

## 1.0 – INTRODUCTION

This manual contains the recommended sampling and analytical procedures to be used during the operation of the Base Oil Plant (“unit”) using Chevron Lummus Global (CLG)’s ISODEWAXING (IDW) and ISOFINISHING (HDF) technologies. The unit will be constructed in Yaroslavl, Russia, by OAO Slavneft-Yanos. Many of the analytical procedures required to successfully operate the unit are industry standard test methods. The detailed techniques for performing these tests are not included in this manual. The Sample Schedules and Chevron Test Methods section of this manual contains analytical methods typically used by Chevron, which are referred to as Chevron Test Methods (CTMs).

The procedures outlined in the CTMs may involve hazardous materials, operations, and equipment. All of the safety problems associated with their use are not addressed. It is the responsibility of the users to establish safe work practices.

**Table 3-I**  
**Sample Schedule**

| Stream   | Sample Point Location <sup>2</sup>  | Measurement                           | Test Method <sup>2,5</sup>             | Sample Size, mL | Frequency  |                       |           |
|--|---|---------------------------------------|--|-----------------|------------|-----------------------|-----------|
|  |   |                                       |  |                 | Startup    | Test Run <sup>3</sup> | Normal    |
| Waxy Lube Base Oil to the Base Oil Hydrogenation Unit. | Upstream of the Waxy Lube Feed / Product Stripper Bottoms Exchanger (T-801) | Gravity                               | ASTM D1298, ASTM D4052                 | 1000            | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Distillation                          | ASTM D2887, ASTM D1160                 | 1000            | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Nitrogen                              | ASTM D4629                             | 50              | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Sulfur                                | ASTM D2622                             | 125             | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Pour Point                            | ASTM D5949, ASTM D5950                 | 50              | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Viscosity @ 70°C                      | ASTM D445                              | 500             | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Viscosity @ 100°C                     | ASTM D445                              | 500             | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | V.I.                                  | ASTM D2270                             | -               | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | UV Absorption                         | CTM 5-16, ASTM D2008 <sup>6</sup>      | 100-1000g       | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Aniline Point                         | ASTM D611                              | 50              | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | % Wax by Solvent Dewaxing             | CTM 5-13                               | 100g            | Once/Day   | 3 Level/Tank          | Once/Tank |
|  |   | Solvent Dewaxed Oil Viscosity @ 40°C  | ASTM D445                              | 500             | Once/Tank  | 3 Level/Tank          | Once/Tank |
|  |   | Solvent Dewaxed Oil Viscosity @ 100°C | ASTM D445                              | 500             | Once/Tank  | 3 Level/Tank          | Once/Tank |
|  |   | Solvent Dewaxed Oil V.I.              | ASTM D2270                             | -               | Once/Tank  | 3 Level/Tank          | Once/Tank |
|  |   | Solvent Dewaxed Oil Pour Point        | ASTM D7, ASTM D5950                    | 50              | Once/Tank  | 3 Level/Tank          | Once/Tank |
| Make-Up Hydrogen                                       | Upstream of XB-804  | Composition                           | ASTM D1945                             | 125             | Once/Day   | Once/Day              | Once/Week |
|  |   | Specific Gravity                      | ASTM D1945                             | 125             | Once/Day   | Once/Day              | Once/Week |
|  |   | CO + CO <sub>2</sub>                  | Gastech Tube or Equivalent, ASTM D1945 | -               | Once       | -                     | (Note 4)  |
|  |   | Chloride                              | Gastech Tube or Equivalent             | -               | Once/Day   | Once/Day              | Once/Week |
| Recycle Gas  | At Recycle Gas Specific Gravity Analyzer                                    | Composition                           | ASTM D1945                             | 125             | Once/Day   | Once/Day              | Once/Week |
|  |   | H <sub>2</sub> S                      | Gastec Tube or Equivalent              | -               | Once/Day   | Once/Day              | Once/Week |
|  |   | NH <sub>3</sub>                       | Gastec Tube or Equivalent              | -               | Once/Day   | Once/Day              | Once/Week |
|  |   | Specific Gravity                      | ASTM D1945                             | 125             | Once/Shift | Once/Shift            | Once/Week |
|  |   | CO + CO <sub>2</sub>                  | Gastec Tube or Equivalent              | -               | Once       | -                     | (Note 4)  |
| Make-Up Hydrogen and Recycle Gas Mixture               | At Recycle Gas Specific Gravity Analyzer                                    | Composition                           | ASTM D1945                             | 125             | Once/Day   | Once/Day              | Once/Week |
|  |   | H <sub>2</sub> S                      | Gastec Tube or Equivalent              | -               | Once/Day   | Once/Day              | Once/Week |
|  |   | NH <sub>3</sub>                       | Gastec Tube or Equivalent              | -               | Once/Day   | Once/Day              | Once/Week |
|  |   | Specific Gravity                      | ASTM D1945                             | 125             | Once/Shift | Once/Shift            | Once/Week |
|  |   | CO + CO <sub>2</sub>                  | Gastec Tube or Equivalent              | -               | Once       | -                     | (Note 4)  |
| IDW Feed Surge Drum Liquid                             | Downstream of E-801   | Gravity                               | ASTM D1298, ASTM D4052                 | 1000            | Once/Day   | Composite             | Once/Day  |
|  |   | Distillation                          | ASTM D2887, ASTM D1160                 | 1000            | Once/Day   | Composite             | Once/Day  |
|  |   | Nitrogen                              | ASTM D4629                             | 50              | Once/Day   | Composite             | Once/Day  |
|  |   | Sulfur                                | ASTM D2622                             | 125             | Once/Day   | Composite             | Once/Day  |
|  |   | Pour Point                            | ASTM D5949, ASTM D5950                 | 50              | Once/Day   | Composite             | Once/Day  |
|  |   | Viscosity, cSt @ 70°C                 | ASTM D445                              | 500             | Once/Day   | Composite             | Once/Day  |
|  |   |                                       |  |                 |            |                       |           |

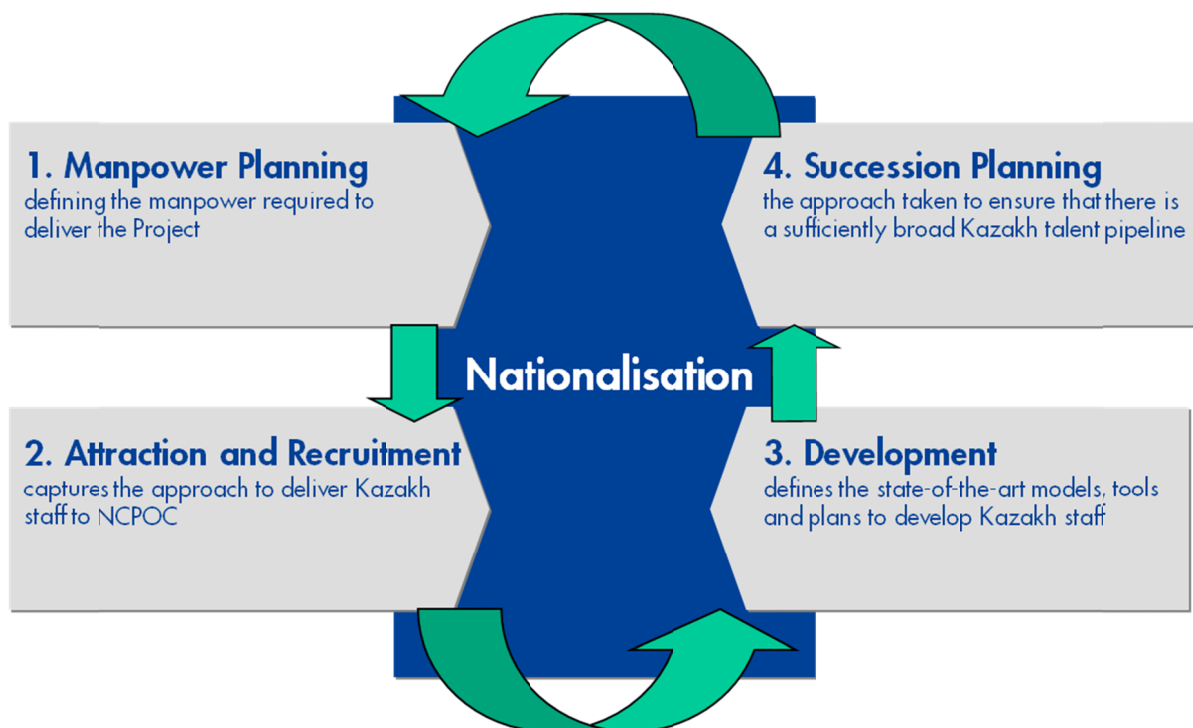
25. Remove the heating tape from the column. Unscrew the nut holding the filter column to the filter base. Carefully tilt the filter column back and wash the white O-ring with hot n-heptane from a wash bottle.
26. Hold the filter column over the sample beaker and rinse the inside and bottom edge with chloroform. This will dissolve any asphaltenes sticking to the sides of the column.
27. Carefully swirl the chloroform around the beaker and pour it into the aluminum weighing dish. Rinse the inside of the beaker with 50, 10-mL portions of chloroform until the washes are colorless. Transfer the chloroform to the weighing dish.
28. Carefully wash the outer edge of the filter with hot n-heptane from a wash bottle.
29. Put the dish containing chloroform washes on a low temperature hot plate. Allow the chloroform to evaporate slowly. Any boiling or spattering due to overheating can lead to loss of sample and, thus, low results.
30. Turn off the vacuum and carefully lift the filter using forceps. Check the bottom of the filter for a dark spot. If an oil spot is present, replace the filter on the filter holder and turn on the vacuum. Carefully wash the filter and asphaltenes with hot n-heptane from a wash bottle. Release the vacuum and check the bottom of the filter again. Repeat washing if necessary.
31. Carefully move the filter from the filter holder to the aluminum weighing dish.
32. Put the aluminum weighing dish containing the filter and asphaltenes in the drying oven for 10 minutes.
33. Remove the dish and cool to room temperature under an inverted beaker.
34. Weigh the dish on an analytical balance. Record the weight to the nearest 0.00001 g.

**NOTE:** You should try to collect a minimum of 50 mg of asphaltenes. If the net weight of asphaltenes is less than 50 mg and the sample size taken is less than 20 g, then the sample should be rerun using a larger sample size.

### **Calculations**

$$\text{ppm Insolubles} = \frac{\text{Weight of Insolubles, g}}{\text{Weight of Sample, g}} \times 10^6$$

$$\text{Wt \% Insolubles} = \frac{\text{Weight of Insolubles, g}}{\text{Weight of Sample, g}} \times 100$$



In terms of future versions of NCPOC's Organisation Plan, Succession Planning will be the key enabling process.

NCPOC will strive to fill as many of these positions and any positions filled in the future by expatriates with Kazakh staff as the expatriates complete their assignments.

## 8. TRAINING AND DEVELOPMENT

The measure of NCPOC's success in contributing to the development of oil and gas professionals in Kazakhstan is the company's ability to develop the capabilities of Kazakh nationals in NCPOC.

NCPOC is committed to staff development and is implementing a comprehensive training plan to ensure access to learning interventions that develop personal and professional effectiveness aligned with identified longer term business requirements and Individual Development Plans (IDPs).

Each Kazakh national in NCPOC will have an IDP documenting:

- Strengths
- Development needs
- Development actions
- Future career considerations.

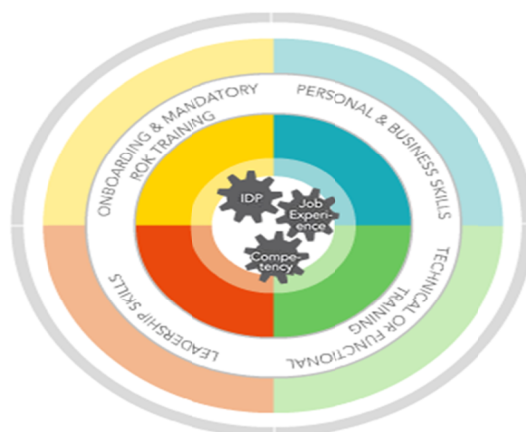
Each supervisor's duty is to support their team members in fulfilling their development actions identified in the IDPs and that the IDPs contain measurable objectives and plans. NCPOC HR Directorate review IDPs on quality and feed back to the supervisors and the team members how to further improve the plans. The NCPOC Leadership Team also reviews Kazakh nationals' development at least twice a year in a meeting dedicated to the topic.

NCPOC will adopt a blended learning approach whereby the process of staff development is based on a combination of formal training programmes (both classroom based and virtual learning) and on-the-job workplace assignments. As part of their roles, Expatriate line managers take the responsibility to provide on-the-job development and knowledge transfer and development should be discussed as part of the regular mid and end year reviews. NCPOC staff will also have access to state-of-the-art learning models such as the Shell '4 box' model which outlines the blended learning approach to staff development. This incorporates the use of reference materials, training courses, on-the-job coaching and

professional experience, in addition to e-Learning programmes (such as Skillsoft and IPIMS) and the suite of opportunities available through classroom based learning in order to develop staff in broadly four areas:

- Completion of Republic of Kazakhstan mandatory Training and HSSE training
- Technical and Functional training (e.g. a Wells and Reservoirs programme for Engineers or finance and HR programmes) for building Technical and Professional Competence
- Personal and Business skills (e.g. Microsoft Excel training)
- Leadership training – applicable to all disciplines (e.g. Foundation leadership courses) for developing Supervisory and Leadership capability.

As a growing company in Kazakhstan, it is assumed that the key priorities for training within the start-up period would be:



A model for the overall NCPOC training approach has been constructed as below:



More courses and development actions are identified as current skill gaps have been verified and analysed. Kazakh staff have access to Shell's learning curriculum for the identified development needs and NCPOC works closely with Agip KCO with access to Agip KCO's learning offering.