiators the unloading, loading and installation must be carried out in the storage pool under water so that the operators are protected by several metres of water shielding.

Special handling equipment and tools must be used

You should have received from us a full set of operating instructions by the time the container is delivered to you.

If our engineers are performing the load, unload and installation these instructions will also include local rules and contingency plans. In the latter case we will need you to approve these instructions and local rules and operating instructions before we start work.

We will always supply trained, competent and authorised engineers to do such work; in the USA these engineers will be licensed installers.

If you are undertaking the work yourself you should (reference section 7.0) address requirements of your National or state legislation and in particular:

- Assess the risks of the operation and eliminate them as far as is reasonably practicable.
- Draw up systems of work, local rules, emergency and contingency plans.
- If more than one employer is to be present, mutually agree operating procedures and responsibilities.
- Inform and train the persons who will do the work.
- Appoint competent persons to assist with preventive and protective safety measures.
- Provide dosimeters, radiation and contamination detectors.
- Keep doses as low as reasonably practicable.

6.3 UNLOADING, LOADING AND INSTALLING SOURCES IN A DRY-STORAGE PLANT

For dry-storage type irradiators the unloading, loading and installation is carried out using special containers which interface with the plant so that as far as is reasonably practicable engineered controls protect the operators from radiation exposure.

For wet-storage industrial irradiators, unless we have trained and assessed you as being competent to safely handle our containers, our engineers will always perform the loading and unloading operations.

If this is the case, you should have received from us a full set of operating instructions, by the time the shipment is delivered. We will need you to approve these instructions/local rules/operating instructions before we start work.

We will always supply trained, competent and authorised engineers to do such work.

If you are doing the work yourself you should also do those things defined in section 7.2.

6.4 LOADING, REASSEMBLY AND REPACKING OF CONTAINERS

Our operating instructions include all the details needed to load, reassemble and repack a transport container.

You will find instructions in the documentation dossier supplied with the sources for how you should return a container to us.

NOTE

In line with our policy of continuous improvement we may amend our operating instructions from time to time. Always follow the set of instructions provided for the current operation and never use a set which were used for a previous operation.

NOTE

In the UK these are duties under the Health and Safety at Work Act and the Management of Health and Safety at Work Regulations

7.0 RADIOLOGICAL PROTECTION

7.1 GENERAL

All radioactive materials are dangerous if not handled, used, stored, transported or disposed of properly and in accordance with the appropriate regulations. Observe these instructions strictly to avoid danger.

The Cobalt 60 sources used in irradiation facilities emit harmful gamma radiations and you must protect persons adequately from this radiation.

To load and unload containers and install Cobalt 60 sources you should only use persons who are fully trained and competent to work with radiation sources of this type. Your National or State legislation may require that such persons are specifically authorized or licensed.

You should ensure that all persons installing sources in your irradiation facility have and use appropriate personal dosimeters, radiation monitors and contamination monitors. Your local rules should specify which are appropriate and your adviser on radiation protection will advise.

7.2 PLANNING AND ADVICE

Before you make any attempt at loading, unloading or other source movement you should prepare a detailed plan of the tasks contemplated to assess any hazard which may arise from them.

You should prepare a contingency plan for any reasonably foreseeable incident or accident.

We recommend that you perform a trial-run with non-radioactive substitutes before the actual source transfer is made.

If we are performing the source unloading, loading or installation work operation then we will need you to approve our local rules and procedures in advance and we will need also to know any local requirements that we need to comply with in advance.

You may need to define a radiation exclusion zone, the extent of which will depend on your National or State regulations. A particular room or building may be designated, or an area marked out. The boundary of this area must be suitably labelled. Consult your adviser on radiation protection for advice on what is appropriate

You should take all reasonably practicable steps to protect persons from the highly penetrating gamma radiation and minimize their radiation exposure.

You should always consult with and take advice from your adviser on radiation protection.

7.3 RADIATION CONTROL AND MONITORING

The high-activity sources used in irradiation facilities give rise to very high dose rates. Sources of this nature must only be used in shielded facilities and installed using specially designed and shielded transport/transfer containers and equipment.

Shielding for industrial irradiation facilities usually consists of substantial amounts of concrete or water for both storage and use. Shielding for research facilities often consists of dense materials such as lead.

Shielding for transport containers consists of dense materials such as lead or depleted uranium.

You should provide suitable means for preventing inadvertent entry of persons into high radiation areas and for preventing exposure to the sources without adequate shielding. In particular you should never attempt to unload a container unless it is within an adequately shielded facility.

You should use suitable, calibrated, doserate meters to check actual doserates to which persons in the vicinity of the container or the loading/unloading or installation operation will be exposed in order to control their dose uptake.

Cobalt 60 sources are classed as sealed sources and, as such, there should be no release of radioactivity during routine handling and use however, after each task you should check the working area, equipment, tools and personnel for contamination using an appropriate, calibrated, contamination detector.

If you do find contamination, implement your contingency plan and also report the matter to us as soon as possible. In addition you may need to inform your National or State radiation regulatory body and your local authority promptly.

NOTE

We recommend that you use personal gamma-ray integrating dosemeter with audible warning in addition to survey meters.

7.4 ACCOUNTING FOR SUBSTANCES

You should record the quantity and radioactive inventory of all source receipts, movements and despatches and maintain records for an appropriate period as specified in your local rules. This is a legal requirement in many countries of the world.

Some transport containers in which we send you the sources may contain the radioactive material depleted uranium. We have to account to Euratom for movements of depleted uranium and you will be asked to complete and return to our Nuclear Materials Accountants the movement-return form that they will send you.

7.5 DOSERATES AND SHIELDING

WARNING

Use shielding between sources and persons at all times.

The exposure doserate in air at 1 metre from a point source of 1Ci (37GBq) of Cobalt 60 is $13.2mSvh^{-1}$. For various distances and activities (neglecting the effects of source dimensions, scatter and absorption) the maximum exposure doserates are as table 1.

Typical relative shielding properties of lead, concrete (2.3g/cc) and water are shown in table 2.

You should allow for the contribution due to scattered radiation in any calculations and check the total radiation levels measurements.

As a guide, the scatter from a single infinite surface of concrete for Cobalt 60 radiation is a maximum of approximately 12%.

Your adviser on radiation protection will be able to advise more precisely on shielding requirements as necessary.

Table 1: Exposure doserates for Cobalt 60 sources

Activity	Distance (metres)				
	1	3	10	30	100
	exposure doserate/hour				
10Ci (370 GBq)	132mSv	14.7mSv	1.32mSv	147µSv	13µSv
100Ci (3.7TBq)	1.32Sv	147mSv	13.2mSv	1.47mSv	132µSv
1000Ci (37TBq)	13.2Sv	1.47Sv	132mSv	14.7mSv	1.32mSv
10000Ci (370TBq)	132Sv	14.7Sv	1.32Sv	147mSv	13.2mSv
100000Ci (3.7PBq)	1320Sv	147Sv	13.2Sv	1.47Sv	132mSv

Table 2: shielding data for Cobalt 60

	mm to reduce radiation level by a factor of					
	10^1	10^2	10^3	10^4	10^5	10^6
lead	50	90	130	170	210	250
concrete	300	500	700	900	1100	1300
water	1300	1700	2100	2500	2900	3300

7.6 HEAT OUTPUT

Cobalt 60 emits considerable quantities of decay heat – 15.4mWCi^{-1} (0.4mWGBq^{-1}).

A single 10000Ci source of the type used in industrial irradiators will have a surface temperature of around 200°C, much more if the source is insulated or grouped with others, for example, when in a transport container.

The precautions you should take to avoid problems with this heat are as follows:

- Do not allow sources to come into contact with combustible materials.
- Design the plant/facility for efficient removal of heat.
- Do not insulate sources or group them together so that they exceed a prescribed critical temperature. This temperature you will find in the Performance Specification (PSpec) which we supply as part of the documentation dossier.
- Handle loaded transport containers wearing heat-resisting gloves as the external surface temperatures of containers may exceed 85°C.
- Do not oversheet the loaded containers or store in a manner that would prevent the free circulation of air.

7.7 STORAGE

If for any reason you cannot load the sources from the container immediately they arrive, or if you cannot despatch a loaded container back to us immediately then put the container into storage under the following conditions:

- Shield or barrier-off the storage area adequately so that the dose rate on the perimeter is within that required by your regulations.
- Prevent unauthorised access to this area.
- Post appropriate warning notices.
- Do not oversheet or overstack the container.
- If the package has ventilation louvres, do not obstruct them.
- Do not store or use flammable solvents or gases in the same area as the container.

7.8 USE

The sources supplied for use in irradiation facilities are designed for use in the conditions usually found in dry- or wet-storage type

irradiation plants. The Performance Specification (PSpec) which we supply as part of the documentation dossier defines more fully the use and service conditions of a particular type of source.

The sources have been type-tested for such environments and you should not use them for other applications or in other environments without our written permission, at best by doing this you may invalidate the warranty on the sources. You will find more details of type testing in section 8.0

Handle sources carefully and avoid bending, dropping or crushing them.

Do not subject sources to any extraneous loads or excessive heat or to potentially corrosive environments. We can advise you on what is currently considered acceptable.

You may need to test sources routinely for leakage of radioactivity. In some countries this has to be done at least annually, in the UK every two years and in the USA every six months. You will find suggested methods for doing these tests in section 8.0

There are no user-serviceable parts in our sources and you must not modify, re-work or otherwise interfere with any source unless we agree in writing.

7.9 DAMAGE OR LOSS

If you damage, or suspect that you may have damaged, a source during installation, use or if it has been involved in an accident or exposed to adverse conditions then implement your contingency plan.

You must:
seek advice from your adviser on radiation protection.

You should:
inform us promptly.

You may need to:
inform your regulatory bodies promptly.

If you lose a source you should implement your contingency plan immediately and then inform your local and national regulatory authorities promptly. In many countries of the world this is a legal requirement.

You must also inform and seek advice from your adviser on radiation protection.

You should keep records of any investigations taken to locate the lost source and retain them for an appropriate period.

7.10 CONTAINER HANDLING

You should ensure that lifting equipment used in the operation is adequate for the load and tested according to National or State regulations.

If you use a mobile crane during the operation select a suitably qualified and experienced person to be the 'appointed person' in control of crane operations to ensure that a suitable safe system of work is followed. The 'appointed person' should not be the crane operator.

Do not lift a loaded container further from a supporting surface than is absolutely necessary.

NOTE

Containers are designed to withstand a 9-metre drop and a fire without release of activity or significant increase in radiation level, but only when fully assembled. When partly disassembled their performance may be reduced.

7.11 TRANSFER AND DISPOSAL

If you sell or transfer a source or incorporate into other products it is your responsibility to ensure that all subsequent users are made aware of the nature of the source and the specified use.

You must keep proper records of the transfer of any radioactive sources.

In some countries you may need a licence before you can sell or transfer a source.

We would like you also to tell us of the sale/transfer etc. as this helps us to maintain a product life-time record of each source we provide.

You should never consign a source to anyone else without the prior written agreement of that person and only then with notification of the date of the shipment and their indication of readiness to accept at that time.

With the original supply of the sources we supplied you with a product dossier which includes the test certificate for each source, these instructions and other relevant information concerning specification,

safe installation, maintenance, use, and disposal. You must pass on this dossier to the transferee of the sources.

When you no longer need a source and it is to be disposed of, it must be properly packed and documented before to being sent for disposal.

In most countries you will need a licence or other authorisation before you can dispose of a source.

By specific written agreement we may be able to remove and accept back decayed cobalt-60 sources at the time of the re-loading of your plant

8.0 INSPECTION AND TESTING

8.1 TYPE TESTING

Before we place any source design-type into service for the first time we test sources in accordance with the requirements of both the tests for Special Form Radioactive Material in the current edition of the IAEA's Regulations for the Safe Transport of Radioactive Materials and the classifcations of Sealed Radiaoctive Sources in ISO 2919 and ANSI-HPS N43.6.

We may also apply tests to the requirements of other National Standards or Regulatory Authorities.

The IAEA tests for Special Form essentially define that a source retains its integrity in the event of a transportation accident and Transport Competent Authorities issue a certificate to show that a design-type has been so approved. In that they show whether a design-type is able to withstand the effects of heat, percussion, impact and bending they relate indirectly to the ability of a source to withstand accidents in use.

The ISO/ANSI classifications assess design-types for their suitability for typical applications and use a graded system of resistance to temperature, pressure, impact, puncture and vibration, the grade requirement depending on the presumed application.

All our source designs have Special Form Approval (SFA) and have passed the ISO and ANSI classification tests to at least the minimum level required for the intended application. The current SFA number and the ISO/ANSI classification is quoted on the test certificate in the product dossier that we supply with the sources. Please ask if you require integrity data to other standards.

As part of our philosophy of continuous improvement and product surveillance we repeat the type-tests at regular intervals to confirm previous results.

If you are in any doubt as to the suitability of a source for a particular application please ask us for advice

8.2 PRODUCTION INSPECTION AND TESTING

Sources are inspected and their serial numbers are confirmed as we load them into the transport/ transfer containers. You should not need to do further inspection before you install them and, indeed, it is not possible in plants of the dry-storage type. In plants of the wet-storage type the sources usually can be viewed in the pond by means of binoculars.

Sources are tested for leakage and contamination in accordance with ISO 9978 before despatch. You will find the tests performed and their results in your product dossier on the test certificate provided with the source.These tests are performed close enough to the point of despatch that you should not need to test them again at the time of receipt.

If you have any causes for concern on these matters you should implement your contingency plan, seek advice from your adviser on radiation protection and report them to us immediately. You may need also to inform your National, State and Local Authorities.

8.3 IN-SERVICE TESTING

Your National or State regulations may require you to carry out leakage tests at regular intervals.

We recommend you refer to IAEA Safety Series No. 107 which provides guidance on frequency and test methods.

None of the test methods in ISO9978 can be easily applied *in situ* and we recommend the following as alternative methods for checking sources for leakage and or contamination:

Dry-storage plant sources

Draw each source in turn out of the plant through the loading/unloading tube into a shielded container. Wipe the inside of the loading tube with a dry swab

and check it for radioactivity using a suitable, calibrated radiation detector.

Wet-storage plant sources

a) Using a suitable, calibrated radiation detector, measure the exposure dose rate on the resin filters used in the pool water deionisation system to verify the absence of radioactivity in the water.

b) Take a sample of the storage pool water and assay it for radioactivity using a suitable calibrated radiation detector

c) Isolate sources in a suitable container in the pool. Allow the sources to soak for 24 hours in water in this container. Remove the water and assay it for radioactivity using a suitable calibrated radiation detector.

If tests indicate radioactivity in excess of 185Bq you should implement your contingency plan and seek advice from your adviser on radiation protection. You may need also to inform your National, State and Local Authorities. You should also report the facts to us promptly.

Your National or State regulations may specify that you make and retain records of inspection and testing for a specified period.

8.4. RECOMMENDED WORKING LIFE

We define the **Recommended Working Life** (RWL) as the period after which you should consider replacing the source.

This period is not directly linked to the half-life of cobalt 60 but has been derived by us after assessing such factors as

- the toxicity of the nuclide
- the total initial activity
- the source construction
- the half-life
- typical application environments
- operational experience
- performance in prototype tests.
- the results of examinations on used sources

We quote the RWL on the test certificate provided with the source.
At the end of the RWL you should expect to send the source for disposal. Sometimes however, after our consideration of the environment of use, the in-service inspections performed and records kept, we may extend the RWL after we – or a recognised competent person or body – have carried out a thorough examination of the source

9.0 BIBLIOGRAPHY

You can refer to the following publications for advice:

IAEA Safety Series

1. No. 6 Regulations for the Safe Transport of Radioactive Material 1985 Edition (as amended 1990)
2. T-SR1 Regulations for the Safe Transport of Radioactive Material 1996 (revised)
3. No. 102 Recommendations for the Safe Use and Regulation of Radiation Sources in Industry, Medicine, Research and Teaching, Annex II
4. No. 107 Radiation Safety of Gamma and Electron Irradiation Facilities

ISO Standards:

1. ISO2919-1999 (E) Sealed Radioactive Sources - Classification
2. ISO9978-1992 (E) Radiation Protection - Sealed Radioactive Sources - Leakage Test Methods

ANSI-HPS Standards:

1. ANSI/HP N43.6 Sealed Radioactove Sources - Classification

APPENDIX 1: SUMMARY OF UK REGULATIONS FOR HOLDING, USE, TRANSPORTATION AND DISPOSAL OF RADIOACTIVE MATERIALS

In the UK, the principal legislation governing the keeping, use and disposal of radioactive substances (including radiation sources) is the Radioactive Substances Act 1993 (RSA); the Health and Safety at Work Act 1974 (HASWA) and specifically the Ionising Radiation Regulations 1999 (IRR) promulgated under the HASAWA.

1.0 ACQUIRING RADIOACTIVE MATERIALS:

Before obtaining any radioactive substances or for the first time undertaking work with ionising radiation in the UK, you must:

- register and obtain a certificate of registration from the Department of the Environment (RSA Section7) or in Northern Ireland the Department of Economic Development (DED)

and

- notify the Health and Safety Executive (HSE) or in Northern Ireland the DED of the intention to carry out the work at least 28 days before commencing the work (IRR Regulation 5(2))

and

- appoint a suitably qualified and experienced Radiation Protection Adviser (RPA), (IRR Regulation 13)

2.0 RADIOACTIVE WASTE

Before accumulating or disposing of any radioactive waste in the UK you must obtain a certificate of authorisation from the Department of the Environment; in Scotland the SEPA and in Northern Ireland, the DED (RSA Sections 13 & 14).

3.0 TRANSPORTATION

Road transport in Great Britain is governed by the Radioactive Material (Road Transport) Regulations 2002 which implement the IAEA Safe Transport of Radioactive Material (1996 Edition) (Revised)) Regulations and the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

Before transporting any radioactive substance you must ensure that the shipment complies with these regulations and, in addition you may need to prepare and submit a contingency plan as required by the Ionising Radiations Regulations (regulation 12).

4.0 FUNCTIONS OF THE RADIATION PROTECTION ADVISER

Having appointed an RPA his advice must be sought on how the Ionising Radiation Regulations are to be observed and, generally, as regards safety in the work to be done.

In particular the RPA must be asked to advise on:

- the selection and training of Radiation Protection Supervisors (RPSs) to supervise the work (regulation 17)
- the drawing up of written systems of work and local rules for the work to be done (regulation 17)
- appropriate training for the person(s) doing the work (regulation 14)
- appropriate dosimeters, dose-rate meters and contamination monitors (regulations 19 and 21)
- hazard assessments and any 'special hazard assessments' that may be required under regulation 7
- contingency plans for dealing with any reasonably foreseeable accident, occurrence or incident involving the sources (regulation 12)

GRAY✦STAR

GRAY*STAR, Inc. certifies that David Blattner has been trained in the following GRAY*STAR Genesis procedures:

GI-201	**"Source Repositioning"**
GI-202	**"Source Loading"**
GI-203	**"Source Unloading"**

The training included both classroom instruction as well as physical handling of "dummy" sources with actual source handling tools.

The classroom training included full discussion on the above procedures as well as radiation protection guidelines to be followed during the implementation of the above procedures.

Approved by: _____

Russell N. Stein – GRAY*STAR, Inc.

On: 6/27/04

GRAY*STAR, Inc. Mt. Arlington Corporate Center 200 Valley Road Suite 103

Mt. Arlington, New Jersey 07856 USA Phone: (973) 398-3331 Fax: (973) 398-8310

GRAY STAR

GRAY*STAR, Inc. certifies that Russell Stein has been trained in the following GRAY*STAR Genesis procedures:

GI-201	**"Source Repositioning"**
GI-202	**"Source Loading"**
GI-203	**"Source Unloading"**

The training included both classroom instruction as well as physical handling of "dummy" sources with actual source handling tools.

The classroom training included full discussion on the above procedures as well as radiation protection guidelines to be followed during the implementation of the above procedures.

Approved by: _____

Russell N. Stein – GRAY*STAR, Inc.

On: 6/27/04

GRAY*STAR, Inc. Mt. Arlington Corporate Center 200 Valley Road Suite 103

Mt. Arlington, New Jersey 07856 USA Phone: (973) 398-3331 Fax: (973) 398-8310

GRAY STAR

GRAY*STAR, Inc. certifies that Leon Deiter has been trained in the following GRAY*STAR Genesis procedures:

GI-201	**"Source Repositioning"**
GI-202	**"Source Loading"**
GI-203	**"Source Unloading"**

The training included both classroom instruction as well as physical handling of "dummy" sources with actual source handling tools.

The classroom training included full discussion on the above procedures as well as radiation protection guidelines to be followed during the implementation of the above procedures.

Approved by: _____

Russell N. Stein – GRAY*STAR, Inc.

On: 6/24/04

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Mt. Arlington, New Jersey 07856 USA Phone: (973) 398-3331 Fax: (973) 398-8310

PMC

PRECISION MATERIALS CORPORATION

7.3

Eugene R. Nestor

Bernard M. Baruch College 9/69 - 6/71

Old Dominion University 10/76 - 7/78

Orange County Community College 6/80 - 9/83

August, 1984 - Present	Precision Materials Corporation Compliance Officer Mine Hill, New Jersey
July, 1981 - August, 1984	Consolidated Edison Company of New York, Inc. (Indian Point Station) Radiation Protection Supervisor
March, 1979 - July, 1981	Consolidated Edison Company of New York, Inc. (Indian Point Station) Senior Health Physics Technician
March, 1971 - March, 1979	United States Navy

PMC

PRECISION MATERIALS CORPORATION

PROFESSIONAL BACKGROUND

Mr. Nestor joined Precision Materials Corporation in August, 1984 as COMPLIANCE OFFICER. Mr. Nestor has an extensive background in Radiation Protection. Before joining the staff of PMC, he was employed by CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., Indian Point Station, as RADIATION PROTECTION SUPERVISOR. Mr. Nestor was responsible for the supervision of 20 to 30 Health Physics Technicians in the following areas: Radioactive Waste Processing and Shipment; Spent Fuel Pool Fuel Rack Modification and routine power plant operations; and, during shutdowns responsibilities included supervision of 50 to 60 Health Physics Technicians in all aspects of Reactor Plant Maintenance. His duties also included writing of Health Physics Procedures and Instructions, Weekly, Monthly and Quarterly Reports and other Special Situation Reports. Also, while Mr. Nestor was employed by CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., (until June, 1981), he was employed as a SENIOR HEALTH PHYSICS TECHNICIAN at Indian Point Station. His duties then included Routine and Special Surveys, Health Physics Coverage of various maintenance jobs during normal operations and shutdowns and auditing of Contractor Health Physics Technicians.

Mr. Nestor served in the United States Navy from March, 1971 to March, 1979. From June, 1978 to March, 1979 he was stationed on board the USS Trepang (SSN674). His primary duty was as the Leading Engineering Laboratory Technician, responsible for a five-man division overseeing all aspects of Chemistry and Radiological Controls for a Navy Nuclear

Power Plant. He also qualified as Engineering Watch Supervisor and Engineering Duty Petty Officer. From September, 1975 to June, 1978 he was stationed on board the USS George C. Marshall (SSBN654). His primary duties were as Leading Engineering Laboratory Technician and Leading First Class Petty Officer for the Mechanical Division with responsibilities for a five-man division overseeing all aspects of chemistry and radiological controls and for a twenty-man division involved in the Operation and Maintenance of the Nuclear Power Plant. He also qualified as Engineering Watch Supervisor and Engineering Duty Petty Officer. From August, 1973 to July, 1975 he was stationed at the Naval Nuclear Power Training Unit, New York. His primary duty was Staff Instructor and secondary duty was Section Leading Engineering Laboratory Technician. He also qualified as a Site Radiation Monitor by the General Electric Company. From September, 1971 to January, 1972, Mr. Nestor was stationed on board the USS Wasp (CVS-18) in the Hydraulics Section of the Auxiliary Division.

While Mr. Nestor is employed as COMPLIANCE OFFICER by PRECISION MATERIALS CORPORATION his primary duties include: RADIATION SAFETY OFFICER, CHAIRMAN of the SAFETY COMMITTEE and ADMINISTRATOR of the OPERATOR TRAINING/QUALIFICATION PROGRAM.

Mr. Nestor is registered as a Radiation Protection Technologist with the National Registry of Radiation Protection Technologists.