



**Springfields Fuels Limited**

# **Annual Environment Health & Safety Report 2009/10**

**July 2010**

Author: **A. G. Taylor**  
Checked by: **A. Parkinson**  
Approved by: **G. G. Gill**



# Executive Summary

This report charts Springfields Fuels Limited's health, safety and environmental performance in 2009 and provides contacts for further information.

Springfields Fuels Limited considers that the data demonstrate that the impact of site activities and operations on the health & safety of its workforce, members of the public and the environment is well controlled and very low.

The site has won a major RoSPA Award in the Manufacturing Sector in 2010, the tenth such award in succession recognizing the site's excellent safety performance.

In order to assess its performance in managing the biological diversity on site, the company sought and achieved the Wildlife Trusts' Biodiversity Benchmark in October 2008, one of only 16 companies in the UK to achieve the award at that time and the only NDA site to have done so.

Please note the following:

The Environment Agency (EA) is working with the industry on developing a Nuclear Sector Plan (NSP). A report for 2008 has been published and is available to the public, showing environmental performance against performance indicators and information about discharges.

The Springfields Radioactive Substances Act discharge Authorisation and Environmental Permit both require monthly reporting of data. This information is publicly available from the EA, either from their area office at Penrith or the EA website:  
<http://www.environment-agency.gov.uk/>



---

# Contents

<b>Introduction to the Springfields Site</b>	<b>4</b>
<b>Site Safety Performance</b>	<b>5</b>
Accident Data	5
Radiation Dose Data	7
Safety Incidents	7
Emergency Planning	7
<b>Site Environmental Performance</b>	<b>9</b>
Summary of Radioactive Discharges to Air and Water	9
Solid Waste Disposals	12
Recycling and Reuse	12
Impact of Discharges (Doses to Public)	13
Non Radioactive Discharges	13
Environmental Incidents and Inspections	13
Energy and Water usage	14
Greenhouse Gas (CO <sub>2</sub> ) generated	14
Contaminated Land	14
Biodiversity Action Plan and Wildlife conservation	14
<b>Public Engagement (Springfields Site Stakeholder Group)</b>	<b>15</b>
<b>Conclusions</b>	<b>15</b>
<b>Glossary of Technical Terms</b>	<b>15</b>
<b>Appendix – Useful Links</b>	<b>16</b>

# Introduction to the Springfields Site

Springfields is a nuclear licensed site located at Salwick, near Preston, Lancashire. The Nuclear Decommissioning Authority (NDA) owns the assets and liabilities of the site. For the duration of this report, the Springfields site was operated under a management and operations (M&O) contract by Westinghouse Electric UK Limited, who managed Springfields Fuels Limited (SFL) on the NDA's behalf. SFL carried out the day-to-day commercial operations and discharge of liabilities.

SFL manufactures nuclear fuel products for the UK's nuclear power stations and for international customers. Springfields provides a complete uranium (U) fuel cycle manufacturing capability. SFL's main activities on site include:

- production of uranium tetrafluoride ( $UF_4$ ) from uranium trioxide ( $UO_3$ );
- production of uranium hexafluoride ( $UF_6$ ) by reaction of  $UF_4$  with fluorine ( $F_2$ );
- manufacture of natural U metal fuel clad in magnesium alloy (Magnox);
- conversion of enriched  $UF_6$  to uranium oxide ( $UO_2$ ) powder by reaction with steam and hydrogen;
- manufacture of oxide fuel pellets and finished oxide fuel clad in Advanced Gas-cooled Reactor (AGR) stainless steel cans;
- recovery of U from residues and legacy materials;
- decommissioning.

These processes are supported by a number of associated activities, including residues recovery lines, a decontamination facility, analytical laboratories, a site laundry and Research and Technology laboratories (operated by the National Nuclear Laboratory).

More than 1300 people are currently employed directly by SFL with over 50 agency staff and contractors also working on the Springfields site. The site covers approximately 80 hectares, contains two Biological Heritage Sites and is home to several protected species.



---

# Site Safety Performance

## Accident Data

Springfields has been striving in recent years to achieve and maintain 'world-class' safety performance. It has been successful in making improvements and this has been recognised by the winning of awards for industrial safety from the Royal Society for the Prevention of Accidents (RoSPA) in every year since 2001:-

↓	2001	Winner	Manufacturing Sector
↓	2002	Highly Commended	Manufacturing Sector
↓	2003	Commended	Manufacturing Sector
↓	2004	Commended	Manufacturing Sector
↓	2005	Commended	Manufacturing Sector
↓	2006	Highly Commended	Manufacturing Sector
↓	2007	Highly Commended	Manufacturing Sector
↓	2008	Winner	Manufacturing Sector
↓	2009	Commended	Manufacturing Sector
↓	2010	Highly Commended	Manufacturing Sector

The accident data in the charts below demonstrates that Springfields continues to achieve an excellent safety record, although there was an increase in Total Recordable Injury Rate as numerous incidents were attributed to the significant period of inclement weather during the winter months. All employees attend an annual safety workshop to discuss issues such as health, chemical safety and accident prevention. The Springfields Event Learning Forum continues to meet on a quarterly basis and has considered events such as site asset management and improvements, 5S, consequences and risk perception and PPE over the past 12 months.

The safety management team have undertaken to hold safety surgeries throughout operational areas on the site. This will give individuals a further forum to highlight potential safety issues in their areas. It is hoped that by holding these surgeries, issues will be raised, prioritised and dealt with without impacting on production activities.

A safety metrics dashboard was introduced across the organisation and has been utilised during the second half of the financial year. Feedback to date has been positive and we are looking to further refine the data during the next financial year, in line with feedback and developments within the business.

Fig 1. Springfields Accident Rates 2006-2010

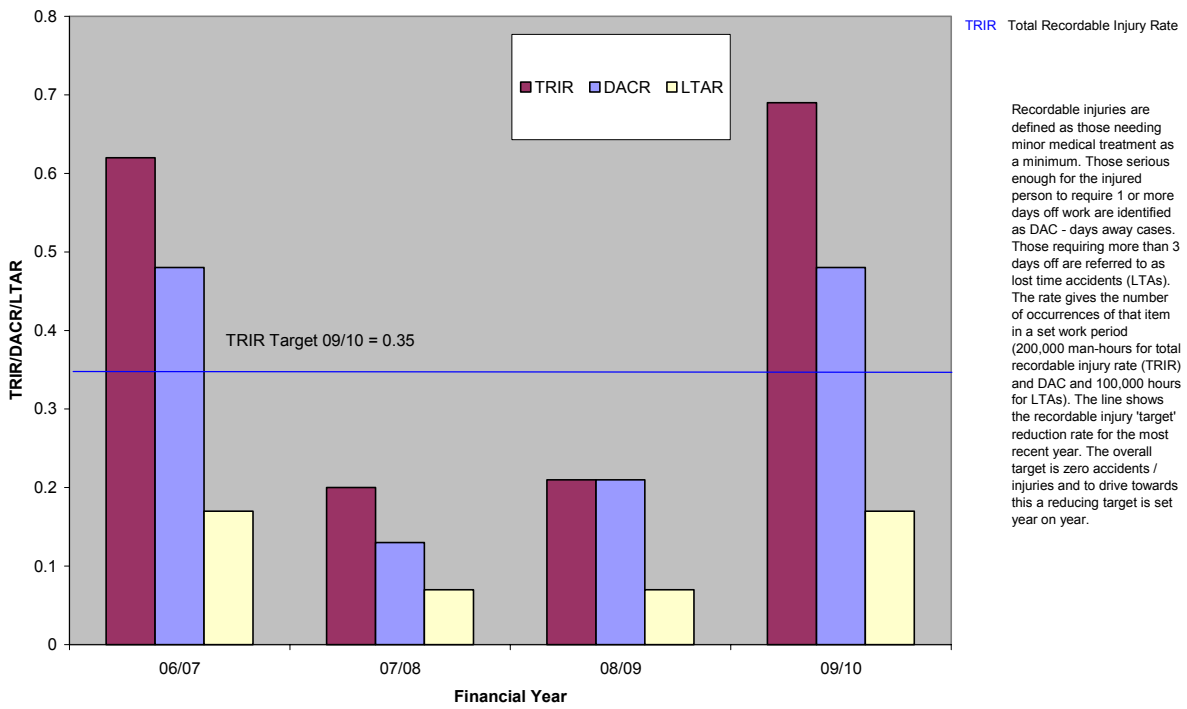
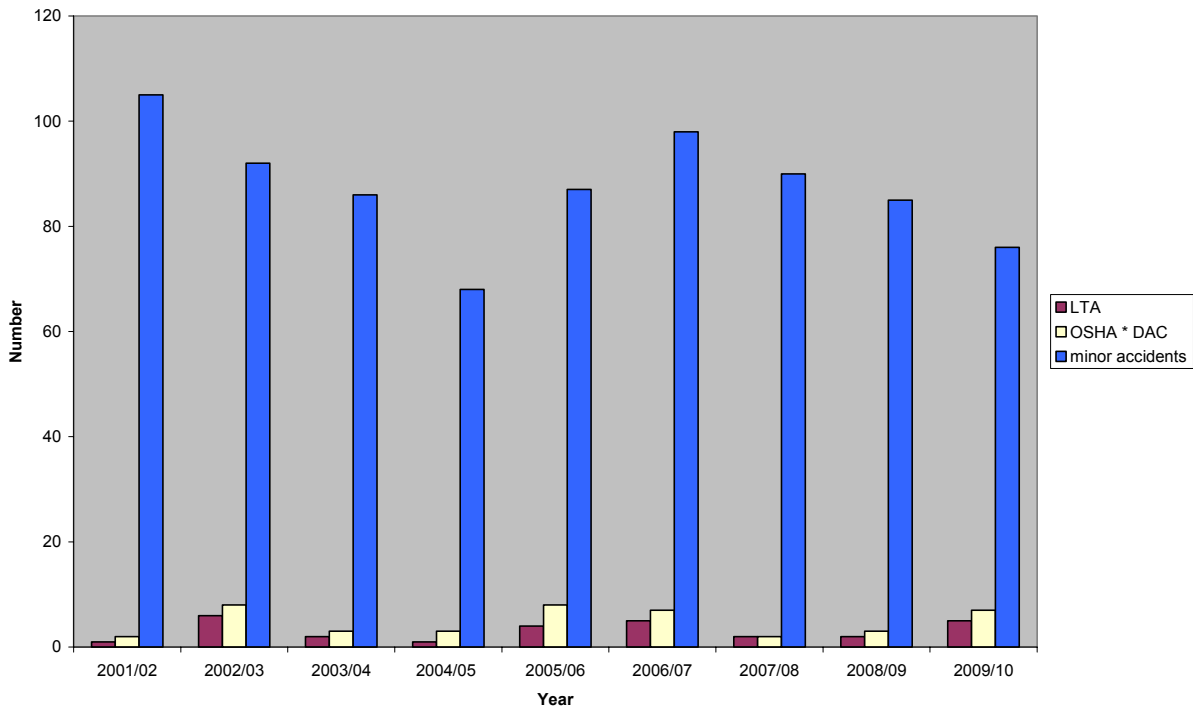


Fig 2. SFL Accidents Since 2001



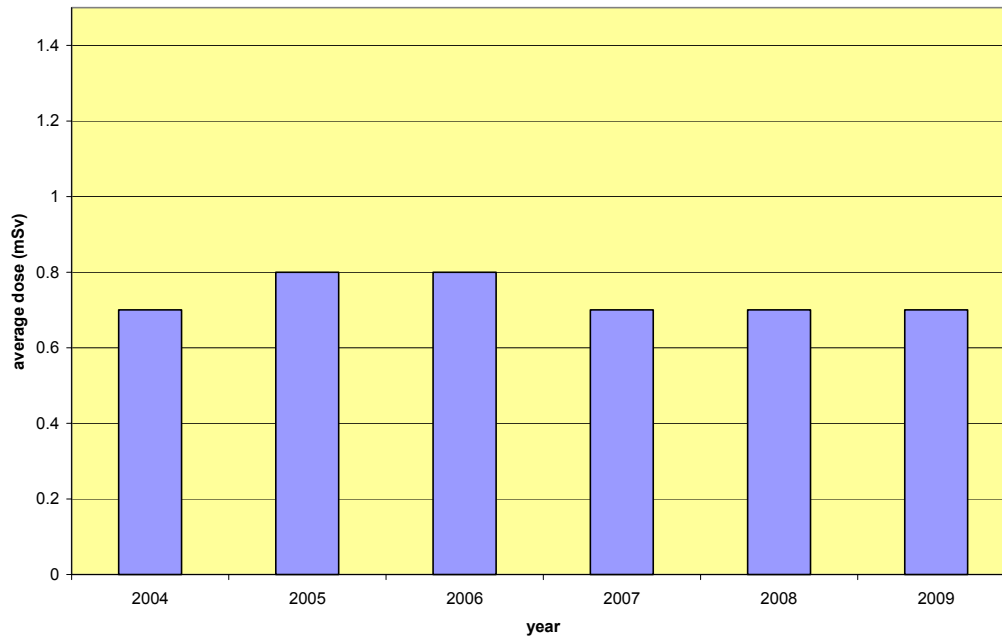
\*OSHA = Occupational Safety Health Administration.



## Radiation Dose Data

Radiation dose data is reported in calendar years, as shown in the chart below.

Fig 3. Springfields Fuels Limited Employees Average Dose (mSv)



By law, workforce radiation doses must be kept As Low as is Reasonably Practicable (ALARP). However, maximum permitted annual doses are specified in legislation as follows:-

Maximum permissible whole body dose – 20 millisieverts (mSv) per year. The chart demonstrates that average doses to Springfields employees, due to their employment, are significantly below the limit and 'ALARP', at or below 1 mSv for many years. The highest individual dose on site in 2009 was 2.5 mSv, comparable with the highest in 2008 of 2.8 mSv.

For comparison, the average dose received by members of the public in the UK from naturally occurring sources of radiation such as cosmic rays and local geology is about 2.2 millisieverts per year.

## Safety Incidents

There were no incidents with any off-site impact.

## Emergency Planning

Site emergency arrangements were all successfully demonstrated in a series of practical drills throughout 2009 and to our regulators in the exercises described below.

The annual site ("Level 1") emergency exercise, witnessed by our regulators, to test the on-site emergency plan, took place in September 2009 and was based around a CHF leak scenario from pipework feeding one of the chemical production facilities on site. Local external emergency services (Lancashire Fire and Rescue and North West Ambulance

Service) were able to participate and several minor learning points were identified; overall the exercise was judged by our regulators to have provided a satisfactory demonstration of the site's emergency arrangements.

A security exercise was undertaken in October 2009 in conjunction with the Civil Nuclear Constabulary. This was witnessed by the Office for Civil Nuclear Security, to demonstrate site security arrangements and tested a simulated incident involving a suspicious package. Our regulators deemed this to be a satisfactory demonstration of arrangements to contain a security incident.

The three yearly offsite exercise ("Level 2") was undertaken in November 2009 in conjunction with Lancashire County Council and involved the establishment of the Strategic Coordinating Centre at Lancashire Police HQ with a significant number of participants from external agencies, both local, regional and national including site regulators. The operational day was followed by a recovery day with a similar number of participants. Both days were deemed successful and the learning taken from this exercise is being fed back into the offsite planning arrangements.

A joint exercise with British Energy was completed in September 2009 to test the response of both companies to an incident whilst material was in transit. This again was deemed successful with the learning points being fed back into both businesses and the wider transport community.

A programme of joint exercises with Lancashire Fire and Rescue was undertaken throughout the year, using teams from all fire stations that would respond to a site incident. This partnership has increased the knowledge of Lancashire Fire and Rescue and enhanced working relationships between Springfields and the blue light services. In addition work was completed with North West Ambulance Service in order to establish protocols for casualty decontamination.

The site Emergency Control Centre has been refurbished in order to further enhance our Emergency Arrangements.

The Emergency Planning Consultative Committee (EPCC), chaired by Lancashire County Council, met twice during 2009.

The site continues as a top-tier Control Of Major Accident Hazards (COMAH) site with an off-site emergency plan.



---

# Site Environmental Performance

Springfields has been striving in recent years to achieve and maintain 'world-class' environmental performance and continues to control discharges to the environment well within authorised levels.

Additionally, SFL has recognised its environmental responsibility to the flora and fauna on the site itself, including preservation of Deepdale Wood, an area of ancient broadleaved woodland, and a wetland habitat populated by great crested newts, both of which are Biological Heritage Sites.

In order to assess SFL's performance in managing the biological diversity on site, the company sought and achieved the Wildlife Trusts' Biodiversity Benchmark in October 2008, one of only 16 companies in the UK to achieve the award at that time and the only NDA site to have done so. The Biodiversity Benchmark award was reaffirmed in October 2009.

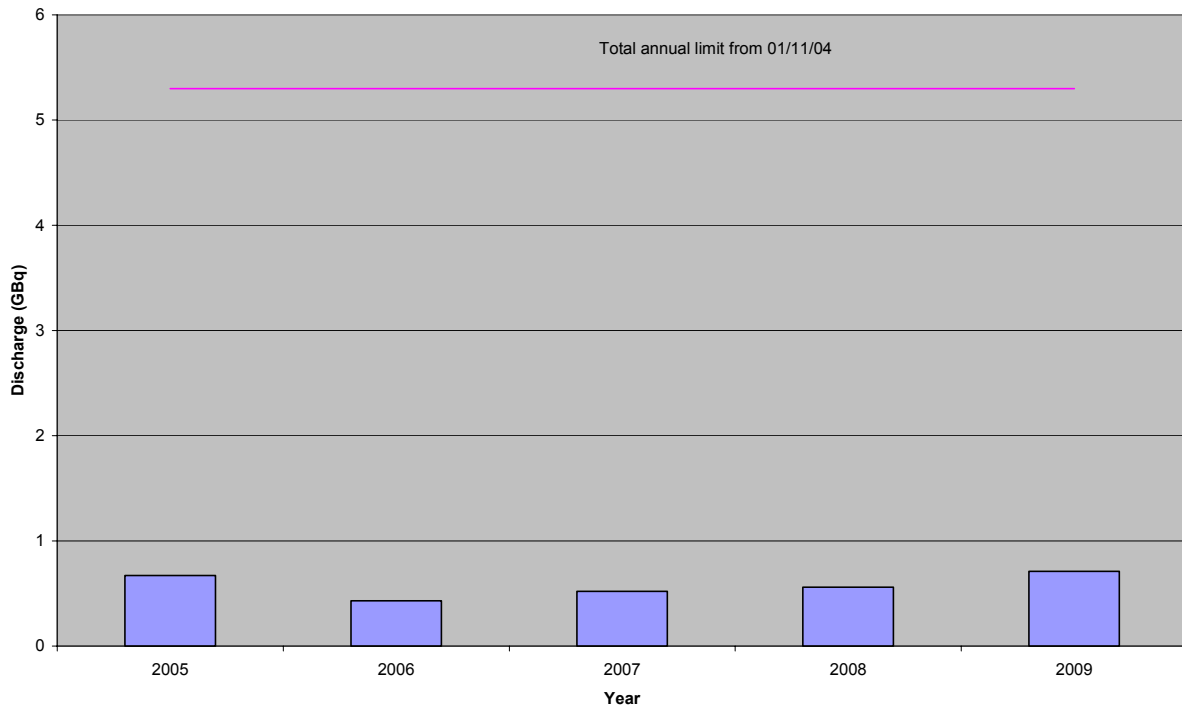
## Summary of Radioactive Discharges to Air and Water

The site's discharge Authorisation under the Radioactive Substances Act 1993 was reissued in 2005, coming into force on 01/04/05 with the transfer to the NDA of site assets and the creation of a new site licence company, Springfields Fuels Ltd (SFL). This Authorisation requires SFL to minimise all discharges and emissions using Best Practicable Means (BPM).

### Aerial Discharges

Figure 4 shows Springfields' discharges to air in gigabecquerels over the last 5 years. These discharges are of filtered air from plants, containing small amounts of uranium. Limits are set for both total emissions and emissions from major stacks.

Fig 4. Springfields' Uranic Discharge to Air 2005-2009



## Liquid Discharges

Figures 5 and 6 show Springfields' discharges to water (River Ribble estuary) in terabequerels over the last 10 years. Maximum discharge limits (as shown in figs 5 and 6) are set within the Authorisation.

With the cessation of UOC (Uranium Ore Concentrate) purification early in 2006, liquid discharges, particularly beta radioactivity, have fallen substantially and this has been reflected in dose rates recorded in the environment (see below). New, reduced discharge limits were agreed in January 2008.

Fig 5. Liquid Discharge – beta, TBq

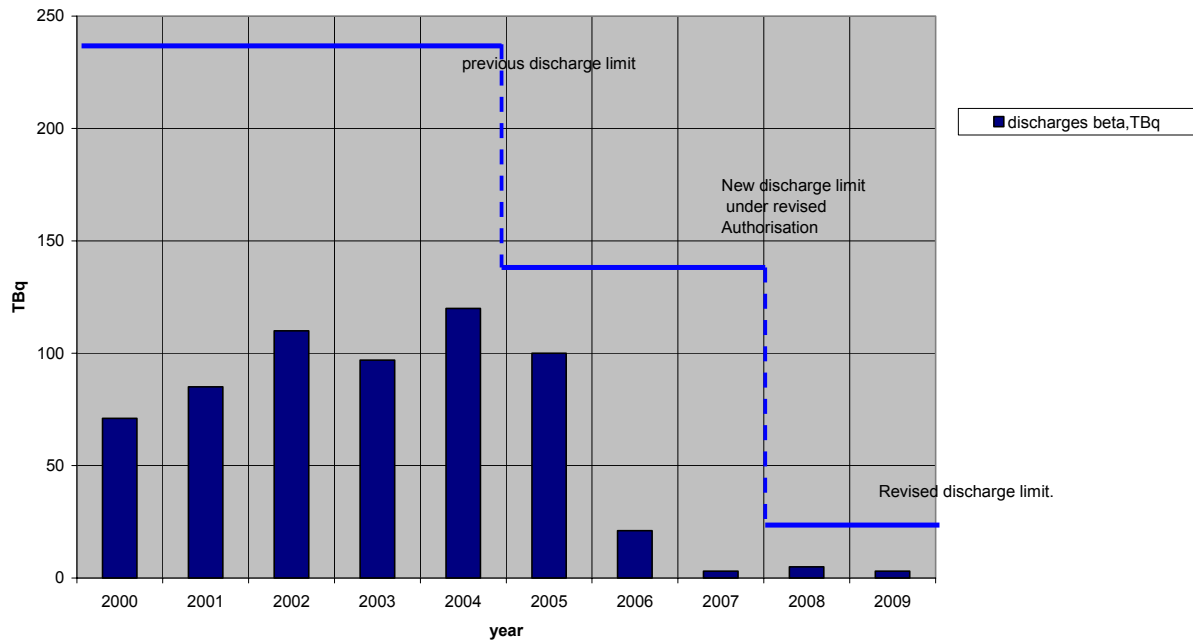
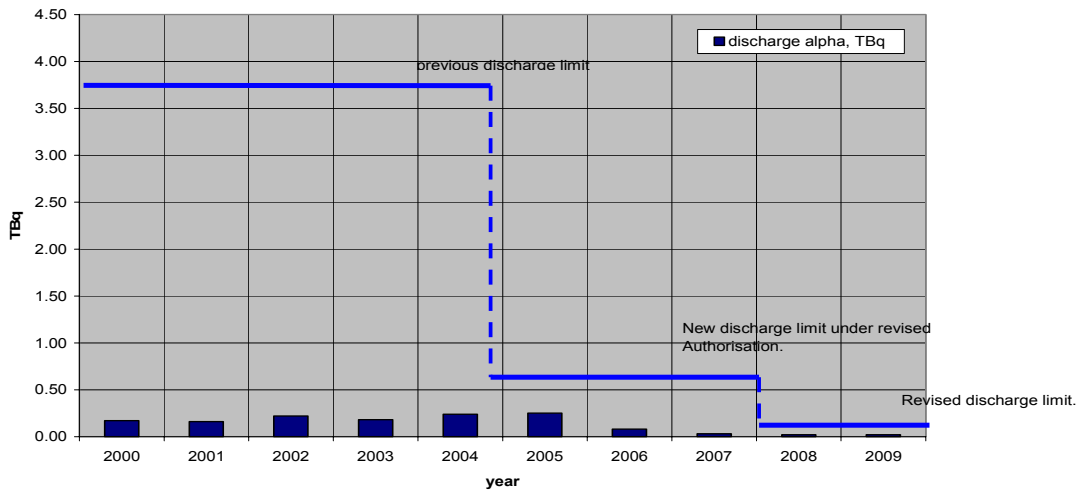


Fig 6. Liquid Discharge – alpha, TBq



## Solid Waste Disposals

Solid waste containing uranium arises from production operations on site and from decommissioning. It can rise or fall year on year, dependent on the decommissioning programme, production throughputs and other factors. Site and regulatory policy require arisings of solid waste to be minimised. Table 1 shows solid waste disposals for the last 5 years.

Table 1 Springfields Solid Waste Disposals 2005 – 2009

	2005	2006	2007	2008	2009
Bulk Weight (te)*	19,000	15,000	7,000	4,000	4,000
Uranium Activity (TBq)	0.17	0.12	0.06	0.05	0.04

\* to nearest 1,000

## Recycling and Reuse

The site philosophy is to use the waste hierarchy (reduce, reuse, recycle) as much as possible. There are difficulties in recycling waste classified as radioactive, but the site reused or recycled 87% by weight of the non-hazardous waste produced from routine operational activities in 2009 calendar year.

The site continues to recycle paper and cardboard. Print toner cartridges are also recycled and this activity generates money for charity. Waste oil from site is reused by conversion to fuel oil by an outside contractor.

New opportunities for reuse or recycling are continually being sought and a new recycling stream introduced during 2009 was secure disposal of waste electrical and electronic equipment.

## Impact of Discharges (Doses to Public)

Discharges of radioactivity must be controlled so that national and international dose limits and dose constraints for members of the public are not exceeded. In order to ensure this, the impact of discharges are assessed by calculating the dose to the members of the public who will be most affected by the discharges. The calculation takes into account the habits of the group members and the amount and types of radiation present in the areas where they spend their time and are generally based on 'worst case' assumptions. The results of the calculations for Springfields discharges and to the different groups are shown in Table 2 below.

The annual dose limit for members of the public is 1000 microsieverts ( $\mu\text{Sv}$ ). In addition, in the UK, national 'constraints' on dose are in place such that doses to members of the critical group are expected to be below  $300\mu\text{Sv}$  if proper controls are being applied to site activities. The results in the table show that doses to the most affected members of the public, from Springfields' discharges, are well within both limit and constraint.

Doses to boat dwellers, wildfowlers, anglers and shellfish consumers in 2009 were of the same order as the previous year, as were doses from direct radiation and were well below the dose limit and only a fraction of the dose received by the UK public from naturally occurring sources. Doses from all other pathways have remained the same in 2009 as 2008.

Table 2 Summary of doses to the public in the vicinity of Springfields ( $\mu\text{Sv}$ )

Pathway	Contribution to doses arising from discharges from sites					
	Springfields		Sellafield		Total	
	2008	2009	2008	2009	2008	2009
Boat dwellers	3	8	9	23	12	30
Wildfowlers	1	2	8	8	9	11
Anglers	5	5	8	7	13	12
Marsh Herdsmen	3	3	25	25	28	28
Shellfish	9-18	9-13	Not applicable			
Terrestrial foodstuffs	0.5	0.5				
Inhalation	2	2				
Direct radiation	25	31				

## Non Radioactive Discharges

Springfields Fuels Ltd has a Permit under the Environmental Permitting (England & Wales) Regulations 2008. The Permit lists the activities giving rise to non-radioactive discharges (both aerial and liquid) and specifies the conditions and monitoring arrangements with which the site must comply. The range of parameters to be monitored is extensive and includes discharge temperature, discharge pH (i.e. how acid/alkaline the effluent is), COD (Chemical Oxygen Demand, an indicator of the effect of the discharge on aquatic life) and various heavy metals. In 2009 the site was compliant with all of the Environmental Permit requirements.

## Environmental Incidents and Inspections

The Environment Agency carried out a team inspection over 3 days on the Springfields Pollution Prevention and Control Permit in March 2010.

## Energy and Water usage

The site set energy and water reduction targets for 2009/10. The performance against targets is summarised in the table below. Energy includes electricity purchased from the national grid and gas and oil used by the site's CHP (Combined Heat & Power) plant to generate electricity and steam for use on site. Water usage includes purchased water and borehole water extracted on site.

Energy reduction (electricity + gas) a. reduce total energy (electricity and gas) usage by 0.5% by end March 2010	Achieved (5% reduction)
Water reduction b. reduce total water usage (purchased and borehole) by 0.5% by end March 2010	Achieved (9% reduction)

## Greenhouse Gas (CO<sub>2</sub>) generated

The prime source of CO<sub>2</sub> on site is the CHP Plant. The site is a member of the EU Carbon Emissions Trading Scheme. The table shows the quantities of CO<sub>2</sub> generated over the last 5 years. By using the CHP plant, efficiencies are gained and less CO<sub>2</sub> is generated than if all the energy required was obtained from the purchase of electricity from the National Grid. Waste heat is used for steam generation.

Table 3 CO<sub>2</sub> Released

	2005	2006	2007	2008	2009
CO <sub>2</sub> Released (te)	66,000	59,000	59,000	35,000	56,000

The reduced CO<sub>2</sub> discharges in 2008 were due to problems with the CHP boilers which affected availability over this period requiring electricity and steam to be generated by alternative means. The 2009 figures are representative of typical annual CHP CO<sub>2</sub> generation.

## Contaminated Land

For several years, Springfields has been undertaking a careful programme of investigation and monitoring to establish the level of historic contamination across the site. No major, unexpected contamination has been identified during this work. The site has developed an extensive network of boreholes to monitor contamination into the future. Stakeholder views are being fed into the process of developing a remediation strategy for the site.

## Biodiversity Action Plan and Wildlife conservation

The Springfields Site has a variety of semi-natural and manmade habitats which provide a valuable home for a range of wildlife. In 2004, the site introduced a comprehensive Biodiversity Action Plan to ensure that these habitats were protected and, where possible, enhanced. The plan has involved a strong educational element as well as encouraging practical measures, such as the planting of indigenous tree species and the preservation of protected species habitats. In addition occurrences of non-indigenous invasive species such as himalayan balsam are monitored and actions taken to eradicate any such species. The plan is reviewed annually and is a key element which has contributed to the achievement of the Wildlife Trusts' Biodiversity Benchmark.

---

# Public Engagement

## (Springfields Site Stakeholder Group)

At least twice a year the SSSG meets to discuss issues of importance and interest relevant to Springfields and the local community. The SSSG comprises local councillors and council officials, regulatory inspectors (Nuclear Installations Inspectorate and the EA), government agencies such as the Food Standards Agency, local emergency services and local environmental groups.

Members of the public are invited to attend as observers.

For further information please contact:

Steve Whitehead. Tel: 01772 764198 or email: [Stephen.w.whitehead@springfieldsfuels.com](mailto:Stephen.w.whitehead@springfieldsfuels.com)

Questions from members of the public should be submitted in writing to:

Steve Whitehead, Community Relations Manager, Springfields Fuels Limited, Springfields, Salwick, Preston, PR4 0XJ

## Conclusions

Springfields' impact on the health and safety of its employees, on members of the public and the environment remains very low and similar to previous years.

## Glossary of Technical Terms

The becquerel (Bq) is a measure of radiation emitted, with a gigabecquerel (GBq) being  $10^9$ Bq and a terabecquerel (TBq) being  $10^{12}$ Bq.

The sievert (Sv) is a measure of radiation received (dose), with a microsievert (mSv) being  $10^{-6}$ Sv and a millisievert (mSv) being  $10^{-3}$ Sv. For comparison, the average dose received from natural background sources (e.g. soils and rocks) in the UK is about 2.2 mSv per year.

## Appendix – Useful Links

Springfields Fuels Limited:-

<http://www.springfieldsfuels.ndasite.co.uk>

Nuclear Decommissioning Authority:-

<http://www.nda.gov.uk>

The Environment Agency:-

<http://www.environment-agency.gov.uk>

The Nuclear Installations Inspectorate:-

<http://www.hse.gov.uk/nuclear>

RADMIL programme (Local Govt sponsored organisation for monitoring radiation in Lancashire):-

<http://www.radmil.org.uk>

Lancashire Major Incident Coordinating Group (Offsite Emergency Plan for Springfields):-

<http://www.lanmic.org.uk>

Department of the Environment, Food & Rural Affairs

<http://www.defra.gov.uk>

Other Nuclear Sites owned by NDA

<http://www.nuclearsites.co.uk>



Copyright 2010

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means), or communicated to the public by any form or electronic transmission, without the written permission of the copyright holders, except as permitted under the Copyright Designs and Patents Act 1988.



**Westinghouse**