Accuracy of the System Management Action Flagging Methodology

Report Covering

May 2011 to April 2012 Inclusive

Executive Summary

The P217A – Revised Tagging Process and Calculation of Cash Out Prices methodology was implemented from November 2009 and aims to remove pollution from the imbalance price caused by actions taken to resolve transmission constraints. Under this methodology the System Operator determines which actions are taken to resolve constraints and flag these actions. These flags are then sent to the BSC Systems and used in the imbalance price calculation methodology.

To ensure that the flagging methodology is operating as intended, National Grid committed to make a report on an annual basis on the accuracy of the methodology and consider any materiality. This is the third of such reports, covering the 12 months between May 2011 – April 2012 inclusive.

This report finds that P217A flagging accuracy continues to be good, with few inaccuracies, none of which had a material effect on pricing.

If you have any comments or queries on this report, please contact National Grid on:
balancingservices@nationalgrid.com

Contents

1.0 Reporting

1.1 Purpose of the Report

This report reviews the accuracy of the P217A flagging process that took place in the 12 months between 1st May 2011– 30th April 2012, in respect of P217A operation and National Grid's flagging of constraint actions in accordance with the SMAF Methodology Statement.

1.2 Outline of P217A SO Flagging

The rationale behind the development of this report was discussed in the initial report document covering November 2009 – April 2010. The underlying objective is to remove distortive pollution from 'cash out' caused by Bid Offer Acceptances (BOAs) taken to resolve transmission constraints. This followed a P217A review in which it was agreed that from the 5th November 2009, under the Balancing Settlement Code (BSC) section Q5.3.1(d) and section Q6.3.2(b) National Grid shall assess whether an action is wholly or partly taken to resolve a transmission constraint; such actions would be 'SO-Flagged' for the purposes of the BSC Systems who then determine the cash prices using the P217A cash out price methodology. In practice SO-Flagging of BOA actions occurs when National Grid identifies specific Balancing Mechanism Units (BMUs) that, in the event of an active transmission constraint, would be utilised by way of BOA instructions to resolve the constraint. Actions on these units are subsequently flagged by National Grid Control Room in real time for the duration required to resolve a constraint. When the Control Room is satisfied that the transmission constraint is no longer active the BMUs are de-flagged and therefore, any actions taken thereafter are not flagged as resolving a constraint. The accuracy with which this flagging takes place is the subject of this report.

1.3 P217A Flagging Assessment Methodology

National Grid uses several processes to assess the accuracy of the Control Room Flagging process and identify potential periods where errors may have occurred. The three main processes are below.

Data Inquiry Report.

Used in the event of the Control Room becoming aware that the flagging of constraint BOAs has been incorrectly set in real time. The Control Room can raise a Data Inquiry report (DIR) to note the discrepancy.

Post Event Cross Check (Working Day +1)

This manual process cross-checks the units identified by P217A flags against other operational information for the purpose of allocating Constraint Costs under

BSIS Reporting.   This takes place on a working-day +1 basis, in which BOA actions are analysed against various operational reports and if identified as taken to resolve a constraint they are 'tagged' with a constraint cost marker ('BSIS SUPERBAAR Constraint Cost Tagging'). Apparent differences between the P217A flagging and SUPERBAAR tags are reviewed with the Control Room as necessary to better determine the correct P217A flags & BSIS SUPERBAAR tags.

A high correlation between the P217 Flagging and the SUPERBAAR Constraint Tagging is expected but it should be noted that differences between the two mechanisms do exist due to the different criteria that apply for flagging under SMAF and tagging under BSIS SUPERBAAR: - in particular relating to;

- The treatment of actions that resolve both constraint and margin issues these being flagged under P217A but not seen as an additional cost under BSIS as they are required for margin; in which case they would carry a P217A flag but no SUPERBAAR tag.

- Differences due to legitimate anomalies such as a BMU out of merit for Black Start security, such actions being neither an energy balancing issue nor a constraint issue and so would carry a P217A flag as a 'system' action but no BSIS SUPERBAAR tag.

- Differences due to the data precision of the two systems, P217A actions being BOA specific, whereas the BSIS SUPERBAAR is half-hour period based and not able to tag individual BOAs to the same precision. Therefore mismatches can arise and the beginning and end of a set of actions and where a P217 flagged BOA and a non-flagged BOA are present in the same period.

Post Event Cross Check (Week +1)

A further period-by-period check of P217A performance is done on a weekly basis at week +1, in which P217A flagging & SUPERBAAR tagging is cross-matched so as to give an indication of incorrect, under/ over-tagging and missing flagging/tagging issues. This picks up on any data which may have been missing or late at the time of the Cross Check 'Day+1' above. This review is written up and is shared with Control staff for any learning points that may arise.

2.0 STATISTICS

2.1 Overall Statistics

Half Hour Periods

The number of half-hour periods in this twelve-month review period was 17,568, of which 3,171 periods had BOA actions that were P217A flagged (18%).

BOAs

During the 12 months May 2011 – April 2012, 41,176 BOAs were flagged under the P217A criteria out of the total 403,528 BOAs accepted, equating to approximately 10.2% of the total actions.   The distribution of these actions are tabulated and charted below.
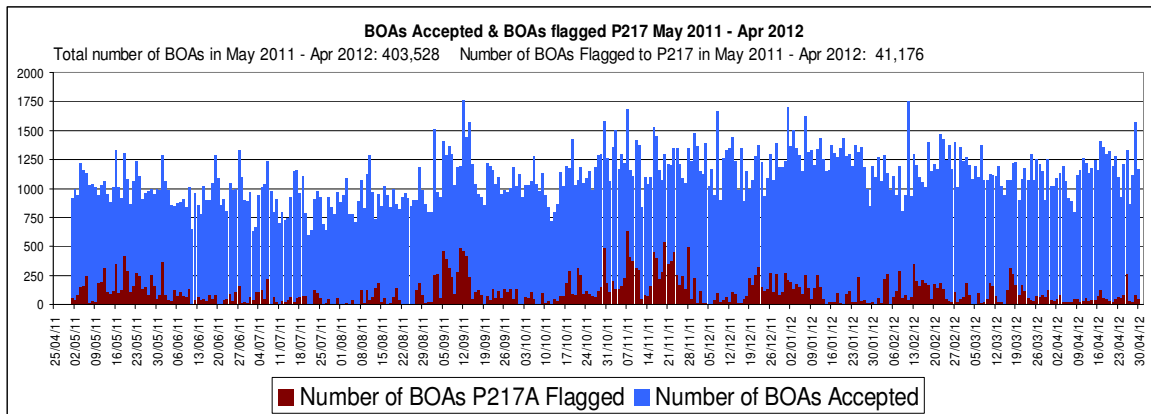
Month	*Total Number of BOAs*	*Number of BOAs P217A Flagged*	*% Flagged to P217*
May - 2011	32,027	4,846	15.13%
Jun-11	28,851	2,106	7.30%
Jul-11	27,150	1,702	6.27%
Aug-11	28,614	1,533	5.36%
Sep-11	34,523	5,409	15.67%
Oct-11	33,842	3,295	9.74%
Nov-11	37,390	8,066	21.57%
Dec-11	37,012	3,326	8.99%
Jan-12	39,981	2,839	7.10%
Feb-12	34,404	3,546	10.31%
Mar-12	35,026	2,835	8.09%
Apr-12	34,708	1,673	4.82%
Number of BOAs Flagged to P217 in May 2011 - Apr 2012:		41,176	10.20%
All BOAs accepted	403,528		

The number of BOAs taken for energy balancing and constraint management has increased year-on-year as summarised below, with a notable increase in the number of BOAs flagged to P217:

	May 2010 – April 2011	May 2011 – April 2012
BOAs accepted	378,913	402,528
Number of BOAs P217A Flagged	24,814	41,176
% Flagged to P217	6.5%	10.2%

The chart below illustrates days in which actions were P217A flagged. The flagged actions are shown in red with the overall count of actions shown in blue. It can be seen

that constraint actions (red) generally occur across a number of days due to the constraint being active over an outage period or set of conditions which can last for a week or possibly longer.

BOAs Accepted & BOAs flagged P217 May 2011 - Apr 2012
Total number of BOAs in May 2011 - Apr 2012: 403,528   Number of BOAs Flagged to P217 in May 2011 - Apr 2012: 41,176

2.2   Flagging Errors Known in Real Time (DIRs)

As mentioned in Section 1.2 above, P217A flags are applied by Control staff in real time while balancing the system. This is a manual task and occasionally flags are misapplied, often reflecting higher levels of workload in Control at the time. When such an error is realised within Control timescales it is logged through a Data Inquiry Report (DIR). 146 DIRs were raised in the 12 months (table right). These reports may cover several BOA actions on one or more BMU generator units.

Most errors resulted from not applying P217 flags – 'under-flagging' (as opposed to 'over-flagging' by leaving flags on or incorrect actions). The greatest number of periods affected by DIR errors was on 29th May 2011 where P217 flags were missed off constraint actions on wind and other renewable plant over 30 periods, across periods 16-45. However, detailed analysis finds these errors had no material impact on system prices.

Month	Number of Data Inquiry reports raised due to P217 Errors
May- 11	24
Jun- 11	14
Jul- 11	12
Aug- 11	14
Sep- 11	14
Oct- 11	22
Nov- 11	17
Dec- 11	8
Jan- 12	9
Feb- 12	7
Mar- 12	3
Apr- 12	2
Total	146

2.3   Assessment of P217A Flagging Accuracy by Cross Reference to SUPERBAAR Constraint Tagging

The primary indicator for assessing accuracy is by matching the P217A flagging against those actions tagged as a constraint cost under the BSIS SUPERBAAR process (1.3 above, 'Flagged' = P217A flagged, "Tagged" = tagged by BSIS as an action taken for system constraint reasons).

In previous reports this was done by considering individual BOAs spread across their respective half-hour periods; 'BOA.Period Actions' representing a BOA, which may spread over several half hour periods, and the periods that they affect.

However, it was found in this report that this approach leads to a significant number of false mismatches which distort the statistics in cases where Control has taken greater care to separate 'flagged' BOAs for 'system' reasons (e.g. constraints) from un-flagged BOAs for 'energy' when they take place on the same unit in the same half hour. This problem has been especially prevalent in this year's data because, for market reasons, certain generators have not self-dispatched overnight but instead have had to be bought on to resolve local voltage control constraints. Once 'on the bars' they can also be used for energy balancing actions, whereby Control place P217 flags on those BOAs to resolve the constraint but not on those taken for 'energy'. To overcome this distortion a new method is proposed for this and future reports which only considers whether flagged actions taken on a BMU any period are matched by BSIS SUPERBAAR constraint tags. Both the original and new methods are presented here for continuity. A comparison of the two methods is set out in the Appendix.

2.3.1 BOA.Period Actions Assessment (Original Method).

Statistics are presented after subtraction of legitimate differences (e.g. out of merit running for black start warming). BOA.Period Actions can fall into one of four categories:

1. 'Energy': Periods where there was no P217A flagging or actions tagged under the BSIS SUPERBAAR process.

2. BOA.Period actions that tally under both P217A flagging and the BSIS SUPERBAAR tagging process.

3. BOA.Period action where P217A flags have no corresponding SUPERBAAR tag (possible P217A over-flagging errors or SUPERBAAR under-tagging errors)

4. BOA.Period actions tagged by SUPERBAAR but with no P217A flag (possible P217A under-flagging errors / SUPERBAAR over-tagging errors)

For the period May 2011 to April 2012 this gives the results below:

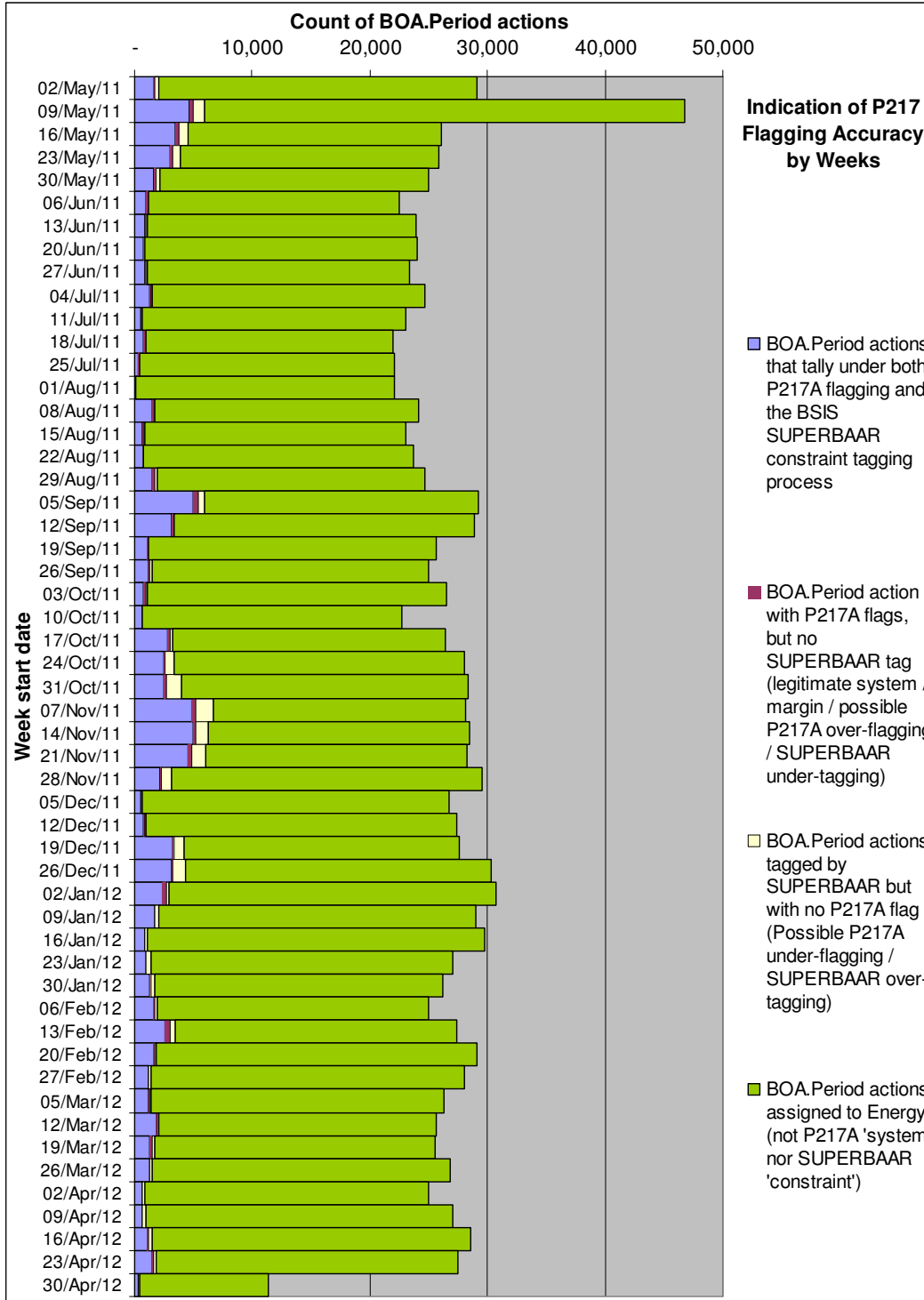| Summary of BOA.Period Action Flagging May 2011 to end Apr 2012	Totals	As % of all BOA.Period Actions	As % of BOA.Periods Flagged or Tagged
Number of BOA.Period Actions	1,377,854	100.0%	-
BOA.Period actions assigned to Energy (not P217A 'system' nor SUPERBAAR 'constraint')	1,261,869	91.6%	-
BOA.Period actions that tally under both P217A flagging and the BSIS SUPERBAAR constraint tagging process	91,035	6.6%	73.8%
BOA.Period action with P217A flags, but no SUPERBAAR tag (legitimate system / margin / possible P217A over-flagging /	7,429	0.5%	6.0%
BOA.Period actions Legitimate Differences (e.g. Black Start)	1,017		
BOA.Period action with P217A flags, but no SUPERBAAR tag after legitimate differences (margin / possible P217A over-flagging / SUPERBAAR under-tagging)	6,412	0.5%	5.2%
BOA.Period actions tagged by SUPERBAAR but with no P217A flag (Possible P217A under-flagging / SUPERBAAR over-tagging)	17,521	1.3%	14.2%
Total BOA.Periods with P217A Flag or SUPERBAAR tag (Flagged or Tagged)	123,414	9.8%	100.0%

The table shows that of the 1,377,854 BOA.Period actions within the assessment period [previous report 782,887], 98,464 had P217A flags (91,035 + 7,429 7.1% of total) [previous report 64,232, 8.2%].

Of the total number of BOAs.Period Actions taken:

- 91.6% were allocated as Energy actions [previous report 92%]

- 6.6% were allocated as Constraint actions [previous report 7.6%]

- 0.5% of all actions had P217A flags but no corresponding SUPERBAAR tag after legitimate adjustment. [Previous report 0.5%]

- 1.3% of overall actions had a SUPERBAAR tag with no corresponding P217A flag [previous report 0.34%]

Overall potential inaccuracy under this method is a maximum of 1.8% of overall actions (0.5% P217A flags no SUPERBAAR tags + 1.3% SUPERBAAR tags no P217A flags) [previous report 0.88%]

The relationship is portrayed on a weekly basis in the chart below 'Indication of P217A Accuracy' which gives a feel for the overall quantities that are processed and the occasions where potential error (red or yellow) may exist as indicated by the mismatch of P217A Boa data and BISIS constraint tagging data.

Count of BOA.Period actions

Indication of P217 Flagging Accuracy by Weeks

- ■ BOA.Period actions that tally under both P217A flagging and the BSIS SUPERBAAR constraint tagging process

- ■ BOA.Period action with P217A flags, but no SUPERBAAR tag (legitimate system / margin / possible P217A over-flagging / SUPERBAAR under-tagging)

- ☐ BOA.Period actions tagged by SUPERBAAR but with no P217A flag (Possible P217A under-flagging / SUPERBAAR over-tagging)

- ■ BOA.Period actions assigned to Energy (not P217A 'system' nor SUPERBAAR 'constraint')

Week start date

02/May/11
09/May/11
16/May/11
23/May/11
30/May/11
06/Jun/11
13/Jun/11
20/Jun/11
27/Jun/11
04/Jul/11
11/Jul/11
18/Jul/11
25/Jul/11
01/Aug/11
08/Aug/11
15/Aug/11
22/Aug/11
29/Aug/11
05/Sep/11
12/Sep/11
19/Sep/11
26/Sep/11
03/Oct/11
10/Oct/11
17/Oct/11
24/Oct/11
31/Oct/11
07/Nov/11
14/Nov/11
21/Nov/11
28/Nov/11
05/Dec/11
12/Dec/11
19/Dec/11
26/Dec/11
02/Jan/12
09/Jan/12
16/Jan/12
23/Jan/12
30/Jan/12
06/Feb/12
13/Feb/12
20/Feb/12
27/Feb/12
05/Mar/12
12/Mar/12
19/Mar/12
26/Mar/12
02/Apr/12
09/Apr/12
16/Apr/12
23/Apr/12
30/Apr/12

2.3.2 BMU.Period Method (Revised Method)

A revised method for P217A/BSIS comparison (see appendix) removes the distortion of mismatches against part-flagged periods. A number of legitimate differences are excluded from the cross-matching statistics:

>2011-2012: 63 days with 895 BMU.periods affected by out of merit running for black start warming

>2010-2011: 30 days with 326 BMU.periods affected by out of merit running for black start warming or footroom actions.

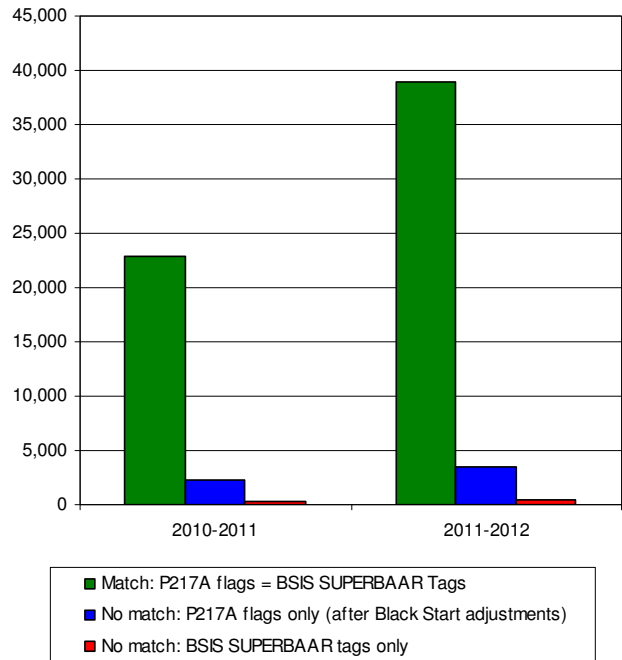The results of this analysis are tabulated and charted below:

BMU.Periods	Match: P217A flags = BSIS Tags	No match: P217A flags only (after Black Start adjustments)		No match: BSIS SUPERBAAR tags	
2010-2011	22,846	2,250	9%	326	1.3%
2011-2012	38,903	3,436	8%	517	1.2%

- P217A flags only: indicates occasions where P217A flags may have been incorrectly applied.

- SUPERBAAR tags only: indicates occasions where P217A flags may have been missed off.

These results show that although there has been a substantial increase in the number of actions that were flagged to P217A year-on-year, potential inaccuracy for 2011 – 2012 flagging is 9.2% (8% + 1.2%), which is better than the previous figure of 10.3%.

These actions themselves represent only 10.2% the overall volume of BOA's that are processed by Control in the year (see 2.1), thus the overall potential flagging error is in the realm if 1% of all BOAs that were processed in the year.

Matching of P217A Flags and BSIS Constraint Tags (number of BMU.Periods that agree/disagree)

- ■ Match: P217A flags = BSIS SUPERBAAR Tags
- ■ No match: P217A flags only (after Black Start adjustments)
- ■ No match: BSIS SUPERBAAR tags only

3.0 PERFORMANCE INTERPRETATION AND MATERIALITY OF ANY ERROR

Taking the assessment in 2.3.2 as the best guide, P217A Flagging performance has improved on that of the previous year despite a large increase in numbers of actions taken for system constraint reasons. The figures are 'worst case' because they also contain inevitable 'straggler' data mismatches between the discrete BOA-based P217A data flags and the discrete half-hour-based SUPERBAAR system tags, where an action fitting into a time pigeonhole in one system may fit a slightly different one in the other.

The quantitative results in the above sections only paint part of the picture; a qualitative review of the year found that most discrepancies were of insignificant impact. Those discrepancies that were judged to be of potential impact were identified (table below) re-run through Elexon's calculations with amended flags. No instance was found to have a material impact on the system prices.

Date	BMU	Issue	Source of error	Periods affected	Change in System Buy /Sell prices £
14/05/2011	FIDL-2 FIDL-3	Fiddlers Ferry units appear under-flagged for most of the day - 23 periods.	Possible mis-flagging	1-18, 29-32, 40-48 flags added	0.00
29/05/2011	FAAR-1 HADHW-1	Windfarms should have been flagged to System across most of day	DIR	FAAR = 27 to 29, HADHW-1 16-20 flags added	0.00
02/06/2011	ERRO-1, ERRO-3 , PEHE-1	6 periods should have had System flags	DIR	18 -22 reflagged	0.00
16/07/2011	PEHE-1	6 periods of offers caught in bid flag trap	Flagged wrong actions	7-15 removed flags	0.00
20/10/2011	LITTD2	7 periods should have Littlebrook 2 actions flagged to System	DIR	31-36 reflagged	0.00
31/10/2011	PEHE-1	11 periods of offers caught in bid flag trap	Flagged wrong actions	13-27 flags removed	0.00
08/12/2011	SLOY	Offers flagged over DP probably for energy balancing	Possible mis-flagging	32-37 flags removed	0.00
04/02/2012	SLOY	5 periods in morning incorrectly flagged to System	Flagged wrong actions	19-22 38 flags removed	0.00
06/02/2012	GRAIN units	3 periods bids in offer trap	Flagged wrong actions	20-22 flags removed	0.00
06/02/2012	EECL-1	3 periods bids in offer trap	Flagged wrong actions	34-40 flags removed	0.00
09/02/2012	GRAIN units	7 periods bids in offer trap	Flagged wrong actions	39-45 flags removed	0.00

4.0 YEAR-ON-YEAR & FLAGGING PERFORMANCE CONCLUSIONS

The key quantities for this and the previous year are compared in the table right. There has been a notable increase in the quantity of P217A flagging over the previous year due to a rise in occasions of system constraints which has been driven by a variety of factors such as outage work and changes in market dispatch of generation.

	May 2010 - Apr 2011	May 2011 - Apr 2012
	In 12 months	In 12 months
Number of half-our periods in year	17520	17568
Number of Periods with P217 Flags	7,554	11,040
Number of DIRs raised	78	146
Number of BOAs accepted	378,913	403,528
Number of BOAs Flagged to P217	24,814	41,176
% flagged to P217A	6.55%	10.20%
Potential inacuracy of P217 Flagging: (Percentage of BMU.Periods without match of P217A & BSIS tags)		
	10.3%	9.2%
Overall potential inaccuracy in all BOAs processed	0.67%	0.94%
Overall accuracy better than:	99.33%	99.06%

Despite this increase, this report concludes:

- P217A flagging performance in the 12 months of this review continues to improve upon on the performance of the preceding year (potential inaccuracy in table above falling from 10.3% to 9.2% of those all flagged by Control or considered by BSIS SUPERBAAR as constraint actions) .

- No materiality issues arose out of instances of incorrect flagging in the review period.

- Potential errors in application of P217A flags affects less than 1% of the overall quantity of BOAs processed (9.2% x 10.2%).

APPENDIX - REVISED METHODOLOGY

In this report it was found that the original methodology for measuring statistical performance of Flagging Accuracy was being distorted by false mismatches between the cross-matching of P217A flags and BSIS Superbaar tags due to the correct part-flagging of actions in periods on certain BMUs both 'To P217A' and 'Not P217A'. This related especially to a large number of Voltage Control actions which where an unusually prevalent in the time frame.   This approach is proposed for future reports.

Original Methodology

The match or mismatch of P217A flagging / BSIS SUPERBAAR tagging can be illustrated in the form of maps, as below. The difference between the above two methods is illustrated in the example below which shows those actions on 8th April 2012 during periods 1-30 (00:00 – 14:30 hrs) for which P217A flags or SUPERBAAR tags were deemed to apply. In this example actions were taken to run Grain generator units up to a certain level for a voltage control constraint.

Original method diagram
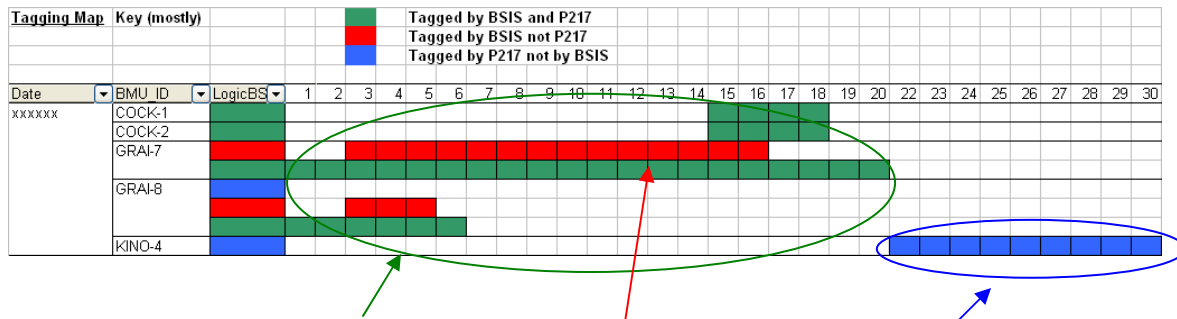
Actions in green taken to put on generation for a constraint – correctly flagged to P217A and correctly BSIS tagged as a constraint.

Actions in Red on same generator as constraint actions are for additional energy and not P217 flagged. The appear as a mismatch i.e. false error, in the statistics

These actions for out-of-merit black start warming, correctly P217A flagged, and not a BSIS SUPERBAAR constraint.

These are legitimate differences and excluded from the cross-match performance analysis.

New Methodology

The new method removes the false mismatches resulting from Control's accuracy in correctly identifying and separating constraint/system actions from energy actions in the same period.

New Method diagram

Date	BMU_ID	Data	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30
####	COCK-1	Both P217 & BSIS															1	1	1	1											
		P217 Only																													
		BSIS Only																													
	COCK-2	Both P217 & BSIS															1	1	1	1											
		P217 Only																													
		BSIS Only																													
	GRAI-7	Both P217 & BSIS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									
		P217 Only																													
		BSIS Only																													
	GRAI-8	Both P217 & BSIS	1	1	1	1	1	1																							
		P217 Only																													
		BSIS Only																													
	KINO-4	Both P217 & BSIS																													
		P217 Only																													
		BSIS Only																													

Logic has identified the dual actions in these periods and
removed the false error.