

CODE OF PRACTICE

Conditions for Acceptance of Radioactive Waste (Issue 10)

Updates from previous issue shown in highlighted text

This document has been produced by Tradebe Fawley in consultation with their RPA/ RWA and is not to be reproduced (in full or in part) without prior permission of Tradebe Fawley Limited

PURPOSE

To ensure that radioactive waste arriving at the High Temperature Incinerator at Fawley is in a suitable condition to allow receipt and disposal of the waste.

SCOPE

These Conditions for Acceptance represent the requirements of Tradebe for receipt and disposal of radioactive waste at their Fawley facility.

RESPONSIBILITY

It is the responsibility of The Consignor delivering Radioactive Waste to Fawley to ensure that the requirements of this document are met.

TRAINING / COMPETENCE

Tradebe, through your contact, will provide guidance on the requirements of this document. See section 7 for Tradebe contact information.

Table of Contents

	Page Number
1. Introduction	2
2. Suitability of Wastes for Disposal at Fawley	2
3. Activity per Consignment and per Container	5
4. Preparation of Radioactive Wastes for Consignment to Fawley Incinerator	7
5. Labelling of Radioactive Containers	10
6. Transport Documentation	10
7. Tradebe Contact Information	11
8. Glossary of Terms	12
Appendix 1 – ARDF Form	14/15

1. Introduction

- 1.1 These Conditions for Acceptance represent the requirements for receipt and disposal of radioactive waste at Tradebe's Fawley facility.
- 1.2 Throughout this document the term "RSR" is used to signify the relevant regulatory provisions for control of radioactive substances and wastes in each part of the UK
- 1.3 Consignors requiring advice on disposal of radioactive wastes to Tradebe should consult a suitable RPA/ RWA and, if necessary, the EA, NRW or SEPA. Please note that where an authorisation or permit under RSR requires the undertaking disposing of radioactive wastes to consult a suitable RPA/ RWA or other qualified expert - Tradebe does not offer advice in this capacity.
- 1.4 The information provided in this document has been prepared in consultation with Tradebe's own RPA/ RWA, but is not intended to provide a definitive statement of regulatory requirements and it must not be treated as such.
- 1.5 Organisations wishing to consign radioactive wastes to Tradebe will need to approach the EA, NRW, NIEA or SEPA to obtain their own permit issued under RSR, **unless they fall under a specific exemption.** Tradebe can provide the necessary information concerning its waste disposal service that the consignor will require to complete such an application, in the form of a 'Letter of Intent'.
- 1.6 Tradebe will only accept radioactive waste for disposal at its Fawley facility providing it meets the specification laid out in this document. Waiver or alteration from this specification will only be granted with the prior written consent of Tradebe.

2. Suitability of Wastes for Disposal at Fawley Incinerator

- 2.1 Tradebe's permit allows the processing of radioactive wastes through the following routes:
 - ✓ Drum and Wheelie Bin Hoist of radioactive wastes direct into the incinerator
 - ✓ Direct Injection for liquid radioactive wastes prior to hoisting the empty container
 - ✓ Shredder for oily sludge and larger items such as HEPA filters
 - ✓ Gases injection system for cylinders
- 2.2 Consignors of waste to Tradebe must ensure that suitable and relevant containers are used in accordance with current legislation. For materials that are to be processed via the hoist, individual package size must not exceed that of a 220 litre (45 gallon) drum or 770ltr wheelie bin. For solid radioactive wastes the permitted weight of any one individual drum should not exceed 150Kg, the permitted weight for a wheelie bin should not exceed 120Kg. The maximum weight limit for any individual item within a wheelie bin is 50kg. Exceptions to these weight limits must be agreed with Tradebe prior to acceptance. For

materials that are suitable for processing via the shredder, the overall package limit is 1.2m x 1.2m x 1.2m and the weight limit is 1200kg.

- 2.3 Only waste covered by a current permit or authorisation issued by the EA, NRW, NIRA or SEPA will be accepted (unless the waste is 'Out of Scope' or exempt from the radioactive substances legislation in the UK). The customer will have in place the necessary arrangements for the return to the customer of any non-compliant consignment, or part thereof, delivered to Tradebe for disposal at Fawley.
- 2.4 The following types of radioactive wastes are routinely accepted for disposal at Tradebe's Fawley incinerator.
 - 2.4.1 Packaged solid radioactive wastes
 - 2.4.2 Packaged liquid radioactive wastes (e.g. organic scintillant in vials within outer packaging)
 - 2.4.3 Packaged bulk liquid radioactive wastes
 - 2.4.4 Packaged sludge
 - 2.4.5 Gaseous wastes and liquefied gases contained in cylinders
- 2.5 Aqueous radioactive solutions may be accepted with the prior written consent of Tradebe.
- 2.6 Wastes of a putrescent nature may be accepted with the prior written consent of Tradebe.
- 2.7 Radioactive wastes must be suitable for handling and treatment in the incinerator at Fawley. Consignors must describe their waste in sufficient detail using the form shown in Appendix 1 – Application for Radioactive Disposal Form (ARDF & Annex) – copies are available on request. Consignors should be aware that heavy metallic and some other items may require to be excluded since they may physically damage the incinerator. If you are unsure of the suitability of any item for incineration, please provide details and photographs at the enquiry stage.
- 2.8 Attention is drawn to the requirement on the Annex form for details of external dose rates for each waste package. A statement of the maximum surface dose rate in microSieverts per hour at the external surfaces of the package measured using a suitable hand held radiation dose rate monitor is required.
- 2.9 Radioactive wastes that are transferred under an authorisation or permit made under RSR are exempt from the Hazardous Waste (England & Wales) Regulations 2005, and Special Waste Amendment (Scotland) Regulations 2004. However, if the radioactive waste is exempt from the requirement for authorisation or permitting under RSR and would otherwise be a Hazardous Waste because of its other properties, it must be declared and treated as such and these regulations will be applied in full.

- 2.10 The solid ash from the incinerator is disposed of as either solid very low level waste (with a limit of 40 KBq in any single item in this waste) or as exempt NORM. Accordingly, wastes in which the radioactivity content will not be adequately dispersed by the incineration process must be excluded from the incinerator. Consignors must consult their own RPA/ RWA and Tradebe if in any doubt about the suitability of a particular item or waste stream.
- 2.11 For the reason described above it is not possible for Tradebe to accept sealed radioactive sources in the form of ceramic beads/pellets or metal capsules that are likely to remain intact in the incineration process. Some types of low activity sources may be acceptable when present with other radioactive wastes. However, these must always be declared and will only be accepted with Tradebe's prior written consent.
- 2.12 The following types of radioactive wastes must generally be **excluded** from wastes sent to Fawley incinerator. Waiver or alteration from this specification will only be granted with the prior written consent of Tradebe.
- Pieces of uranium metal including shielding from sealed source containers, etc.
 - Radioactive luminous articles such as old clocks and watches and radioactive luminous "EXIT" signs and similar.
 - Radioactive lightning conductors.
 - Anti-static devices that use a radiation source (e.g. polonium-210)
 - Any sealed radioactive sources, for example, sources comprising cobalt-60, caesium-137, americium-241 and nickel-63 whether present as capsules or foils.
 - Lead metal including the shielding in sealed source containers and in some types of plastic containers used to hold vials of radioactive solutions (e.g. iodine-125 and phosphorus-32).
 - Large metallic objects such as piping, ducting and flanges.
- 2.13 Tradebe can accept small quantities of uranium and thorium compounds under RSR exemption provisions but any such items must be presented separately. Tradebe can provide advice on packaging requirements.

3. Activity per Consignment and per Container

3.1 Tradebe's RSR permitted monthly limits and standard package and consignment limits appear in the following table. All values quoted are in MegaBecquerels (MBq).

Categories and individual radionuclides		Permitted monthly limit	Consignment limit	Package limit		
1	Tritium	7,500,000	2,000,000	100,000 (1,000 for shredder)		
2	Carbon-14	2,000,000	2,000,000	200,000 (1,000 for shredder)		
3	Phosphorus isotopes- ³² P, ³³ P	45,000	100	6	48	
	Sulphur-35		250	20		
4	All other beta emitters and weak gamma emitters ³⁶ Cl, ⁴⁵ Ca, ⁵¹ Cr, ⁵⁵ Fe, ⁶³ Ni, ⁹⁰ Sr, ¹⁰⁹ Cd, ¹²⁵ I, ¹²⁹ I, ¹⁴⁷ Pm,		500	48		
5	Medium gamma emitters ⁵⁷ Co, ⁶⁵ Zn, ⁷⁵ Se, ⁸⁵ Sr, ⁸⁶ Rb, ⁹⁵ Zr, ¹⁰³ Ru, ¹⁰⁶ Ru, ¹³¹ I, ¹³³ Ba, ¹³⁷ Cs, ²⁰³ Hg		250	20		
6	Strong gamma emitters ²² Na, ⁴⁶ Sc, ⁵⁴ Mn, ⁵⁹ Fe, ⁵⁶ Co, ⁵⁸ Co, ⁶⁰ Co, ^{110m} Ag, ¹²⁴ Sb, ¹³⁴ Cs, ¹⁵² Eu, ¹⁵⁴ Eu		100	10		
7	Other man-made gamma emitting isotopes not listed		100	10		
8	Weak alpha emitters ²¹⁰ Po, ²²³ Ra, ²²⁴ Ra, ²²⁶ Ra, ²³² Th, ²³³ U, ²³⁴ U, ²³⁵ U, ²³⁶ U, ²³⁸ U, ²⁴² Cm		500	20 ²		
9	Actinium 227		10	1 ²		
10	Alpha emitters (shredder or wheeler bin)		100	0.8 ^{1 2}		
	Alpha emitters (solids for the hoist or pumpable liquids)			1 ¹²		
11	NORM (sum of highest activity isotope from each decay chain)	²³⁸ U, ²³² Th, ²³⁵ U,	10,000	200 (Total)	20	40 ¹
		²²⁶ Ra, ²¹⁰ Pb, ²¹⁰ Po	(sum of highest activity isotope from each decay chain)	400 (per radionuclide)	40 ¹	
		²²⁸ Ra, ²²⁸ Ac, ²²⁸ Th		150 (per radionuclide)	20 ¹	

¹ This value may increase for specific waste streams subject to the preparation of an appropriate risk assessment – please contact Tradebe for details

² See condition 3.8 for multiple alpha emitters

- 3.2 The authorised limits in the above table refer to Tradebe's own RSR permit. Consignors must ensure that the wastes to be transferred fall within the limits and conditions of their own transfer authorisation/permit.
- 3.3 For wastes containing mixed radionuclides the total activity from all listed radionuclides in each separate category (3-10) must be summed.
- 3.4 NORM (category 11) limits apply only if no other isotopes are present from groups 1 to 10.
- 3.5 These package limits are based on Tradebe's processing constraints, including RSR permitted daily limits and limits on concentrations in solid waste arisings from the incinerator. They do NOT necessarily imply that these activities can be transported in individual packages declared as "excepted packages" or "industrial packages" under the current Transport Regulations or other applicable regulations. Consignors must ensure that they address this issue themselves. Note that the limits for C-14, tritium and some alpha emitters in excepted packages are lower than stated above, especially in the case of liquid wastes.
- 3.6 Package and consignment limits for radionuclides in the "other beta/gamma" category are restricted so as to facilitate compliance with the concentration limits applied to solid arisings including ash from the incinerator. For gamma emitting isotopes in Categories 5 and 6 additional restrictions are imposed to control external radiation levels and the exposure of workers at the Fawley site.
- 3.7 Package limits for gamma emitters in Categories 4, 5 and 6 above are based on calculations of dose rates for a nominal 200 litre cylindrical waste volume. For smaller packages these (Category 5 and 6) activity limits may need to be reduced pro-rata.
- 3.8 Where a package contains alpha emitters from more than one of Categories 8, 9 and 10, a sum of quotients must be used to determine acceptability (unless accepted under condition 3.9)
- 3.9 Package limits for alpha emitters above may be increased on the provision of additional information. In these cases, please provide information on package type, contents of package, weight and breakdown of isotopes.
- 3.10 As a general guide, Tradebe are likely to accept a drummed package with an average surface dose rate that is less than 30 microSieverts per hour with a Transport Index of less than of 0.3. Activity or dose rate in excess of the stated package and consignment limits may be acceptable subject to Tradebe's prior written agreement. Where the maximum surface dose rate is greater than 30 microSieverts, both maximum and average dose rates should be supplied
- 3.11 Consignors must declare the activity of all radionuclides in waste that they send to Fawley for incineration for each consignment. When declaring activity in waste containers, consignors must complete the ARDF form and annex (copies are available on request) shown in Appendix 1 and note the following points.

- ✓ All isotopes must be declared separately.
- ✓ Activity in radioactive wastes which could otherwise be disposed of as solid very low level waste according to authorisations and permits made under RSR MUST be declared - these wastes must NOT be treated as "non-active" for the purpose of calculating the total activity in a container or consignment.
- ✓ Likewise any activity in wastes that could otherwise be disposed of under the provisions of the current exemptions must be declared. Note that not all wastes of this type may be sent to Fawley incinerator (see previous section on suitability of wastes for disposal at Fawley incinerator).
- ✓ Except for NORM (see below), declared activities must include those of all decay products known or likely to be present in the wastes at the time of processing at Tradebe.
- ✓ If in doubt about what to declare consult your RPA/ RWA and Tradebe.

3.12 For NORM:

- ✓ An adequate radiochemical fingerprint is required for the waste stream to determine:
 - The highest activity in each of the decay chains below (these are the entries that appear in the Fawley permit)
 - A separate declaration of lead-210
 - A separate declaration of polonium-210
- ✓ The consignor must have an adequate method for monitoring individual waste containers to determine activity (most likely gamma dose rate will be used but with disequilibrium (higher than Ra-226) lead-210 or polonium-210 levels radiochemical analysis of samples from individual waste containers may be necessary.
- ✓ The monitoring method should be able to detect any significant diversion from the agreed fingerprint.

Th-232=	Th-232, Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po-212/ Tl-208
U-235=	U-235, Th-231
U-238=	U-238, Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb,214, Bi-214, Po-214, Pb-210, Bi-210, Po-212, Tl-208

4. Preparation of radioactive wastes for consignment to Tradebe's Fawley incinerator.

- 4.1 Consignors are responsible for preparing and packaging radioactive wastes for transport to Fawley but are also required to meet minimum standards set by Tradebe that are aimed at ensuring that the risks to its own personnel are suitably controlled.

4.2 The following minimum standard of waste packages must be met for acceptance of wastes at the Fawley plant:

- ✓ Metal, plastic or fibreboard drums, not greater than 220-litre capacity, in good condition with well fitting lids. Lids must be secure in transit but should not be fixed down in such a way that prevents their being loosened immediately prior to loading into the incinerator. (This is necessary to avoid build-up of pressure.)
- ✓ The maximum volume of solid waste in an individual container is 220 litres (45 gallon). To avoid damage to the brick lining of the kiln the maximum weight of such waste in any one container should be kept below 150Kg, exceptions are possible by prior written consent.
- ✓ Some solid wastes, some oily sludge and NORM wastes, and can also be accepted in IBCs, wooden crates and pallet boxes. (Please consult Tradebe for suitability of your waste). The overall package limit is 1.2m x 1.2m x 1.2m and the weight limit is 1200kg.
- ✓ Some solid waste can also be accepted in lined wheelie bins max 770L, subject to dimensions being compatible with Fawley handling equipment (full specification available on request). Please consult Tradebe for suitability of your waste. Once full, wheelie bins should be sealed using single use numbered tags to ensure no further waste is added. Tag numbers must be declared on the Annex to the ARDF.
- ✓ Tradebe can accept waste packages which are over-packed in full height ISO containers and half height ISO containers for transport. Please consult Tradebe if you wish to transport your waste in an ISO container.
- ✓ The maximum mass of low melting point metal such as copper/aluminium in a single drum is 25kg.
- ✓ The maximum mass of lithium is 2.5kg in a single drum – please consult Tradebe about specific packaging requirements
- ✓ The maximum mass of elemental sodium is 2.5kg in a single drum – please consult Tradebe about specific packaging requirements
- ✓ The maximum volume of non-pumpable aqueous sludge waste in an individual container is 60 litres (20 litres if oil or solvent based). This value increases to 1000 litres for materials that are suitable for processing via the shredder. Please consult Tradebe for suitability of your waste.
- ✓ The maximum volume of free liquid waste in an individual container of solid waste shall not exceed 20 litres for materials suitable to be hoisted into the incinerator. This does not apply to small volumes contained within individual scintillation vials and similar where the limit is increased to 50 litres (total volume of liquid in the vials).
- ✓ Liquids delivered to Fawley in closed head or bung top containers up to 220 litre (45 gallon) or IBCs will usually be processed using a direct injection system prior to the empty container being incinerated. Such wastes must, as far as possible, be free of suspended solids and should, if necessary, be filtered prior to transfer to Fawley.

Any remaining suspended solids shall be no greater than 3mm unless the material and activity is suitable for processing via the shredder (please consult Tradebe for further information). **Viscous liquids are not pumpable through the site systems, please contact Tradebe for advice.**

- ✓ NORM waste often has mercury contamination. Please obtain a mercury analysis and declare the level of contamination at the time of your enquiry. Package limit of 2kg mercury applies to all wastes.
- ✓ Asbestos must be declared, double bagged and limited to 5kg per container. Other packaging techniques that prevent exposure to our operators will be considered.
- ✓ Further restrictions apply to beryllium, lead, nickel and other heavy metals – please consult Tradebe for further details.
- ✓ Uranium and Thorium compounds can be accepted for incineration. Package limit of 500g (as U and Th) applies to all compounds except those of enriched uranium where the packages must also be fissile exempt

Deviations from the above will be considered and only accepted with the prior written agreement of Tradebe.

- 4.3 Except for bulk liquids in drums, waste containers are accepted on the basis that they will be introduced unopened into the incinerator at Fawley. Prospective consignors are encouraged to study the package and consignment limits in Section 3 *before* packaging their wastes since Tradebe does not have facilities at Fawley for handling radioactive wastes retrieved from individual packages delivered to the site.
- 4.4 Tradebe can accept the use of returnable secondary containers that require their contents emptying at Fawley site **with prior agreement**, appropriate primary containers must be used to ensure safe handling at site. Where the use of secondary transport packaging is approved by Tradebe, the empty over-pack will be returned as 'RADIOACTIVE MATERIAL, EXCEPTED PACKAGE - EMPTY PACKAGING' under UN2908.
- 4.5 Where individual packages are over-packed in ISO containers, the inner packages must be labelled according to Tradebe's minimum requirements (see section 5 below).
- 4.6 Where individual packages are over-packed in ISO containers, waste consignors should ensure that there is control of contamination on the outside of the waste packages. Instances of non-fixed contamination in excess of 4Bq/cm² β/γ or 0.4Bq/cm² α on the outside of waste packages will be raised with the consignor.
- 4.7 Waste containers are monitored for external dose rate upon arrival at Fawley site. The external dose rate limit for an excepted package is 5 microSieverts per hour. Tradebe also accepts wastes containing gamma emitters which are being transported under the Low Specific Activity (LSA) category (contained in approved Industrial Packages). All packages must be labelled **in accordance with ADR**, with the appropriate transport label

i.e. White-I for dose rates below 5 μ Sv/hr and Yellow-II with transport index if contact dose rate exceeds 5 μ Sv/hr.

- 4.8 All consignments of radioactive wastes are checked upon arrival for evidence of external radioactive contamination. In order to comply with transport requirements, waste consignors should ensure that there is **control of** contamination on the outside of transport packages. Instances of contamination on the outside of waste containers will be raised with the consignor. If levels of contamination exceed those permitted for transport, a copy of the report made will be requested.

5. Labelling of Radioactive Waste Containers

- 5.1 Note that this section does not seek to provide a definitive statement of the requirements of the relevant transport regulations and in some cases Tradebe's requirements exceed these. For example, while the regulations may not demand "radioactive" markings on the outside of some types of package containing low levels of radionuclides, Tradebe does require this to assist in recognition of these packages at its own site.
- 5.2 All containers of radioactive waste must be labelled in accordance with current legislation. As a minimum requirement we ask for the following:
- ✓ Class 7 warning diamonds appropriate to the designation of the package for the purpose of the transport regulations or, for example in the case of "excepted packages", alternative warning signs including the radiation trefoil and the word "radioactive".
 - ✓ Additional warning signs appropriate to any other hazardous properties of the waste.
 - ✓ The consignor or consignee's name and address.
 - ✓ The names of the principle radionuclides in the wastes and the activities of each present or the total activity. It is not necessary to list minor components in the wastes or decay products although these must be declared on the ARDF form.
- 5.3 Consignors must consult their RPA/ RWA or DGSA if clarification is required.

6. Transport documentation

- 6.1 Consignors will be required to complete a signed declaration on the ARDF form relating to the packaging and transport of their wastes. The ARDF declaration is for Tradebe's purposes and its completion does not imply that the consignor has necessarily discharged their responsibility to provide a "transport document" in connection with the transport regulations. Consignors must consult their RPA/ RWA, DGSA or Waste Carrier if they are in doubt as to how to meet this requirement.
- 6.2 Consignors should submit this declaration to Tradebe who will then issue the consignor shipping approval and an agreed date for acceptance of wastes at Fawley. A copy of the signed ARDF must also be included with the transport documents for each consignment.
- 6.3 For the benefit of both Tradebe and the carrier of their wastes, consignors are required to include with their consignment written information of who within their organisation can be contacted in the event of accidents or queries involving their wastes.
- 6.4 To avoid unnecessary delays or refusal of access onto site, consignors wishing to bring their own wastes to Tradebe's Fawley site should consult the site in advance for information about deliveries of wastes and a booking reference number must be quoted by the driver on arrival at Fawley Site.

7. Tradebe Fawley Contact Information

For Sales and Technical Advice:	To arrange the collection and/or delivery of a consignment to Fawley
<p>Paul Turner Business Manager / RPS Tradebe Fawley Charleston Road Hardley, Hythe Southampton SO45 3NX</p> <p>Tel: 023 8088 3018 Fax: 0238 088 3010 E-mail: paul.turner@tradebe.com</p> <p>OR</p> <p>Bruce Wilson Commercial Manager Tradebe Fawley Charleston Road Hardley, Hythe Southampton SO45 3NX</p> <p>Mobile: 07920 876 499 Fax: 0238 088 3010 E-mail: bruce.wilson@tradebe.com</p>	<p>Paul Turner Business Manager / RPS Tradebe Fawley Charleston Road Hardley, Hythe Southampton SO45 3NX</p> <p>Tel: 023 8088 3018 Fax: 0238 088 3010 E-mail: paul.turner@tradebe.com</p> <p>OR</p> <p>Clare Dalton Active Waste Chemist / RPS Tradebe Fawley Charleston Road Hardley, Hythe Southampton SO45 3NX</p> <p>Tel: 023 8088 3007 Fax: 0238 088 3010 E-mail: clare.dalton@tradebe.com</p>

Approved by:

Mick Barker

Site Manager

8. Glossary of Terms

Activity	Measure of an amount of a radionuclide. Describes the rate at which transformations occur in it. Unit Becquerel. Symbol Bq. 1 Bq = 1 transformation per second. Multiples: kiloBecquerel (kBq, 10 ³ Bq), megaBecquerel (MBq, 10 ⁶ Bq) and gigaBecquerel (GBq, 10 ⁹ Bq).
Consign	In the context of waste, means the transfer to Tradebe for the purpose of disposal at Fawley.
Consignment	A single shipment of waste and packaging received from a single customer.
EA	Environment Agency of England.
Free Liquid	Liquid that is present in a separate phase.
DGSA	Dangerous Goods Safety Adviser.
NRW	Natural Resources Wales
RPA	Radiation Protection Adviser. Person or body appointed in accordance with the Ionising Radiations Regulations (1999) to give advice on radiation protection.
RPS	Radiation Protection Supervisor. Person appointed in accordance with the Ionising Radiations Regulations (1999) who is responsible for the day-to-day supervision of work with ionising radiation.
RSA93	Radioactive Substances Act (1993).
RWA	A RWA is a specialist in radioactive waste disposal and environmental radiation protection who has demonstrated competence in the RWA syllabus.
RSR	Throughout this document the term "RSR" is used to signify the relevant regulatory provisions for control of radioactive substances and wastes in each part of the UK, as appropriate
NIEA	Northern Ireland Environment Agency
SEPA	Scottish Environment Protection Agency.
Hazardous Waste Regulations	Hazardous Waste (England & Wales) Regulations (2005) including any current amendments thereto or any re-enactment thereof.