IAlpha Ppm Plus

Quick Beginners Guide

Version 0.2-0.3 Beta

IALPHA PPM PLUS DEVELOPMENT TEAM

S/N	Department	Role	Remarks
1	BOGT Operations	Application Design and Systems Development/QAQC	
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REFERENCES

1. IOG 157 (n.d.) Integrated Operations Guide for Chemical Injection. Shell
    Petroleum Development Company, Nigeria [Online]. Available from:
    https://sww-knowledge-
    epg.shell.com/knowtepg1/livelink.exe/fetch/2000/581635/582061/2087448/2
    57431/4457278/IOG_157-Chemical_Injection.pdf?nodeid=4457379&vernum=7
    (Accessed: 3rd October 2012)

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1.0 INTRODUCTION

IAlpha Ppm Plus is an application developed by BSi Intelligent Systems with major contributions from BOGT Field Supervisors and Laboratory. It implements the agile development approach (Scrum, a bit of Test Driven Development consciousness and Rational Unified Process approach for different major milestones) that mainly releases software version updates when available and well tested. The results produced from the calculations and pump simulation have been verified by Laboratory as correct but intermittent confirmations and reset of user stroke values might be required to always represent the actual performance of the system. This is because the default standard is built on a good working performance of the flocculants pumps.

IAlpha Ppm Plus is an application/management system that implements all the solutions required to ensure a thorough monitoring of process parameters, results and maintenance of A1403.

Currently it helps the field operator/laboratory personnel to:

1. Estimate the performance/pump rate of each flocculants pumps (P1405A-E)
2. Estimate the amount of chemical (in ppm) each or a combination of pumps are injecting into the surge tank, saving time, improving accuracy in computation and ensuring operating limits are not exceeded unknowingly.
3. Presets/determines the exact settings (stroke percentage) a combination of pumps are expected to be at a particular inlet flow rate to achieve a desired chemical Ppm – This is one major importance.
4. Forecasts chemical consumption rates and refill dates daily.

   In the next release:

5. Creation of tables will be automated so as field operators can estimate on site the settings of the pump from the tables generated from iAlpha: Ppm Plus.
6. Provision of a detailed guide on: maintenance, safety, history, overview, etc.

2.0 FUNCTIONAL/NON FUNCTIONAL REQUIREMENTS AND IOG 137 (CHEMICAL INJECTION OPERATIONS GUIDE) COMPLIANCE

An extremely important requirement before this system can ever be used effectively is an accurate injection rate into the injection vessel/surge tank or stream. If this value is erroneous the system will give misleading analysis and will be of no importance. This means before use of this system, an accurate means of estimating the stream flow rate MUST be present and available (example, 14FT016 – BOGT inlet flow transmitter into T1401, must be online and accurate).

The following are the functional requirements iAlpha Ppm Plus is intended to provide:

1. Calculate Injecting Flocculants Ppm Using Pump Stroke Interpolation

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2. Predetermine Flocculants Ppm to Inject
3. Plan refill time for Flocculants
4. View default stroke values
5. View and Set Custom User Stroke Values
6. Creating Reports
7. Produce pump injection estimation charts

The following are the non functional requirements of iAlpha Ppm Plus:

1. Self extracting platform/system independent implementation
2. Runs on virtual machine i.e. platform independent and installable
3. Maintainability - The system should be easily maintained after final deployment
4. Durability – The system should be able to recover from errors and handle all exceptions during operation in a manner that fosters user friendliness.
5. Reliability – All deliverables should be validated using tests and test duration should be specified and results logged and filed

3.0 TUTORIAL: HOW TOS

Below is how to execute most of the tasks using the Ppm Plus tool. The interface is self-explanatory and user friendly, most tasks are basically easy to accomplish with very minimum guide.

3.1 CALCULATE INJECTING FLOCCULANTS PPM USING FIELD TIMING

1. Get the time (example - average time for all running floc. pumps 2 minutes) required to pump a known volume of flocculants from the calibration pot, example 30ml. Get and note the average time for all the running flocculants pumps. Also get the flow rate (example 5000bbls/hr) into the surge tank (or vessel where the flocculation will take place). If Pump A – 1min, Pump B 2min, Pump C 1.5min, Pump D 1.5min, average time will be (1+2+1.5+1.5)/3 = 2min/30ml for 4 running pumps. Note this is just an example not from real field test.

2. Open iAlpha Ppm Plus, click the main tab as shown (red pen) and enter all the parameters collected in step 1 above as shown below:
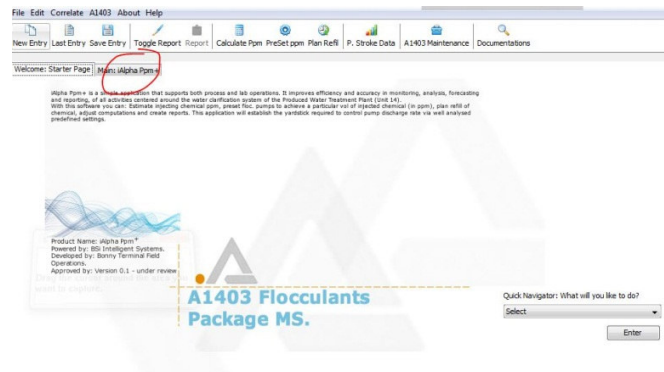
Figure 1. iAlpha Ppm Plus Home Screen.

3. Enter the parameters as shown below 30ml floc. Vol, 4 running pumps, 2min to pump 30ml (stroke does not matter in this approach), and 5000bbl/hr inlet flow rate into to surge tank:

Figure 2. Entering parameters to calculate ppm.

4. Click Calculate and view result as shown below

Figure 3. Calculating ppm and reviewing results

Result and Analysis: From the result, it can be deduced that, the rate of chemical injection into the surge tank is 4.5288ppm and in 86.4 liters/day and 4.32% of the tank will be consumed in a day.

3.2 CALCULATE INJECTING FLOCCULANTS PPM USING PUMP STROKE INTERPOLATION

1. From field/flocculants package, take note of the number of pumps running and the individual stroke percentages. Get the inlet flow rate into the surge tank (example T1401). Example, 4 pumps running, A,B pumps running at 70% stroke length and C,D pumps at 80% stroke length, and 5000bbls/hr inlet flow rate into the surge tank.

2. Open iAlpha Ppm Plus and tick the check box *"Click to use second approach for calibration below"* to enable the second approach and disable the first approach. *Note the first approach is always a recent performance of the package than the second approach, except the pump performance for the second approach is reviewed weekly*. The dialog box will display to inform you that you are using the second approach. Click ok. Shown below:

Figure 4. Changing approach to calculating Ppm.

3. Enter the parameters:

Figure 5. Reviewing parameters and results from second approach to calculating Ppm

Result and Analysis: You can see that Pump A, B are at 70% and C,D at 80%. Pump E was not selected because on site it was not running. After setting the strokes, click

"calculate" and the results will be computed. 6.36ppm was injected and 121.334liters/day is being injected per day and 6% of the tank is being used per day.

Note: When you wish to use the first approach to calculating ppm again, uncheck the "Click to use second approach to calculating ppm" and click on OK on the dialog box that will acknowledge your choice.

3.3 PREDETERMINE FLOCCULANTS PPM TO INJECT

To predetermine flocculants ppm to inject involves choosing a particular ppm to inject into the surge tank and setting pump strokes to inject at a rate that produces the predetermined ppm. Example, you went to site and after using approach one or approach two from iAlpha ppm plus you observed that you were currently injecting 7ppm and you don't want to inject 7ppm but 4ppm. To do this, you will obtain the strokes required to produce 4ppm from iAlpha and this can be computed using this ppm tool. To do this, follow the example below.

1. Click on the "Preset Ppm" on the tool bar or click on the "Correlate" menu button and then click on "Pre-select pump stroke configuration" or Alt+A. as shown below
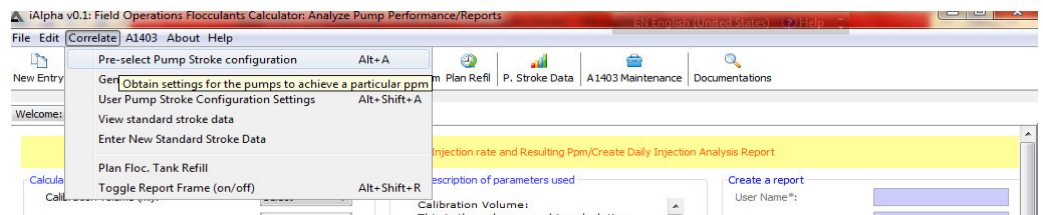
Figure 6. Pre-determining injection ppm.

To predetermine the pump strokes for a certain predefined ppm, after the window opens as shown below, enter the desired ppm (example 4ppm), and the surge tank's flow rate.
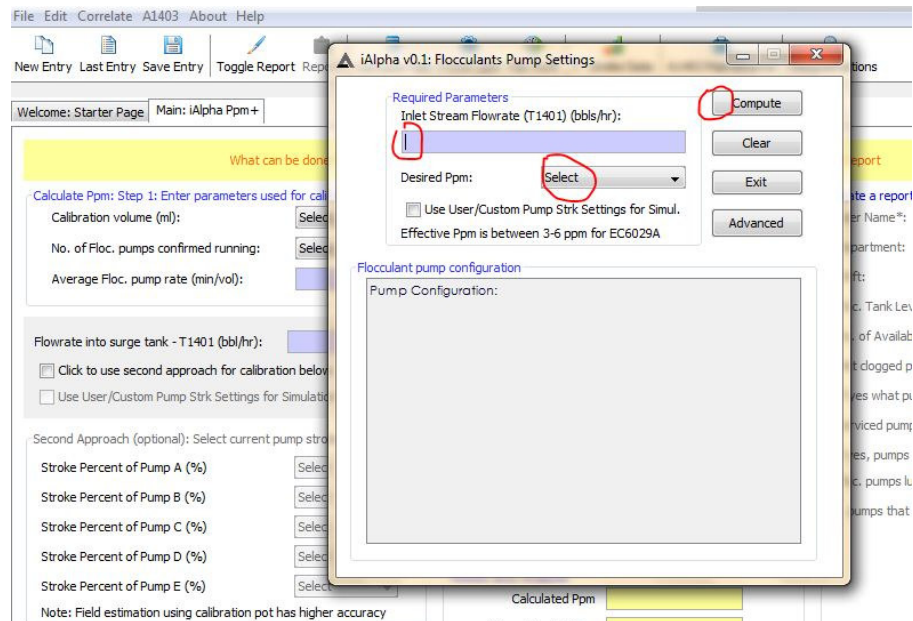
Figure 7. Window for pre-determination of Ppm

Example, using the basic pump at 5000bbl/hr surge tank flowrate and a desire ppm pf 4ppm, see below
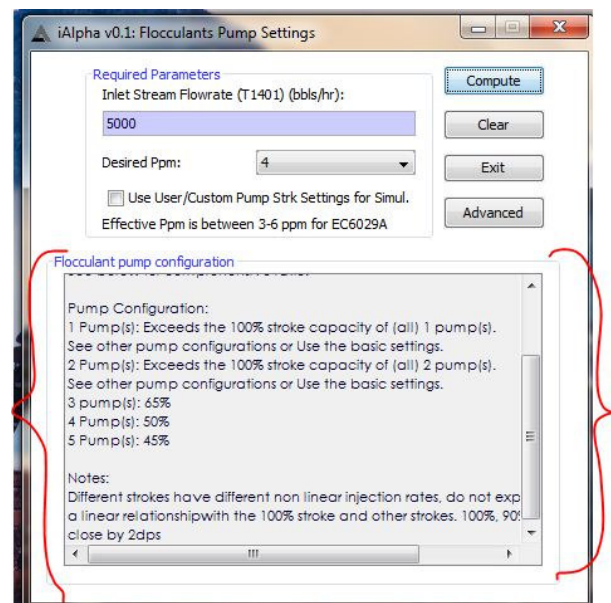

Figure 7. Result and Analysis after predetermining Ppm

Result and Analysis: From the resulting gross flow rate required to achieve the desired ppm entered by the user, a uniform ratio between the pumps has been identified. From the results, the required flowrate exceeds 100% stroke capacity for both one pump running alone and two pumps running simultaneously. From the result, 3 pumps can achieve the user-define ppm. For 3 pumps to achieve the set ppm, set the stroke at

65%. If 4 pumps are to be used, the four pumps will be set at 50% and for five pumps 45%

3.4 PLAN REFILL TIME FOR FLOCCULANTS

To plan refill of the chemical is simply to get the volume of the tank and estimate at what date the tank will be reduced to remaining just 10% of the entire volume. To do this simply open the program and click "Plan Refil" from the toolbar. Also you can do this from the menu bar, click "Correlate>Plan Floc. Tank Refil". The following are shown below.

The diagram below is required when using the toolbar.
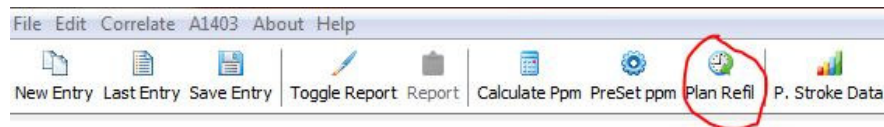
Figure 8. Planning Refil

This following diagram is when using the menu bar
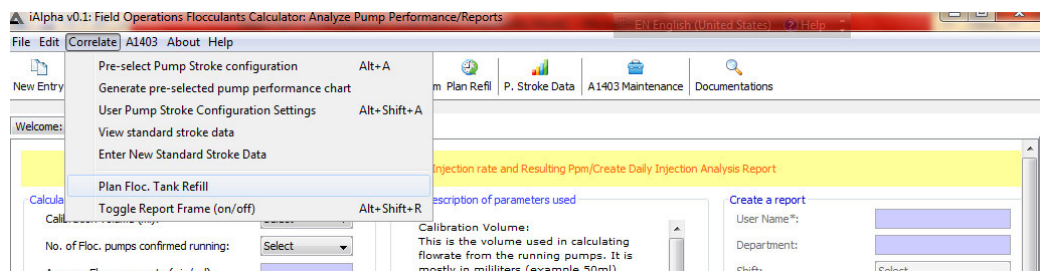
Figure 9. Planning refill using menu bar

From using either of this approaches, THE PPM MUST BE CALCULATED FIRST (on how to calculate Ppm, review section 3.0, 3.1 and 3.2 of this guide). Example, **click "Alt+F" or "Edit>Fill in Sample Data"** this will fill in some sample data that can be used for calculation, then click "Calculate". After calculating Ppm, the rate of injection must have been computed, thus the refill estimation can be calculated. Now, enter the current volume of the flocculants tank and click OK, as shown below.

Figure 10. Calculating refil

Example enter 60 as the current level in flocculants tank, after clicking OK the estimated time to refill will be displayed, as shown below.

Figure 11. Viewing refill time

3.5 VIEW DEFAULT STROKE VALUES

The second approach in computing Ppm is simulated using correlated stroke values from field-pump's performance analysis. These values are prone to changes when they do not represent the actual performance or injection rates of the field pumps. The current standard stroke values of this software version was obtained from an ideal state of the flocculants pumps (clean strainers, well lubricated, cleaned check valves and an average of all performance from all the pumps, see section 4.0 or any appendix for detailed explanation). To view these values, click "P. Stroke Data" P. Stroke Data from the toolbar.

These values are used to more easily calculate ppm without any time analysis on site. The value for this version of software is shown below.
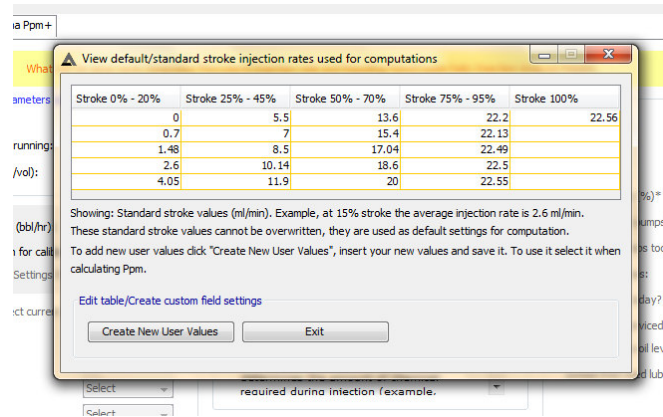

Figure 12. View default stroke values

3.6 VIEW AND SET CUSTOM USER STROKE VALUES

The stroke values shown in section 3.5 are default standard stroke values. If the user wants to use the second approach, the user can still use the system if it does not represent the current performance of the field pumps by going to site and generating the current performance/injection rates of the pump and entering the data into the system as shown below. Click on "Create New User Values"
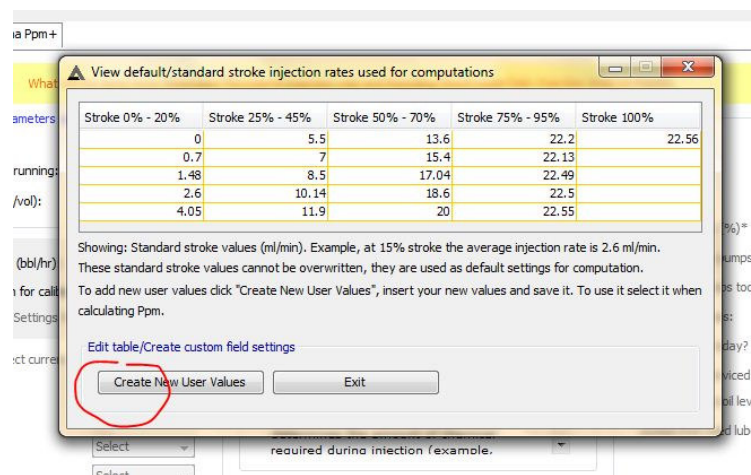
Figure 13. How to enter new user values

After that, first check for any saved user stroke data by clicking on "Show Any Saved User data" and editing it or entering entire new values. This is shown below.

Figure 14. Window for entering user stroke values

To fill in the new values gotten from site, edit the fields in the table as shown below, just as 0 was entered for stroke 0 in the table below. The column in table one has a header "Stroke 0% - 20%" this means the first cell beneath the header is the cell to hold the stroke value for 0% stroke, the next below the 0% stroke is 5%, followed by 10, 15 and 20% stroke as shown in the table below. **NOTE THE TABLE BELOW IS NOT THE VALUE FOR THE STROKE BUT TO BE USED AS AN ILLUSTRATION OF THE CELLS THAT HOLDS THE TRUE VALUE FOR THOSE STROKES. FOR A TYPICAL EXAMPLE, SEE THE DEFAULT STROKE VALUES AS SHOWN IN SECTION 3.5**

Figure 14. Stroke percent and value mapping

After entering the real values from 0% to 100%, click on "Save New User Data", and if ok with the values, accept the dialog box to confirm the saving of the new stroke data.

3.7 CREATING REPORTS

To create daily/shift reports click on "toggle reports" button on the toolbar, or checkbox in the reports frame as shown below.

Figure 15. Initializing report creating

When the report frame is now enabled, input all fields. The fields with asterisks are required to run the report and must be filled. Example, input user name: Joan; Department: NESBO; Shift: Day; Floc. Tank Level (%)*: 62; No. of Available pumps*: 4; Met clogged pumps today?: no; If yes what pumps: "leave here blank since no pumps was met clogged"; Serviced pump today?: no; If yes, pumps Serviced: "leave blank since no pump was serviced today"; Floc pumps lube oil levels*: All pumps ok; Pumps that need lube oil: "leave it blank, since all pumps are ok"; General Notes is required when user wants to add general notes to the report, but this feature is not in this version (0.2 and 0.3).

Now, click "Create Report".

Figure 16. Parameters entered to create report

After clicking "Create Report" the report window will show a preview/sample of the report, in your practice, scroll down to see the full report.

Figure 17. Preview of iAlpha Ppm plus report

After previewing the report, if satisfied, click on save report, else discard the report – this
will delete the report and clear the preview. To save the report, click on "Save As";
choose a where to save the report (i.e. browser folders) rename your report and then
click on save from the dialog box, as shown below.
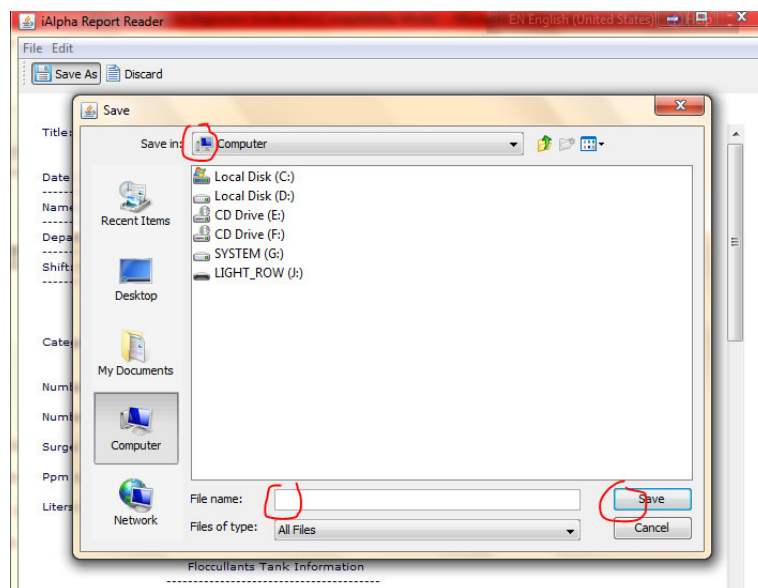
Figure 18. Saving Floc. report

Below is a screenshot showing a confirmation dialog for the report created. The report was renamed: Joan's Report. The program then automatically appended "-iAlpha-Floc-Report.txt" to the report and saved it, also showing to the user the location where the report was saved.
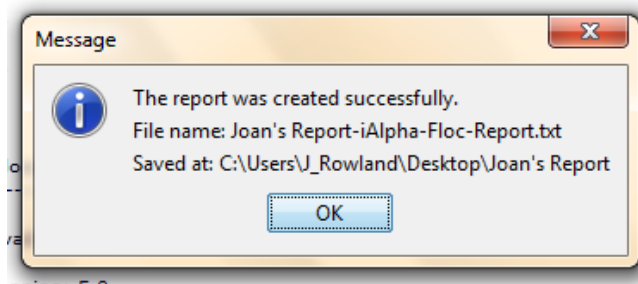

Figure 19. Dialog box showing a successful report creation.

Below is the screenshot of the final version of the report in text format.

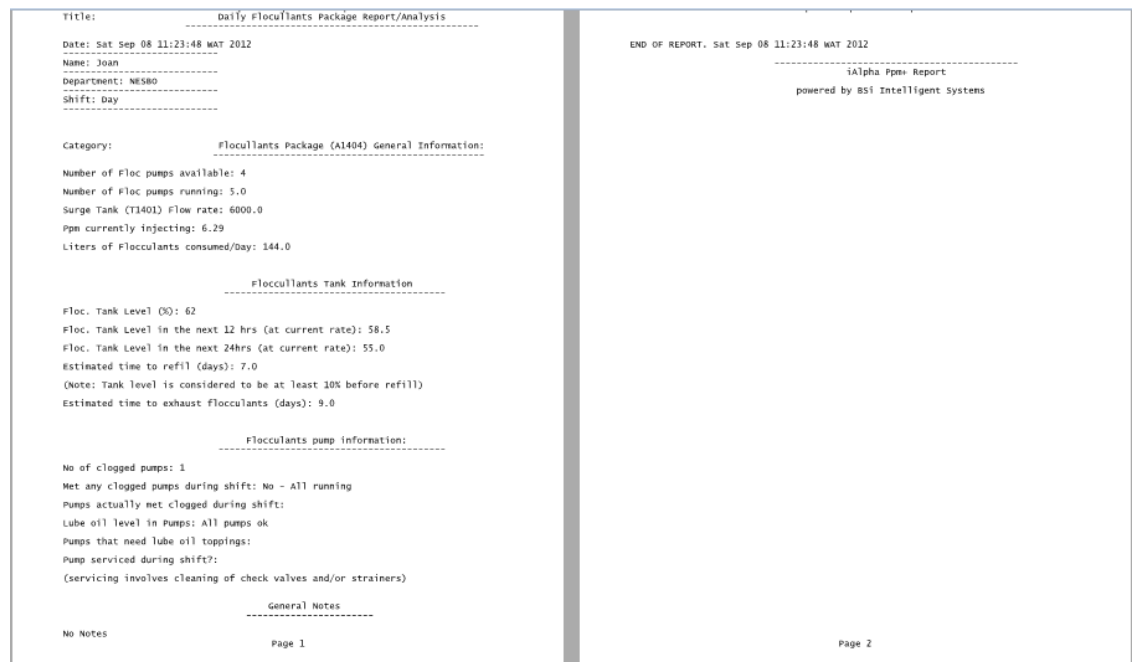Figure 20. Sample of a saved report

Users can print or export to other formats.

3.8 DOWNLOADING THE FINAL VERSION AND UPDATES

The current version of iAlpha Ppm Plus is still under review; the reports are prone to external editing but will not be so in the final version. Authorization will be required to update the user stroke data when calculating Ppm in the final version but not so in this

version. The final version is yet to be completed at the time of this documentation and will be downloadable from www.royalbsi.com. Updates will also be obtained from the same URL when the site update/maintenance is completed – at the time of this documentation, the maintenance was being planned.

4.0 Appendix – next revision
iAlpha Ppm Plus Mathematical Analysis

4.1 Formula for calculating chemical injection
4.2 Procedure used for determining pump stroke
4.3 values used for computation
4.4 Procedure used for predetermination of injection ppm
4.5 Procedure used for estimation of Flocculants Tank Refill
4.6 IAlpha Ppm Plus Versioning and Configuration Management