LLW Repository Ltd

National Waste Programme

National Waste Programme

Actual vs. Forecast Data analysis

NWP-REP-124 – Issue 1 – August 2016

A company owned by UK Nuclear Waste Management Ltd

Old Shore Road, Drigg, Holmrook,
Cumbria, United Kingdom CA19 1XH
Company Registration No. 05608448

	Name	Role
Originator:	Ed Ghosn	National Programme Coordinator
Checker:	Helen Cassidy	National Programme Implementation Manager
Approver:	Hannah Kozich	Head of National Programme

Document history

Issue	Date	Amendments
001	August 2016	First issue of document

GLOSSARY

Term	Definition
AWE	Atomic Weapons Establishment
CNS	Capenhurst Nuclear Services
DSRL	Dounreay Site Restoration Ltd
EDF	Electricite de France
FY	Financial Year
HAW	Higher Activity Waste
HHISO	Half Height ISO
HVLA	High-Volume Low Activity
ILW	Intermediate Level Waste
JWMP	Joint Waste Management Plan
LLW	Low Level Waste
LLWR	Low Level Waste Repository
MoD	Ministry of Defence
NDA	Nuclear Decommissioning Authority
NWP	National Waste Programme
RSRL	Research Site Restoration Ltd
SLC	Site Licence Company
UKRWI	UK Radioactive Waste Inventory
VLLW	Very Low Level Waste
WIF	Waste Inventory Form

Executive Summary

The National Waste Programme Office has undertaken a study to compare the waste arising forecasts (from a number of sources) from 2013/14, 2014/15 and 2015/16 to the actual waste arisings for those same financial years to enable the accuracy and confidence in different forecasting sets to be evaluated and understood; and to provide underpinning for discussions with waste producers on forecasting and the deviation between actuals and forecasts, to improve their accuracy and quality. This report summarises the findings from this study.

The forecasts were extracted from the Waste Inventory Forms (WIF), the UK Radioactive Waste Inventory (UKRWI) and the Joint Waste Management Plans (JWMP). The study looked at: how each forecast evolved over time; the difference in accuracy between the forecasts; the forecasting accuracy of different waste producers; and the effect of waste route on forecast accuracy.

By examining the data, the following conclusions were drawn:

- It was not possible to identify any forecast as the most accurate as these varied by financial year and by waste producer.
- There were no trends observed in the actual vs forecast variation over time, especially within the UKRWI.
- The UKRWI forecasts tended to significantly over forecast the amount of waste likely to arise.
- There was a mixture of over and under forecasting by producers in the WIFs.
- Most producers tended to underestimate the amount of waste they would send for treatment as metallic or combustible, or for very low level waste disposal. On the other hand, they also tended to overestimate the amount of waste they expected to send for disposal at the repository as Low Level Waste (LLW). The latter might therefore not have arisen within the expected timescales or was being successfully diverted from disposal to the repository which would also explain the higher than expected diversion volumes.
- Some of the deviations observed between actual values and forecasts were quite significant and did not seem to follow any overarching trends. Appropriate caution therefore needs to be taken when using these forecasts for any future work.
- A large number of data entries in the JWMPs were left blank by waste producers or filled out as 0. This in turn made it difficult to process data for a number of producers and no specific conclusions could be made in relation to them.

Contents

1. Introduction

LLW Repository Ltd is responsible for implementing the UK's Low Level Waste (LLW) Strategy on behalf of the Nuclear Decommissioning Authority (NDA). This is achieved via leadership of the LLW National Waste Programme (NWP) and collaboration with a diverse range of stakeholders engaged with the management of LLW across the UK [Ref. 1].

One component of the National Waste Programme is the transparent communication of the successes, risks and opportunities in the implementation of the UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry [Ref. 2]. The National Waste Programme achieves this aim by regularly publishing data about waste arisings, the successful diversion of waste from the repository, and the optimal use of assets such as the Low Level Waste Repository (LLWR) and the waste treatment facilities. This data is compared to forecasts provided by the waste producers (within the NDA estate) and to the targets they agreed with the NDA.

Waste arising forecasts are provided through 3 different routes:

1. The NDA Waste Inventory Form (WIF) provides comprehensive and up-to-date information covering waste stream inventory, treatment, and packaging and disposal data for LLW and lower activity Intermediate Level Waste (ILW). The WIF is updated annually by the waste producers (coordinated by LLW Repository Ltd's Inventory Team) and was undergoing its fifth iteration at the time of the study.
2. The UK Radioactive Waste Inventory (UKRWI) provides forecast waste arisings until 2130. This is updated every 3 years and is published on the NDA website [Ref. 3].
3. The Joint Waste Management Plans (JWMPs), produced by the NDA Site Licence Companies (SLCs) and by the non-NDA estate under their contractual obligations with LLW Repository Ltd. These are updated in March and September of every year and predict the waste arisings over a rolling 5 year period [Ref. 4].

2. Data Analysis Objectives

This study's aim was to compare the aforementioned data sets for Financial Year (FY) 2013/14, FY 2014/15, and FY 2015/16 to the actual waste arisings, published monthly in the Waste Metric Dashboards [Ref. 5].

The objective of the study was to enable the accuracy and confidence in different forecasting sets to be evaluated and understood; and to provide underpinning for discussions with waste producers on forecasting-the deviation between actuals and forecasts-to improve their accuracy and quality. This was achieved by focussing on the differences between the different waste forecasts and the actual waste arisings in the past and how the forecasts have evolved over the years.

The outputs of this study are this document and a summary document, which could be used by LLW Repository Ltd personnel in discussions with waste producers, waste treatment providers, and other interested stakeholders including the NDA.

3. Purpose of this Document

This document provides an overview of the approach, underpinning information and outcomes of the study and includes the following information:

- The background, purpose, and objectives;
- The assumptions and constraints limiting the study and its scope;
- The process adopted to conduct the data analysis;
- The data analysis and findings; and
- The conclusions and recommendations.

4. Assumptions and Constraints

The key assumptions for this study were:

- The data analysis only looked at LLW (including Very Low Level Waste (VLLW)); Higher Activity Waste (HAW) was deemed to be outside the scope of this review since it is not within the remit of the National Waste Programme.
- Compaction was not analysed as it does not represent an end point for waste.
- The study did not look at radioactivity and was only focussed on volume and mass of waste arisings.
- The 2013 iteration of the WIF and the 2013 UKRWI presented data in terms of calendar year and these were compared to the actual waste arisings by financial year. Given that both cases look at 12 months in total this should not affect the integrity of this study.
- Research Site Restoration Ltd. (RSRL) was amalgamated into Magnox Ltd in 2015 and therefore forecasting data from the two producers was combined to compare against actual arising in FY 2015/16 for Magnox Ltd.
- With regards to actual waste arisings, the density of metal was considered to be $1Te/m^3$ and the volume of waste in HHISO containers was assumed to be $10m^3$ which corresponds with the values used to produce the dashboards.
- The 2013 UKRWI contains forecasting data for the combined period of 2015-2019. The volumes were assumed to be equally distributed over the five years to calculate expected waste arisings for 2015.

The main constraints associated with this study were:

- There is fragmented data available before FY 2013/14 which restricted the scope of the study to three financial years.
- Data is not available for all use of direct contracts for waste treatment. Arisings data is as reported in the relevant monthly Waste Metric Dashboard.
- Some forecasts were not completed by producers. This in turn limited the number of sites which could be considered individually.
- The study did not examine the reasoning or justification for any perceived differences between the forecasts and the actual values.

5. Process

The review was conducted in collaboration with members of the LLW Repository Ltd Waste Inventory team and followed 4 distinct phases.

5.1. Scoping

The aim of the scoping phase was to enable the project team to identify:

- How many years the study should look at;
- The data sets which should be considered;
- The specific waste producers to focus on; and
- Which waste routes to consider.

5.2. Data Collection

Forecasting data was provided by the Waste Inventory team and covered: the March and September iterations of the JWMPs in 2013, 2014, and 2015; the 2013, 2014, and 2015 WIF data; and the 2013 UKRWI data. Although the data sets were produced at different time intervals, they all contained waste forecasts for a number of years following the production date. This meant that for example, the JWMP produced in March 2013 contained forecasts for all 3 financial years within the study scope.

Waste actuals data was collected from the Waste Metric Dashboards from March 2014, 2015, and 2016 to cover all the financial years considered in this study. The dashboards report on actual waste arisings in terms of waste treatment or disposal route. The waste routes of relevance to this study were:

1. LLW disposal to the LLWR: for LLW that cannot be treated, or residual wastes from a treatment process.
2. Metallic waste treatment: for metallic waste which can be recycled to reduce the volumes of LLW disposal and to produce recycled metal for beneficial future use.
3. Combustible treatment: for waste which can be thermally treated to reduce LLW disposal volume.
4. VLLW disposal: disposal of high-volume low activity (HVLA) waste at appropriately licensed commercial waste landfill sites.

While data in the JWMPs is reported in terms of waste route, waste in the WIF and UKRWI is reported in terms of wastestreams. The study therefore looked at total volumes projected by each producer annually and compared those to the overall actuals. The latter value was obtained by combining metallic treatment, combustible treatment, VLLW disposal, and LLW disposal volumes and masses, according to the assumptions mentioned previously.

5.3. Data Analysis

Once all the data was compiled, the analysis was undertaken by comparing data from the actual waste arisings to the WIF, JWMPs, and UKRWI separately and then comparing them against

each other. The comparison was conducted for different sites to check if there are any differences between waste producers and looked at how forecasting has changed over the last 3 years by calculating Actual-Forecast values.

The next step involved comparing the deviations across all the forecasts to see whether they were different and to check which, if any, gave the most accurate numbers.

5.4. Document Production

This document was produced to report on the findings of this study following the data analysis. It focused on: how the forecasts compared to each other and how they developed over time; the forecast accuracy depending on waste producer and how the NDA and non-NDA estate compared to each other; whether producers were over or under estimating their future waste arisings; and the difference in accuracy by waste route.

A further summary document highlighting the general trends observed was also produced for use in discussions with stakeholders.

6. Data Analysis and Findings

This section reports on the actual data analysis and the findings from this study and looks at the WIFs, the UKRWI, and the JWMPs separately.

6.1. WIF Data Analysis

The WIF data analysis was conducted for: Dounreay Site Restoration Ltd (DSRL), LLWR, Magnox Ltd, RSRL, and Sellafield Ltd. These waste producers were chosen because they were the only ones for which WIF forecast data was available. As previously mentioned, the study looked at overall waste volumes forecasted for these sites and compared them to the actual waste arisings reported in the dashboards.

Table 1 provides a summary of the WIF data analysis by presenting the deviation between WIF forecast values and the actual arisings. The actual forecast and arising values behind these can be found in table 5 in Appendix 1.

Table 1: WIF Data Analysis Summary Table

	FY 13/14	FY 14/15		FY 15/16		
	WIF 13	WIF 13	WIF 14	WIF 13	WIF 14	WIF 15
Sellafield	4522	3111	-5416	1336	-404	-7131
Magnox	2698	4899	3812	534	288	72
RSRL	-1476	-799	-696			
DSRL	30	0	-2900	-18248	-1692	-1854
LLWR	-579	-279	-350	-283	-88	-2248

Colour coding was used to highlight the variances between the actual and the forecast. Purple cells indicate that the forecast submitted was lower than actual waste managed in that period. An orange cell denotes that the forecast submitted was higher than the actual waste managed. Blue cells highlight that the forecast submitted and the actual waste managed are equal to each other. A grey cell indicates that no recordable data was submitted by the waste producer. This same colour coding was used throughout the document.

By analysing the data presented in Table 1 the following trends were noted:

1. In most cases, the deviation between forecast and actual arisings was significant.
2. In general, forecasting did not seem to be improving year on year (i.e. newer forecasts were not more accurate than previous ones).
3. The WIF forecasts seemed to be more accurate for the out-years. The 2013 WIF forecast accuracy improved from FY 2013/14 to FY 15/16. The same was true for the 2014 WIF.
4. Waste producer overestimated the amount of waste they were likely to produce 60% of the time. The WIF analysis does however show a mix of both over and under forecasting.
5. Magnox Ltd tended to underestimate their future waste arisings. Their forecasts improved year on year and were the most accurate in the year of production.
6. Magnox Ltd and RSRL combined seemed to have provided accurate forecasts for FY 2015/16. This could have been due to the fact that, while Magnox tended to underestimate their waste arisings, RSRL tended to overestimate theirs and the two might have balanced each other out. It was therefore impossible to draw a specific conclusion as to whether Magnox had improved its forecasting approach at the time of the study.

6.2. UKRWI Data Analysis

UKRWI data was analysed for Sellafield, Magnox, DSRL, LLWR, Atomic Weapons Establishment (AWE), Capenhurst Nuclear Services (CNS), Electricite De France (EDF), GE Healthcare, and the Ministry of Defence (MoD). These were the only waste producers for which both forecasting and actuals data were available. Springfields, UK Atomic Energy Authority and other minor waste producers whose forecasting data was in the UKRWI were excluded because they did not declare their actual waste arisings to LLW Repository Ltd in the relevant periods.

Unlike the WIF, the UKRWI includes forecasts from non-NDA estate waste producers and the differences between the two were highlighted in the study.

Table 2 shows a summary of the deviation between actuals and forecasts for the aforementioned producers. All the data underpinning Table 2 can be found in Table 6 in Appendix 2.

Table 2: UKRWI Deviation Summary

		FY 13/14	FY 14/15	FY 15/16
NDA Estate	Sellafield	-1507	-4188	1506
	Magnox	-3759	-1029	196
	DSRL	-6881	-6911	-5670
	LLWR	-422	-153	-95
Non-NDA Estate	AWE	-2	-214	650
	CNS	390	-2929	-534
	EDF	-349	-340	-425
	GE	-210	-208	-146
	MoD	-910	-911	-513

The following trends and observations were drawn from the data in Table 2:

1. With regards to the UKRWI, all waste producers tended to overestimate the amount of waste that was likely to arise across their sites.
2. There was no particular trend in the forecast vs actual variation over time (i.e. size of variation was inconsistent across the data set).
3. There was also no particular trend in the variation across the different producers (i.e. none of the waste consigners was consistently accurate or inaccurate).
4. Although non-NDA estate waste producers exhibited a smaller deviation overall than NDA estate producers, this might be due to the smaller amount of waste they generate (or declare to LLW Repository Ltd) and should not be taken as them providing more accurate forecasting overall.

The deviation shown in Table 2 meant that work based on the UKRWI forecasts would carry in it a considerable margin of error. In particular, the UKRWI is used to allocate disposal volumes for different waste producers at the repository, and such data should be used with recognition of these uncertainties.

Overall, the UKRWI provided more accurate forecasts relative to arisings than the WIF. This was a surprising outcome considering that the WIF is updated annually and would be expected to provide more accurate values, in particular for the execution year and short term thereafter, than the UKRWI which was developed in 2013.

6.3. JWMP Data Analysis

Unlike the WIF and the UKRWI, the waste forecasts in the JWMPs are expressed in terms of waste treatment or disposal route and were compared accordingly. The analysis initially included Sellafield Ltd, Magnox Ltd, RSRL, DSRL, EDF, MoD (including Babcock Marine, HMNB Devonport, HMNB Clyde and Rolls Royce), CNS, Urenco, AWE, LLWR, and all other non-NDA sites grouped together. The JWMP forecasting data for all these sites can be found in Table 7 in Appendix 3 along with the actual waste arisings for each site by waste route as well as the calculated deviations.

Following a preliminary analysis based on the data in Table 7, DSRL, EDF, MoD, CNS and Urenco were disregarded from this study due to a lack of forecasting and/or actuals data. Table 3 shows the waste producers which were analysed in more detail as well as a summary of the deviation between actual and forecast waste arising values.

It can be seen that:

1. In most cases, the JWMPs iterations produced in September were more accurate than those produced in March.
2. Forecasting accuracy seemed to be improving year on year.
3. 48% of forecasts were below the actual values and 44% were above. Therefore, there did not seem to be an inclination towards either over, or under, forecasting as was observed with the WIF data. The remaining 8% of forecasts actually matched the waste arisings but these were cases when both values were reported to be zero.
4. Of the actuals waste entries gathered from the dashboards, 41% were either reported as 0, or even left blank, as seen from Table 6. This led to a significant increase in the perceived deviation between the JWMP forecasts and the actual waste arisings. The forecasts deviations might therefore not be as bad as they seem but data about the waste that producers have sent to service providers under direct contracts would be required to corroborate this.

With regards to the NDA estate waste producers, the following trends were observed:

1. For metallic treatment, data for the NDA estate shows a mixture of under forecasting and over forecasting for waste producers. Sellafield Ltd have consistently under forecasted metallic arisings. For Sellafield Ltd there was predominantly a decrease in variation over the time period with smaller variations in the year of execution.
2. Data for combustible treatment shows predominately under forecasting with decreasing variations within the year of execution across the estate. LLWR performance differed in that arisings were predominantly over forecast.
3. With regards to VLLW disposal, waste producers predominately under forecasted with no specific pattern showing in variations.
4. Over forecasting can be predominantly seen with an inconsistent pattern in variations for LLW disposal. LLWR display a change to under forecasting towards FY2015/16.

Similarly, the following observations were made for the non-NDA estate:

1. There are significant gaps in actuals and forecast provision from non-NDA estate.
2. For metallic treatment, a mixture of over forecasting and under forecasting can be seen with a tendency towards over forecasting. Differences between variations for the non-NDA estate are relatively low.
3. Consigners predominantly over forecasted combustible waste volumes with small variances.
4. There is a variable mixture of over forecasting and under forecasting across all three financial years for VLLW and LLW disposal.

Table 3: JWMP Data Analysis Summary Table

		FY 13/14		FY 14/15				FY 15/16					
		Mar-13	Sep-13	Mar-13	Sep-13	Mar-14	Sep-14	Mar-13	Sep-13	Mar-14	Sep-14	Mar-15	Sep-15
Sellafield	Metals	1696	675	1737	772	792	101	1736	791	811	816	336	336
	Combustibles	275	125	525	225	225	0	1135	535	535	535	235	-65
	VLLW (off site)	1040	130	19	-81	-81	-256	1413	1363	1363	1363	1363	1363
	VLLW (on site)	4663	872	3881	-2504	-2504	816	3736	375	375	375	986	986
	LLW	-67	-13	-81	-55	-53	-3	-58	-64	-62	-30	-52	-18
Magnox	Metals	242	-444	194	628	108	-92	-828	-900	-1164	-1236	391	380
	Combustibles	850	445	541	214	216	-131	1198	1183	1024	509	398	254
	VLLW	-33	609	3062	2837	677	1215	2913	2772	779	-2	1334	1205
	LLW	-15	-21	-22	-32	-46	-21	-20	-19	-49	-49	-18	5
RSRL	Metals	8	7	19	-13	-31	32						
	Combustibles	233	85	368	329	158	9						
	VLLW	25	25	172	704	560	488						
	LLW	-10	5	-11	-11	-4	-2						
LLWR	Metals	-10	-8	0	-2	-12	-5	-18	-17	-10	-20	-11	-11
	Combustibles	0	0	-10	-10	-10	-10	-7	-7	-1	-21	9	9
	VLLW	-67	-60	30	30	-10	30	0	0	0	-40	-39	0
	LLW	-12	-11	-2	-3	-12	-1	3	3	2	-5	3	5

		FY 13/14		FY 14/15				FY 15/16					
		Mar-13	Sep-13	Mar-13	Sep-13	Mar-14	Sep-14	Mar-13	Sep-13	Mar-14	Sep-14	Mar-15	Sep-15
AWE	Metals	-70	-13	-150	-270	-187	-101	64	-156	94	67	-88	10
	Combustibles	-47	-35	-45	-15	-6	-52	-43	-13	5	-84	-5	-4
	VLLW	-364	-94	-256	-86	-286	-232	442	612	506	365	-66	-171
	LLW	-3	1	-1	-7	-8	1	-5	-10	-6	-7	-7	-2
Other non-NDA	Metals	0	0	-170	10	10	10	171	171	171	171	171	128
	Combustibles	0	0	0	0	0	0	0	0	0	0	-220	-29
	VLLW	21	-35	123	63	33	73	253	263	83	83	-77	263
	LLW	-13	21	7	-12	-157	5	3	19	-156	-27	-28	18

6.4. Forecast Data Comparison

Using an absolute average for each financial year, it is possible to compare the forecasting accuracy across the different data sets. This analysis was conducted for Sellafield, Magnox, DSRL, and LLWR (the only waste producers with reported values in all three forecasts) and is shown in table 4.

Table 4: Forecasting data comparison

	FY 13/14			FY 14/15			FY 15/16		
	WIF	UKRWI	JWMP	WIF	UKRWI	JWMP	WIF	UKRWI	JWMP
Sellafield	4522	1507	5138	4264	1507	4110	2957	1506	4295
Magnox	2698	3759	1492	4356	3759	2781	298	196	3345
DSRL	30	6881	0	1450	6881	8	7265	5670	3450
LLWR	579	422	188	315	422	85	873	95	72

The following trends can be observed from table 4:

1. The JWMPs provided the most accurate forecasts for DSRL and LLWR.
2. No one forecast was overall more accurate than the others.
3. With regards to Sellafield, the UKRWI was the most accurate forecast for all three financial years and the JWMPS were the least accurate.

7. Conclusion

In conclusion, when considering all three data sets, the NDA estate waste producers generally provided less accurate estimates that the non-NDA estate producers. This might have been due to the small size of some of the latter which meant that their waste arisings were significantly smaller and the overall error in forecasting was not too significant

In general, waste producers tended to overestimate the amount of waste they were likely to manage especially when looking at UKRWI forecasts. With regards to metals, combustibles, and VLLW in particular, producers tended to underestimate the amount of waste arising while overestimating the volume of LLW disposal. Considering these two factors combined it might be possible that waste producers have been exceeding their diversion targets as they have been encouraged to do by the NWP and the NDA reducing LLW disposals thus saving space in the repository in line with National Strategy and the Waste Hierarchy.

As expected, the JWMPs provided overall the most accurate data. This was due to the fact that they are produced twice a year and provide forecasting data for only 5 years which should be more straight forward that the WIF and the UKRWI. The latter two seemed to vary in accuracy.

8. Recommendations

Throughout the study, the following recommendations were drawn:

1. The JWMP forecasts for Sellafield in FY 15/16 were less accurate than the 2 previous financial years. It would be beneficial to conduct a separate piece of work to look at this in more detail and find the reason behind the irregular deviations in FY 15/16 to mitigate against any similar future trend.
2. In general, waste producers tended to overestimate the amount of waste they were expecting to send for LLW disposal while underestimating waste going for VLLW disposal or metals and combustibles treatment. This trend might be due to producers exceeding the diversion targets they forecast and there would be benefit in considering it in more detail to improve forecasting accuracy.
3. RSRL provided accurate forecasts for metals and LLW disposal in the JWMPs but failed to do so for combustibles and VLLW disposal. It might be worth it to study this deviation in more detail to see whether there is a difficulty in forecasting VLLW disposal and combustible waste volumes which is not present for metals and LLW.
4. Since RSRL was amalgamated into Magnox in 2015, it would be worth it for the latter to try and capture some of the forecasting knowledge that RSRL held and try to apply that to their forecasts.
5. The study has showed that certain producers provided better forecasts than others and these varied across the different sets of forecasting data. A peer learning exercise could be conducted to look at how different sites produced their forecasts and what can be learned and shared throughout the industry.
6. Finally, one common theme that emerged throughout the study was the lack of data from certain producers. All waste producers are required to provide 5 year forecasts under the terms of their commercial contracts with LLW Repository Ltd; and the latter should work with these producers to gain compliance with this contractual requirement.

9. References

1. LLW Repository Ltd, the National Waste Programme Manual, RSM 03.08.01, Issue 4, May 2015.

2. DECC and Devolved Administrations, UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry, February 2016.

3. Nuclear Decommissioning Authority, 2013 UK Radioactive Waste Inventory, https://ukinventory.nda.gov.uk/.

4. LLW Repository Ltd, Joint Waste Management Plans, http://llwrsite.com/national-waste-programme/programme-governance/.

5. LLW Repository Ltd, Waste Metric Dashboards, http://llwrsite.com/national-waste-programme/programme-governance/waste-metric-dashboard/.

APPENDIX 1 – WIF Data

Table 5: WIF Data

	FY 13/14			FY 14/15					FY 15/16						
	Actuals	WIF 13	Difference	Actuals	WIF 13	Difference	WIF 14	Difference	Actuals	WIF 13	Difference	WIF 14	Difference	WIF 15	Difference
Sellafield	9804	5282	4522	8352	5241	3111	13768	-5416	10191	8855	1336	10595	-404	17322	-7131
Magnox	4868	2170	2698	6128	1229	4899	2316	3812	6496	5962	534	6208	288	6424	72
RSRL	3115	4591	-1476	2562	3361	-799	3258	-696							
DSRL	30	0	30	0	0	0	2900	-2900	1241	19489	-18248	2933	-1692	3095	-1854
LLWR	4	583	-579	30	309	-279	380	-350	59	342	-283	147	-88	2307	-2248

APPENDIX 2 – UKRWI Data

Table 6: UKRWI Data

	FY 13/14			FY 14/15			FY 15/16		
	Actuals	UKRWI	Difference	Actuals	UKRWI	Difference	Actuals	UKRWI	Difference
Sellafield	9804	11311	-1507	8352	12540	-4188	10191	8685	1506
Magnox	4868	8627	-3759	6128	7157	-1029	6496	6300	196
DSRL	30	6911	-6881	0	6911	-6911	1241	6911	-5670
LLWR	4	426	-422	30	183	-153	59	154	-95
AWE	411	413	-2	199	413	-214	1063	413	650
CNS	584	194	390	75	3004	-2929	490	1024	-534
EDF	32	381	-349	41	381	-340	17	442	-425
GE	0	210	-210	2	210	-208	0	146	-146
MoD	60	970	-910	60	971	-911	85	598	-513

APPENDIX 3 – JWMP Data

Table 7: JWMP Data

		FY 2013/2014					FY 2014/2015								FY 2015/2016											
		Actuals	Mar-13	Difference	Sep-13	Difference	Actuals	Mar-13	Difference	Sep-13	Difference	Mar-14	Difference	Sep-14	Difference	Actuals	Mar-13	Difference	Sep-13	Difference	Mar-14	Difference	Sep-14	Difference	Mar-15	Difference	Sep-15	Difference
Metals (te)	Sellafield	2176	480	1696	1501	675	2217	480	1737	1445	772	1425	792	2116	101	2236	500	1736	1445	791	1425	811	1420	816	1900	336	1900	336
	Magnox	844	602	242	1288	-444	740	546	194	112	628	632	108	832	-92	1003	1831	-828	1903	-900	2167	-1164	2239	-1236	612	391	623	380
	RSRL	139	131	8	132	7	144	125	19	157	-13	175	-31	112	32													
	DSRL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LLWR	4.2	14.1	-10	12	-8	0	0	0	2	-2	12	-12	5	-5	0	18	-18	17	-17	10	-10	20	-20	11	-11	11	-11
	AWE	160	230	-70	173	-13	0	150	-150	270	-270	187	-187	101	-101	214	150	64	370	-156	120	94	147	67	302	-88	204	10
	CNS	163					29							144	-115	97							50	47				
	EDF	2	0	-2	0	-2	11							15	-4	7							24	-17				
	MoD	0	5	-5	771	-771	0	5	-5	181	-181	536	-536	231	-231	13	5	8	2	11	150	-137	38	-25	40	-27	73	-60
	Urenco	0	27	-27	181	-181	0	60	-60	83	-83	103	-103	103	-103	0	10	-10	0	0	38	-38	38	-38				
	Other Non-NDA	0	0	0	0	0	10	180	-170	0	10	0	10	0	10	171	0	171	0	171	0	171	0	171	0	171	43	128
Combustibles (m^3)	Sellafield	425	150	275	300	125	825	300	525	600	225	600	225	825	0	1435	300	1135	900	535	900	535	900	535	1200	235	1500	-65
	Magnox	1987	1137	850	1542	445	1551	1010	541	1337	214	1335	216	1682	-131	1843	645	1198	660	1183	819	1024	1334	509	1445	398	1589	254
	RSRL	349	116	233	264	85	396	28	368	67	329	238	158	387	9													
	DSRL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	-40	0	0	40	-40	0	0
	LLWR	0	0	0	0	0	0	10	-10	10	-10	10	-10	10	-10	9	16	-7	16	-7	10	-1	30	-21	0	9	0	9
	AWE	5	52	-47	40	-35	5	50	-45	20	-15	11	-6	57	-52	7	50	-43	20	-13	2	5	91	-84	12	-5	11	-4
	CNS	0					0							4	-4	168							70	98				
	EDF	0	0	0	0	0	0							24	-24	0							36	-36				
	MoD	0	25	-25	26	-26	0	25	-25	26	-26	15	-15	17	-17	2	50	-48	20	-18	15	-13	12	-10	34	-32	39	-37
	Urenco	0	0	0	0	0	0	45	-45	14	-14	4	-4	4	-4	0	1.5	-2	0	0	50	-50	50	-50				
	Other Non-NDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220	-220	29	-29
VLLW (m^3)	Sellafield-off site	1140	100	1040	1010	130	169	150	19	250	-81	250	-81	425	-256	1613	200	1413	250	1363	250	1363	250	1363	250	1363	250	1363
	Sellafield-on site	4663		4663	3791	872	3881		3881	6385	-2504	6385	-2504	3065	816	3736		3736	3361	375	3361	375	3361	375	2750	986	2750	986
	Magnox	1867	1900	-33	1258	609	3697	635	3062	860	2837	3020	677	2482	1215	3430	517	2913	658	2772	2651	779	3432	-2	2096	1334	2225	1205
	RSRL	2567	2542	25	2542	25	2002	1830	172	1298	704	1442	560	1514	488													
	DSRL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LLWR	0	67	-67	60	-60	30	0	30	0	30	40	-10	0	30	0	0	0	0	0	0	0	40	-40	39	-39	0	0
	AWE	216	580	-364	310	-94	144	400	-256	230	-86	430	-286	376	-232	842	400	442	230	612	336	506	477	365	908	-66	1013	-171
	CNS	421					46							59	-13	225							2400	-2175				
	EDF	0	0	0	0	0	0							0	0	0							0	0				
	MoD	0	0	0	453	-453	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	-68
	Urenco	0	714	-714	365	-365	652	0	652	200	452	1220	-568	1220	-568	551	0	551	0	551	2400	-1849	2400	-1849				
	Other Non-NDA	31	10	21	66	-35	133	10	123	70	63	100	33	60	73	263	10	253	0	263	180	83	180	83	340	-77	0	263
LLW (no. of containers)	Sellafield	140	207	-67	153	-13	126	207	-81	181	-55	179	-53	129	-3	117	175	-58	181	-64	179	-62	147	-30	169	-52	135	-18
	Magnox	17	32	-15	38	-21	14	36	-22	46	-32	60	-46	35	-21	22	42	-20	41	-19	71	-49	71	-49	40	-18	17	5
	RSRL	6	16	-10	1	5	2	13	-11	13	-11	6	-4	4	-2													
	DSRL	0	0	0	0	0	0	0	0	0	0	3	-3	0	0	93	0	93	0	93	916	-823	0	93	960	-867	0	93
	LLWR	0	12	-12	11	-11	0	2	-2	3	-3	12	-12	1	-1	5	2	3	2	3	3	2	10	-5	2	3	0	5
	AWE	3	6	-3	2	1	5	6	-1	12	-7	13	-8	4	1	0	5	-5	10	-10	6	-6	7	-7	7	-7	2	-2
	CNS	0					0							0	0	0							0	0				
	EDF	3	1	2	0	3	3							1	2	1							5	-4				
	MoD	6	6	0	6	0	6	7	-1	10	-4	10	-4	2	4	7	7	0	9	-2	11	-4	2	5	3	4	18	-11
	Urenco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	Other Non-NDA	27	40	-13	6	21	27	20	7	39	-12	184	-157	22	5	19	16	3	0	19	175	-156	46	-27	47	-28	1	18