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| Predictive Health Notification  Alinity I ITV |
| ALINITY ci Immunoassay Analyzer  Anthony Schuler  June 25, 2018 |

**PHN - Alinity IA ITV Spec Sheet for Apollo**

**References**

D000045703/B, Alinity i ITV Predictive Health Notification

**Summary**

To implement a Prognostic Health Monitoring (PHM) algorithm for Alinity i analyzers that will detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception and/or unplanned instrument down time.

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| PHN Descriptor | Alinity IA ITV |
| PHN Experience Code / Name | CC31: PHN\_Alinity\_IA; PHN\_Vortexer VTXR1; PWM  CC41: PHN\_Alinity\_IA; PHN\_Vortexer VTXR2; PWM  CC51: PHN\_Alinity\_IA; PHN\_Vortexer VTXPT; PWM  CC61: PHN\_Alinity\_IA; PHN\_Vortexer pVTX; PWM |
| PHN KM Article Number/ Name | K04134211: PHN\_Alinity\_IA ITV |
| Service Level | 2- Advanced Service |
| Always On Package | Always On 01DP5- 01, 02, 03, 09, 80, 83, 84, 89 |
| IDA Table | IDAQOWNER.ICQ\_ITVDATA |
| IDA Table Fields | MODULESN, ITVMECHANISMNAME, PWMVALUE, ACTUALSPEED, REQUESTEDSPEED, LOGDATE\_LOCAL |
| Analysis Frequency | Daily |
| Data Required | Previous 1 day |
| Data Aggregation | Average |
| Run Time Estimate | 66 seconds (59 days, 110 instruments, 1,179,171 rows, 578 algorithm flags) |
| Flag Criteria | Reagent1Itv1Mechanism: Mean PWM Value >= 725  Reagent2Itv2Mechanism: Mean PWM Value >= 795  PretreatItv3Mechanism: Mean PWM Value >= 900  PretriggerItv4Mechanism: Mean PWM Value >= 735 |
| Probable Failure Modes | Fluid Leakage causing corrosion and/or salt build up on the ITV.  ITV Failure  Loose or poor connection of the ITV |
| Suppression Experience Codes | See Table Below |
| Applicable Work Done Codes (WDC) | C8\*\*: Fluid Movement:Vortexer VTXR1  C9\*\*: Fluid Movement:Vortexer VTXR2  CJ\*\*: Fluid Movement:Vortexer VTXR4  CI\*\*: Fluid Movement:Vortexer VTRX3 |

**Suppression Experience Codes**

|  |  |  |
| --- | --- | --- |
|  | Alinity Experience Codes | Alinity Text |
| Vortexer VTXR1 | C32K | Fluidics Issue: Vortexer VTXR1 Step Loss/Stalls/Speed/Cycle Errors |
|  | C327 | Fluidics Issue: Vortexer VTXR1 Movement not as expeted |
|  | C321 | Top of Form  Fluidics Issue: Vortexer Vortexer VTXR1 Vortex Errors (Engage/Disengage/Time) Bottom of Form |
|  | A6NK | Votexer Issue: Vortexer #1 Step Loss/Stalls/Speed/Cycle Errors |
|  | A6N1 | Votexer Issue: Vortexer #1 Vortex Errors (Engage/Disengage/Time) |
|  | Z6OO | 5309 (R1) vortexer did not reach required speed. |
|  | Z6OC | 5306 (R1) vortexer did not disengage from RV. |
|  | Z6OG | 5307 (R1) vortexer did not engage with RV. |
|  | Z6OK | 5308 (R1) vortexer mixing error. |
| Vortexer VTXR2 | C33K | Fluidics Issue: Vortexer VTXR2 Step Loss/Stalls/Speed/Cycle Errors |
|  | C337 | Fluidics Issue: Vortexer VTXR2 Movement not as expeted |
|  | C331 | Top of Form  Fluidics Issue: Vortexer Vortexer VTXR2 Vortex Errors (Engage/Disengage/Time)  Bottom of Form |
|  | A6OK | Votexer Issue: Vortexer #2 Step Loss/Stalls/Speed/Cycle Errors |
|  | A6O1 | Votexer Issue: Vortexer #2 Vortex Errors (Engage/Disengage/Time) |
|  | Z6OP | 5309 (R2) vortexer did not reach required speed. |
|  | Z6OD | 5306 (R2) vortexer did not disengage from RV. |
|  | Z6OH | 5307 (R2) vortexer did not engage with RV. |
|  | Z6OL | 5308 (R2) vortexer mixing error. |
| Vortexer VTXPT | C35K | Fluidics Issue: Vortexer VTXPT Step Loss/Stalls/Speed/Cycle Errors |
|  | C357 | Fluidics Issue: Vortexer VTXPT Movement not as expeted |
|  | C351 | Top of Form  Fluidics Issue: Vortexer Vortexer VTXPT Vortex Errors (Engage/Disengage/Time)  Bottom of Form |
|  | A62K | Votexer Issue: Pre-Trigger Step Loss/Stalls/Speed/Cycle Errors |
|  | A621 | Votexer Issue: Pre-Trigger Vortex Errors (Engage/Disengage/Time) |
|  | Z6OQ | 5309 (pVTX) vortexer did not reach required speed. |
|  | Z6OF | 5306 (pVTX) vortexer did not disengage from RV. |
|  | Z6OI | 5307 (pVTX) vortexer did not engage with RV. |
|  | Z6OM | 5308 (pVTX) vortexer mixing error. |
| Vortexer pVTX (Pretreatment) | C34K | Fluidics Issue: Vortexer pVTX Step Loss/Stalls/Speed/Cycle Errors |
|  | C347 | Fluidics Issue: Vortexer pVTX Movement not as expeted |
|  | C341 | Top of Form  Fluidics Issue: Vortexer Vortexer pVTX Vortex Errors (Engage/Disengage/Time)  Bottom of Form |
|  | A61K | Votexer Issue: PreTreat: Step Loss/Stalls/Speed/Cycle Errors |
|  | A611 | Votexer Issue: PreTreat: Vortex Errors (Engage/Disengage/Time) |
|  | Z6OR | 5309 (Pretreatment) vortexer did not reach required speed. |
|  | Z6OE | 5306 (Pretreatment) vortexer did not disengage from RV. |
|  | Z6OJ | 5307 (Pretreatment) vortexer did not engage with RV. |
|  | Z6ON | 5308 (Pretreatment) vortexer mixing error. |

**Data Processing Steps**

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| --- | --- |
| Data Processing Steps | |
| 1 | Query all data from the previous day for each ITV/instrument combination (IDA Table: IDAQOWNER.ICQ\_ITVDATA). |
| 2 | Unique ITVs will be identified by MODULESN and ITVMECHANISMNAME. |
| 3 | Exclude data points where ACTUALSPEED = 600. |
| 4 | Only include data points where REQUESTEDSPEED = 1502. |
| 5 | Summarize the data by calculating the mean PWMVALUE per ITV/instrument. |
| 6 | Flag any ITV/instrument combinations where:  Reagent1Itv1Mechanism Mean PWM Value >= 725  Reagent2Itv2Mechanism Mean PWM Value >= 795  PretreatItv3Mechanism Mean PWM Value >= 900  PretriggerItv4Mechanism Mean PWM Value >= 735 |

**Define Reusable Routine**

|  |  |
| --- | --- |
| **Routine Details** |  |
| Routine Source | Define Reusable Routine |
| Routine Type | Oracle Procedure |
| Run Mode | Batch |
| Routine Invoke Command | PHM\_ICQ\_ITV\_PROC |
| Status | Enable |

|  |  |
| --- | --- |
| **Apollo Details** |  |
| Algorithm ID \* | Alinity IA ITV - Generic |
| Algorithm Name \* | Alinity IA ITV - Generic |
| Algorithm Description \* | Detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception. |
| Product Family \* | Alinity IA |
| Algorithm Group \* | Alinity ITV |
| Functional Area | N/A |
| Algorithm Category 1 | N/A |
| Algorithm Category 2 | N/A |
| Algorithm Category 3 | N/A |
| Remaining Useful Life Value | 7 |
| Remaining Useful Life Unit | Day |
| Keep Results Num Days | 14 |
| **Routine Details** |  |
| Routine Source | Define Reusable Routine |
| Routine Type | Oracle Procedure |
| Run Mode | Batch |
| Routine Invoke Command | PHM\_ICQ\_ITV\_PROC |
| Status | Disabled |
| **Parameters** |  |
| Parameter Group Name | ICQ\_ITV |
| **Parameter Name** | **Parameter**  **Values** |
| IHN\_LEVEL3\_DESC | IHN\_LEVEL3\_DESC |
| I\_ITV\_THRESHOLD\_ACTSPD | 600 |
| I\_ITV\_THRESHOLD\_ITVMECHNAME | I\_ITV\_THRESHOLD\_ITVMECHNAME |
| I\_ITV\_THRESHOLD\_MEANPWM | 725 |
| I\_ITV\_THRESHOLD\_REQSPD | 1502 |
| THRESHOLD\_COUNT | 1 |
| THRESHOLD\_DESCRIPTION | THRESHOLD\_DESCRIPTION |

**APPENDIX 1:** CC31: PHN\_Alinity\_IA; PHN\_Vortexer VTXR1; PWM

**Algorithm Code**

SELECT

evals.MODULESN

FROM

(SELECT

I.MODULESN,

I.ITVMECHANISMNAME,

AVG(I.PWMVALUE) AS MEAN\_PWMVALUE

FROM

IDAQOWNER.ICQ\_ITVDATA I

WHERE

I.LOGDATE\_LOCAL >= TRUNC(SYSDATE) - 1

AND I.LOGDATE\_LOCAL < TRUNC(SYSDATE)

AND I.ACTUALSPEED != 600

AND I.REQUESTEDSPEED = 1502

AND I.ITVMECHANISMNAME = 'Reagent1Itv1Mechanism'

GROUP BY

I.MODULESN,

I.ITVMECHANISMNAME

ORDER BY

I.MODULESN,

I.ITVMECHANISMNAME

) evals

WHERE

evals.MEAN\_PWMVALUE >= 725

**Apollo Algorithm Details**

(\* is Mandatory)

|  |  |
| --- | --- |
| **Apollo Details** |  |
| Algorithm ID \* | Alinity IA ITV R1 PWM |
| Algorithm Name \* | Alinity IA ITV R1 PWM |
| Algorithm Description \* | Detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception. |
| Product Family \* | Alinity IA |
| Algorithm Group \* | Alinity ITV |
| Functional Area | N/A |
| Algorithm Category 1 | N/A |
| Algorithm Category 2 | N/A |
| Algorithm Category 3 | N/A |
| Remaining Useful Life Value | 7 |
| Remaining Useful Life Unit | Day |
| Keep Results Num Days | 14 |
| **Routine Details** |  |
| Routine Source | Use Reusable Routine |
| Reusable Routines | Alinity IA ITV - Generic |
| Run Mode | Batch |
| Status | Enable |
| **ODS Routine Details** |  |
| ODS Routine Name | PHM\_ODS\_ICQ\_ITVDATA\_PROC |
| **Prognostic Health Notification Details** |  |
| PHN Code | PHN\_Alinity IA\_CC31 |
| Issue Description (Use Algorithm Name) |  |
| Experience Code | CC31 THE WRONG CODE WAS PULLED IN DEV |
| **Knowledge Management DB Articles** |  |
| KM Article ID | K04134211 |
| KM Article | PHN\_Alinity\_IA ITV |
| **Parameters** |  |
| Parameter Group Name | ICQ\_ITV |
| **Parameter Name** | **Parameter**  **Values** |
| IHN\_LEVEL3\_DESC | Alinity IA ITV R1 PWM |
| I\_ITV\_THRESHOLD\_ACTSPD | 600 |
| I\_ITV\_THRESHOLD\_ITVMECHNAME | Reagent1Itv1Mechanism |
| I\_ITV\_THRESHOLD\_MEANPWM | 725 |
| I\_ITV\_THRESHOLD\_REQSPD | 1502 |
| THRESHOLD\_COUNT | 1 |
| THRESHOLDS\_DESCRIPTION | Alinity IA ITV R1 PWM |
| **Chart Details** |  |
| Chart Title | Alinity IA ITV R1 PWM |
| Chart Type | Line |
| Chart Threshold Parameter | ICQ\_ITV-THRESHOLDS\_COUNT |
| Group ID | Group 7 |
| Chart X Axis Name | Date |
| Chart Y Axis Name | Threshold Count |

**APPENDIX 2:** CC41: PHN\_Alinity\_IA; PHN\_Vortexer VTXR2; PWM

**Algorithm Code**

SELECT

evals.MODULESN

FROM

(SELECT

I.MODULESN,

I.ITVMECHANISMNAME,

AVG(I.PWMVALUE) AS MEAN\_PWMVALUE

FROM

IDAQOWNER.ICQ\_ITVDATA I

WHERE

I.LOGDATE\_LOCAL >= TRUNC(SYSDATE) - 1

AND I.LOGDATE\_LOCAL < TRUNC(SYSDATE)

AND I.ACTUALSPEED != 600

AND I.REQUESTEDSPEED = 1502

AND I.ITVMECHANISMNAME = 'Reagent2Itv2Mechanism'

GROUP BY

I.MODULESN,

I.ITVMECHANISMNAME

ORDER BY

I.MODULESN,

I.ITVMECHANISMNAME

) evals

WHERE

evals.MEAN\_PWMVALUE >= 795

**Apollo Algorithm Details**

(\* is Mandatory)

|  |  |
| --- | --- |
| **Apollo Details** |  |
| Algorithm ID \* | Alinity IA ITV R2 PWM |
| Algorithm Name \* | Alinity IA ITV R2 PWM |
| Algorithm Description \* | Detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception. |
| Product Family \* | Alinity IA |
| Algorithm Group \* | Alinity ITV |
| Functional Area | N/A |
| Algorithm Category 1 | N/A |
| Algorithm Category 2 | N/A |
| Algorithm Category 3 | N/A |
| Remaining Useful Life Value | 7 |
| Remaining Useful Life Unit | Day |
| Keep Results Num Days | 14 |
| **Routine Details** |  |
| Routine Source | Use Reusable Routine |
| Reusable Routines | Alinity IA ITV - Generic |
| Run Mode | Batch |
| Status | Enable |
| **ODS Routine Details** |  |
| ODS Routine Name | PHM\_ODS\_ICQ\_ITVDATA\_PROC |
| **Prognostic Health Notification Details** |  |
| PHN Code | PHN\_Alinity IA\_CC41 |
| Issue Description (Use Algorithm Name) |  |
| Experience Code | CC41 |
| **Knowledge Management DB Articles** |  |
| KM Article ID | K04134211 |
| KM Article | PHN\_Alinity\_IA ITV |
| **Parameters** |  |
| Parameter Group Name | ICQ\_ITV |
| **Parameter Name** | **Parameter Values** |
| IHN\_LEVEL3\_DESC | Alinity IA ITV R2 PWM |
| I\_ITV\_THRESHOLD\_ACTSPD | 600 |
| I\_ITV\_THRESHOLD\_ITVMECHNAME | Reagent2Itv2Mechanism |
| I\_ITV\_THRESHOLD\_MEANPWM | 795 |
| I\_ITV\_THRESHOLD\_REQSPD | 1502 |
| THRESHOLD\_COUNT | 1 |
| THRESHOLDS\_DESCRIPTION | Alinity IA ITV R2 PWM |
| **Chart Details** |  |
| Chart Title | Alinity IA ITV R2 PWM |
| Chart Type | Line |
| Chart Threshold Parameter | ICQ\_ITV-THRESHOLDS\_COUNT |
| Group ID | Group 7 |
| Chart X Axis Name | Date |
| Chart Y Axis Name | Threshold Count |

**APPENDIX 3:** CC61: PHN\_Alinity\_IA; PHN\_Vortexer pVTX; PWM (Pretreatment ITV)

**Algorithm Code**

SELECT

evals.MODULESN

FROM

(SELECT

I.MODULESN,

I.ITVMECHANISMNAME,

AVG(I.PWMVALUE) AS MEAN\_PWMVALUE

FROM

IDAQOWNER.ICQ\_ITVDATA I

WHERE

I.LOGDATE\_LOCAL >= TRUNC(SYSDATE) - 1

AND I.LOGDATE\_LOCAL < TRUNC(SYSDATE)

AND I.ACTUALSPEED != 600

AND I.REQUESTEDSPEED = 1502

AND I.ITVMECHANISMNAME = 'PretreatItv3Mechanism'

GROUP BY

I.MODULESN,

I.ITVMECHANISMNAME

ORDER BY

I.MODULESN,

I.ITVMECHANISMNAME

) evals

WHERE

evals.MEAN\_PWMVALUE >= 900

**Apollo Algorithm Details**

(\* is Mandatory)

|  |  |
| --- | --- |
| **Apollo Details** |  |
| Algorithm ID \* | Alinity IA ITV Pretreatment PWM |
| Algorithm Name \* | Alinity IA ITV Pretreatment PWM |
| Algorithm Description \* | Detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception. |
| Product Family \* | Alinity IA |
| Algorithm Group \* | Alinity ITV |
| Functional Area | N/A |
| Algorithm Category 1 | N/A |
| Algorithm Category 2 | N/A |
| Algorithm Category 3 | N/A |
| Remaining Useful Life Value | 7 |
| Remaining Useful Life Unit | Day |
| Keep Results Num Days | 14 |
| **Routine Details** |  |
| Routine Source | Use Reusable Routine |
| Reusable Routines | Alinity IA ITV – Generic |
| Run Mode | Batch |
| Status | Enable |
| **ODS Routine Details** |  |
| ODS Routine Name | PHM\_ODS\_ICQ\_ITVDATA\_PROC |
| **Prognostic Health Notification Details** |  |
| PHN Code | PHN\_Alinity IA\_CC61 |
| Issue Description (Use Algorithm Name) |  |
| Experience Code | CC61 |
| **Knowledge Management DB Articles** |  |
| KM Article ID | K04134211 |
| KM Article | PHN\_Alinity\_IA ITV |
| **Parameters** |  |
| Parameter Group Name | ICQ\_ITV |
| **Parameter Name** | **Parameter Values** |
| IHN\_LEVEL3\_DESC | Alinity IA ITV Pretreatment PWM |
| I\_ITV\_THRESHOLD\_ACTSPD | 600 |
| I\_ITV\_THRESHOLD\_ITVMECHNAME | PretreatItv3Mechanism |
| I\_ITV\_THRESHOLD\_MEANPWM | 900 |
| I\_ITV\_THRESHOLD\_REQSPD | 1502 |
| THRESHOLD\_COUNT | 1 |
| THRESHOLDS\_DESCRIPTION | Alinity IA ITV Pretreatment PWM |
| **Chart Details** |  |
| Chart Title | Alinity IA ITV Pretreatment PWM |
| Chart Type | Line |
| Chart Threshold Parameter | ICQ\_ITV-THRESHOLDS\_COUNT |
| Group ID | Group 7 |
| Chart X Axis Name | Date |
| Chart Y Axis Name | Threshold Count |

**APPENDIX 4:** CC51: PHN\_Alinity\_IA; PHN\_Vortexer VTXPT; PWM (Pre Trigger)

**Algorithm Code**

SELECT

evals.MODULESN

FROM

(SELECT

I.MODULESN,

I.ITVMECHANISMNAME,

AVG(I.PWMVALUE) AS MEAN\_PWMVALUE

FROM

IDAQOWNER.ICQ\_ITVDATA I

WHERE

I.LOGDATE\_LOCAL >= TRUNC(SYSDATE) - 1

AND I.LOGDATE\_LOCAL < TRUNC(SYSDATE)

AND I.ACTUALSPEED != 600

AND I.REQUESTEDSPEED = 1502

AND I.ITVMECHANISMNAME = 'PretriggerItv4Mechanism'

GROUP BY

I.MODULESN,

I.ITVMECHANISMNAME

ORDER BY

I.MODULESN,

I.ITVMECHANISMNAME

) evals

WHERE

evals.MEAN\_PWMVALUE >= 735

**Apollo Algorithm Details**

(\* is Mandatory)

|  |  |
| --- | --- |
| **Apollo Details** |  |
| Algorithm ID \* | Alinity IA ITV Pretrigger PWM |
| Algorithm Name \* | Alinity IA ITV Pretrigger PWM |
| Algorithm Description \* | Detect degrading ITV performance before the customer begins experiencing an increase in ITV speed errors; 5309 (ITV X) did not reach required speed, causing tests lost to exception. |
| Product Family \* | Alinity IA |
| Algorithm Group \* | Alinity ITV |
| Functional Area | N/A |
| Algorithm Category 1 | N/A |
| Algorithm Category 2 | N/A |
| Algorithm Category 3 | N/A |
| Remaining Useful Life Value | 7 |
| Remaining Useful Life Unit | Day |
| Keep Results Num Days | 14 |
| **Routine Details** |  |
| Routine Source | Use Reusable Routine |
| Reusable Routines | Alinity IA ITV |
| Run Mode | Batch |
| Status | Enable |
| **ODS Routine Details** |  |
| ODS Routine Name | PHM\_ODS\_ICQ\_ITVDATA\_PROC |
| **Prognostic Health Notification Details** |  |
| PHN Code | PHN\_Alinity\_IA\_CC51 |
| Issue Description (Use Algorithm Name) |  |
| Experience Code | CC51 |
| **Knowledge Management DB Articles** |  |
| KM Article ID | K04134211 |
| KM Article | PHN\_Alinity\_IA ITV |
| KM Link | https://addkm.abbott.com/advisor/showcase?case=K04134211&project=Abbott |
| **Parameters** |  |
| Parameter Group Name | ICQ\_ITV |
| **Parameter Name** | **Parameter Values** |
| IHN\_LEVEL3\_DESC | Alinity IA ITV Pretrigger PWM |
| I\_ITV\_THRESHOLD\_ACTSPD | 600 |
| I\_ITV\_THRESHOLD\_ITVMECHNAME | PretriggerItv4Mechanism |
| I\_ITV\_THRESHOLD\_MEANPWM | 735 |
| I\_ITV\_THRESHOLD\_REQSPD | 1502 |
| THRESHOLD\_COUNT | 1 |
| THRESHOLDS\_DESCRIPTION | Alinity IA ITV Pretrigger PWM |
| **Chart Details** |  |
| Chart Title | Alinity IA ITV Pretrigger PWM |
| Chart Type | Line |
| Chart Threshold Parameter | ICQ\_ITV-THRESHOLDS\_COUNT |
| Group ID | Group 7 |
| Chart X Axis Name | Date |
| Chart Y Axis Name | Threshold Count |

**APPENDIX 5:** Algorithm Understanding Check – Algorithm Developer to Prognostic Health Monitoring (PHM) Specialist Transition

This step is not necessary. For this algorithm, the Algorithm Developer and PHM Specialist were the same individual (i.e. the PHM Specialist was the one that developed the Algorithm). As such, there was no “hand-off” of the algorithm from Algorithm Developer to PHM Specialist, and no Understanding Check was necessary. Proper algorithm functionality was checked by the original developer of the algorithm (again, the PHM Specialist).

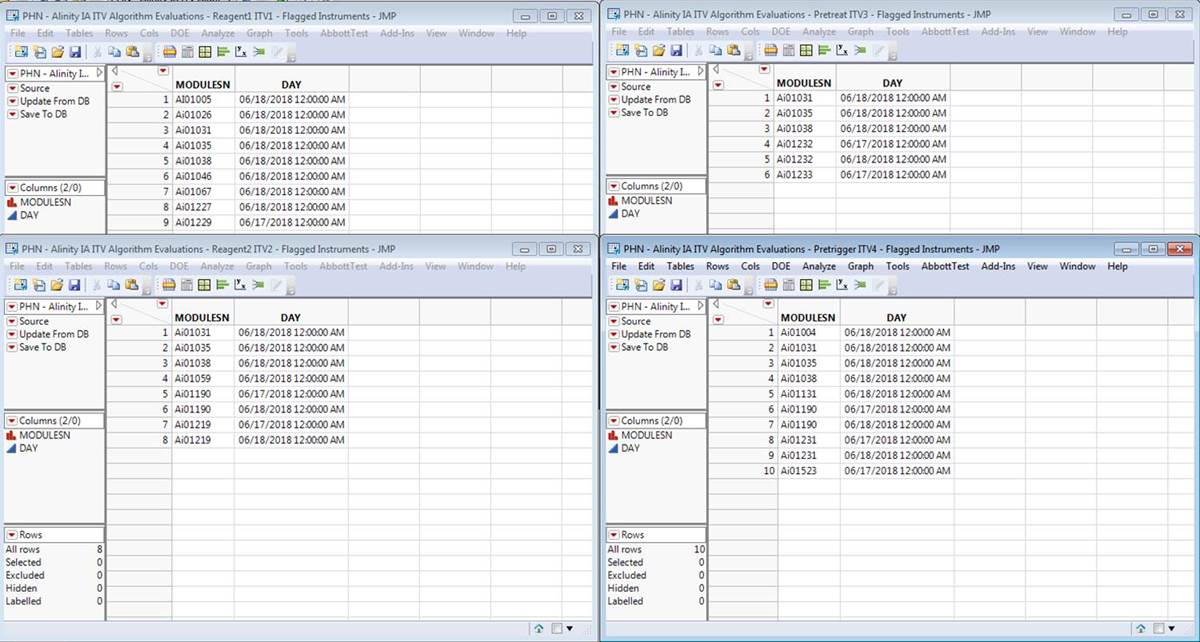
**APPENDIX 6:** Algorithm Transition to Apollo – PHM Specialist to Apollo Developer

**Data Set Description**

The data set for this transition was retrieved from the IDAQOWNER.ICQ\_ITDATA table within the DABBTO database. Data was collected for all available instruments between June, 17 2018 and June 18, 2018, inclusive.

**PHM Specialist Analysis Output**

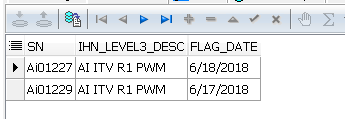
The following 33 instrument-days (MODULESN-DAY) were identified as violating the algorithm by the PHM Specialist:



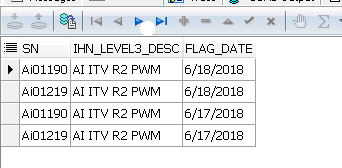
**Apollo Developer Analysis Output**

The following 14 instrument-days (SN-FLAG\_DATE) were identified as violating the algorithm by the Apollo Developer (note that where the Apollo Developer and PHM Specialist don’t match is because the instruments do not exist in the Apollo environment, and therefore have no data to run the algorithm against):

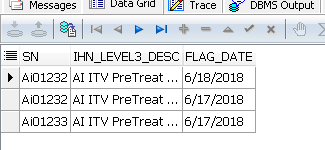
Reagent1 ITV1:



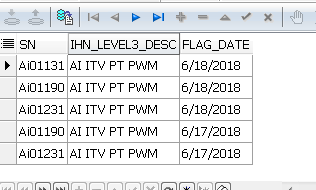
Reagent2 ITV2:



Pretreat ITV3:



Pretrigger ITV4:



**Algorithm Transition Summary**

Based on the outputs from both the Apollo Developer and PHM Specialist, the Apollo Developer’s understanding of the delivered algorithm is confirmed. Both the Apollo Developer and PHM Specialist analyzed the same data set and got the same results (with the exception of the instruments not in Apollo as mentioned previously). In particular, the MODULESN/SN and DAY/FLAG\_DATE fields matched by ITV. This means that both the Apollo Developer and PHM Specialist flagged the same algorithm violations within the given data set.