



Scope of Work (SOW)

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Introduction

PEI (the "**Company**") is a company fully owned by the government of Israel, and deals with the storage and transportation of crude oil and distillates, Terminal Kiryat-Haim, in Haifa bay, is one of the Company's terminals for storage of crude oil in above ground, external floating roof, storage tanks, 36 m' and 60 m' diameter.

The tanks are constructed as a welded or riveted shell.

This scope of work document describes the general stages for cleaning the tanks, based on "no man entry" methods, using mechanical means with minimum manual intervention and vapor elimination method.

General

1. The tanks that need cleaning are Tanks No. 44,45.
2. [deleted]
3. The Company emphasizes that there is no steam supply at the site.
4. The process of crude oil tank cleaning shall involve shifting of ALL sludge available inside the tank to temporary tanks to be supplied by the Contractor or to a designated tank of the company, by using a "no man entry" method, and involving vacuum pumps, vacuum truck system and mechanical cleaning means of tank internals, and handing over the crude tank for maintenance & inspection with minimum manual intervention.
5. The removed sludge shall be processed for oil recovery by using mechanical shakers, hydro cyclones, centrifuge, etc. outside the tank, in a parallel process.
6. The cake after de-sludging shall be suitable for landfill and will be stored in sealed containers, and delivered by the Contractor, by trucks, to a unique site in the south of Israel.
7. The Contractor will collect the drainage water to iso-tanks, for disposal by the Company.
8. The Company and the Contractor will weigh the recovered oil, the drainage water, the sludge cakes or any other residual.
9. Along with their Bid, Bidders must submit: detailed method for carrying out the entire activity, along with a bar chart, process of de-sludging and oil recovery with process diagram, area required to install the equipment for de-sludging process. The Contractor will be responsible for all health, safety (including fire safety) in the work environment, including in all the equipment it brought on site.
10. The Company will provide electricity, water and foam supply to a point inside the tank band, as detailed in the tank's details below.
11. Attached as Appendix no 2 is a surveyor analysis of the sludge contained in the Tank, based upon samples taken. However, the Company does not undertake any responsibility with relation to the surveyor analysis, and the



winning Bidder shall have no claim or demand whatsoever towards the Company, including without limitation regarding the consideration to be paid or any other of the contractual conditions, in the event that the analysis of the sludge at the time of execution of the Works, shall differ in any way from that contained in the analysis provided by the Company.

12. **A representative of the Contractor who is a Hebrew or English speaker must be at the Site at all working times.**

Scope of Work

13. The main issues of the SOW are:
- Stage 1:
 - "No man entry" cleaning
 - Maximum oil recovery from sludge
 - Minimum Vapor emission
 - Stage 2 :
 - Final cleaning to "gas free" status, including cleaning of pontoons, roof legs and roof exterior using manual cleaning.
14. The recovered crude oil will be delivered, by pipeline or trucks, to a designated tank of the Company, and the Contractor will need to arrange, install and test all pipework (tie-in) needed for connection of the oil recover pumps to existing 10/8" pipeline.
15. The cleaning process will be executed accordingly to the description and the condition and location of the tank detailed below.
16. Detailed procedures with equipment layout, approved chemical additives, if necessary to use, and bar chart of the total activity scheduled for tank cleaning and oil recovery activity has to be submitted for approval prior to job commencement to the Company's Representative.
17. All of the man holes will be closed and the shell valves will be in lock position before the tank is handed to the Contractor.
18. The sludge quantity in the tank will be measured by a reputable surveyor acceptable to both Parties. The quantity will be measured from the roof top after pumping out the free oil and draining the water from the tank. The measured quantity which will be determined will be the baseline for the payment.
19. The Contractor may request and the Company will approve and supply crude oil to dilute the sludge. See also details in section 54 herein, and section 27 of the contract with respect to use of excessive crude oil by the contractor.
20. During the no man entry cleaning process the maximum oxygen level inside the tank should not exceed 8%.
21. Before every pump out of recovered crude oil from the Tank, the Contractor shall sample the recovered oil and order a laboratory test to see if the BS&W (bottom sediment and water) in the recovered crude oil is equal to or less than 5%. If yes - the Contractor will be allowed to pump out. The Company will then send the sample of the recovered crude oil to the laboratory to perform an ASTM D 4007 test. If the test results show



- that the BS&W is more than 5%, then the pump out will be stopped and the Contractor undertakes to perform additional cleaning and retesting (as above) before it will be allowed to pump out again. The Company will take samples of the recovered oil every 2 hours during the transfer.
22. Following completion of the "no man entry" stage, the Company's Representative along with the Contractor shall jointly sample the tank, the recovered oil, drainage water and sludge cake and send the samples to be tested at a laboratory, to be selected by the Company, in order to make sure that they meet the following requirements, referred to in the Contract as the "**Acceptance Tests**", all within the Timeframe designated for the Tank's Works as specified in the Contract:
- 22.1 The total volume of crude oil/sludge in the tank should be not more than 5% of the volume measured in the Tank before the commencement of that Tanks' works, as detailed in Section 17 above.
- 22.2 Next, the following must be achieved:
- (i) The recovered crude oil will contain a maximum of 5% BS&W (bottom sediment and water), this test (ASTM D4007) will be performed before every pump out from the tank, if there will a large difference between the laboratories result and the Contractor's result the Company will send the sample for a test in another laboratory and the average result between the two laboratories will be the determined result; See Appendix no. 3 for a diagram of the testing process.
 - (ii) The drainage water will be free from solids content and have a maximum of 1,000 PPM TPH (Total Petroleum Hydrocarbons);
 - (iii) The sludge cakes will contain less than 10% wt oil.
- After these requirements are fully met, the "no man entry" stage for the tank will be considered completed.
23. The Contractor will need to design and place its tank cleaning & sludge processing units in the tank band. The Timeframe specified in the Contract for the Tanks' Works shall include mobilization of the aforesaid Contractor's units into the tank band of the current Tank. The Contractor will arrange all transportation of the infrastructure needed to maneuver the equipment near the tank.
24. The Contractor will carry out all pipe connections to the tank's roof and the Tank's shell including hot tapping, if necessary.
25. The Contractor shall provide mechanical or digital measuring instruments for measuring the quantity of crude oil received and also to measure the recovered oil pumped out.
26. The Contractor shall provide qualified safety personnel, fire watchers and breathing apparatus (BA) to persons required to enter inside the crude tank and carry out the vacuuming of sludge.
27. The Contractor shall maintain proper daily records which shall include, at least, the following: date and time of measurements and activities, crude



- oil received, sludge processed in cubic meters, oil recovered in cubic meters, samples tested for BS&W at its laboratory. Any other relevant data as advised by the Company's Representative, as defined in the Contract, from time to time also is incorporated in the records on daily basis.
28. The Contractor shall provide calibrated flow meters (mechanical or digital) to measure the recovered oil pumped to the Company's batch wise which shall be recorded and counter signed by the Company Representative.
 29. Before entering the tank the Contractor will have to receive the Company's Representative's approval for a work permit.
 30. Before entering into the tank, it is the Contractor's obligation to check roof support and make all construction needed by qualified manpower if there is any doubts about the roof support integrity.
 31. The Contractor shall install high capacity air educator, exhaust fan and compressor on the man hole to ventilate the tank internally before allowing any person with breathing apparatus to enter physically into the tank. It must clean the whole area within the tank band and residue collection area including the path of transportation by removing all residue, cotton waste, oil etc. to the satisfaction of the Company's Representative. The Contractor shall be responsible to maintain the area of work with good housekeeping at all time and the surrounding area safe for people to work.
 32. During the assembly of the system the work will be permitted only during regular working hours of the Terminal. Only when the Contractor will start the no man entry stage the Company will approve 24/7 work, subject to the Contractor obtaining the necessary permits.
 33. Local labor laws must be adhered to, an employee may not work more than 12 hours per day and must be given one vacation day per week.
 34. The Contractor is responsible for obtaining all necessary regulatory approvals for the Works. Without derogating from the generality of the foregoing, performance of the Works is conditioned upon the Contractor having an Israeli heights working permit and a closed environment working permit.
 35. A representative of the Contractor who is a Hebrew or English speaker must be at the Site at all working times.

Electrical Issues

36. All equipment, including electrical equipment and communication, brought to the site by the Contractor should be suitable for hazardous area -Area classification: Class I, Division I, Gas group IIA & B Power to the contractor's or ATEX- Zone 1.
37. Power supply available in 3 phases, 400 + 10% V, 50 Hz+3%, 40 A.
38. The Company cannot guarantee continuous electrical supply, so the Contractor shall arrange alternate source of power supply distribution skids including grounding system e.g: the entire electrical equipment of Contractor shall be earthed through separate adequately sized earth strips and brought to the panel's main earth points.



39. All the motors of the unit shall have independent push button stations with start & emergency stop near motor itself.
40. Contractor shall provide in its Bid the electrical power requirements along with all necessary details.
41. Cabling and wiring within the unit is included in the scope of Contractor.
42. Area lighting and specific lighting requirement for the job is in the Contractor's scope.
43. Electrical generator and all electrical connections shall be checked by a qualified engineer examiner prior to commencement of work under the responsibility of the contractor.

Scope of Supply

Contractor's Scope:

44. Providing all equipment/accessories/tools for the successful recovery of oil from processing sludge from inside and outside the tank will be in the scope of the Contractor with necessary skilled operators. This will include jet mixer, vacuum truck, circulating pump, filter, exhaust fan, centrifuge, decanter, high solid separation unit, hydro dozer, air compressor, suction and discharge high pressure hoses/lines, power cable, two power distribution boards, measuring equipment/flow measuring instruments for receipts of diluent & recovery oil.
45. Special positive displacement pumps required for handling liquefied sludge and residue. The pump would have the ability to overcome pipe line pressure drop.
46. Hydro-jetting machines and other mechanical devices for final cleaning of tank internals.
47. Diesel required for running diesel driven equipment's hired/owned by the contractor will be purchased by the Contractor.
48. Skilled manpower required for roof supporting sludge/residue collection, shifting, unloading, shoveling, housekeeping etc.
49. Consumables like approved additives/ diluents for liquefying the sludge, cotton waste, hand gloves, scrappers, rubber mop, shovels, spades, axe, buckets etc.
50. The Contractor will have to provide his own site office in the Company's plant area.
51. The Contractor shall arrange all transportation to and from the site, local accommodation for their manpower, materials, consumables, material handling equipment's etc.
52. Arrangement of crane will be done by the Contractor as and when required.
53. Safety- without derogating from any provisions detailed in the Tender Documents:
 - All the equipment that the contractor shall use must receive approval by a certified inspector.



- Electrical equipment shall be approved by a certified electrician, as well as an approval from an electrical engineer inspector for generator connections and grounding.
 - Before commencement of work the employees shall be given safety guidance on site.
 - The Contractor shall be given an organization area for its equipment, removal of trash and waste which will be at the expense of the Contractor.
 - The Contractor is responsible for all sanitary conditions for its employees, including WC, drinking water and an eating area.
 - It is emphasized that there is great importance to keep a clean working environment.
 - Safety equipment like oxygen/gas meters, breathing sets, air lamps, personal protective equipment etc. as required for safe working inside the tank.
54. Any other consumables /equipment /materials required for the completion of the job and not specifically mentioned in the Company's scope of supply shall be arranged by the Contractor.
55. Provide the laboratory services for testing /analysis purpose of recovered oil and sludge cake samples during sludge processing activities.

The Company's Scope:

56. De-Commissioning of the Crude Oil Storage Tank, and pumping out oil and water up to the extent possible by using the Company's existing pumping system.
57. Spading of tank's inlet/outlet headers by the Company.
58. Crude oil will be supplied by the Company, up to a maximum of 2000 CBM for every 1000 CBM of sludge. For use of crude oil, in the course of any Tank's cleaning, in excess of the quantity stated in the Contractor's Bid (following a pro rata adjustment to the quantity after the sludge volume is measured in accordance with Section 11 of the Contract), the Contractor shall be charged **500 USD** per CBM. The winning Bidder may not use crude oil for the cleaning process, purchased from a source other than the Company.
59. The Company will supply water from the hydrant, and electricity from the nearest available source up to 20 KWH. However the Contractor shall arrange for necessary connections as and when required. Contractor is to indicate the power requirement, if any, along with its Bid. Potable water for flushing will be supplied to the contractor from the nearest source. Maximum water pressure – 7 Bar.
60. The water will be measured by a meter and the contractor will receive water up to 130 CBM per Tank. For any quantity exceeding the above mentioned the Contractor will be charged **20 USD** per CBM. It is to be noted that it's prohibited to bring in water supply from outside the Site.



Specifications:

61. The Contractor's cleaning procedure for the execution of the work will be according to the specifications mentioned below:

- API 2015-SAFE ENTRY AND CLEANING OF PETROLEUM STORAGE TANKS
- API RP 2016 – GUIDELINES AND PROCEDURE FOR ENTERING AND CLEANING PETROLEUM STORAGE TANKS
- **NFPA 11** -Standard for Low-Expansion Foam
- **ASTM D4007** – standard test method for water and sediment in crude oil



Tank Details

T-44

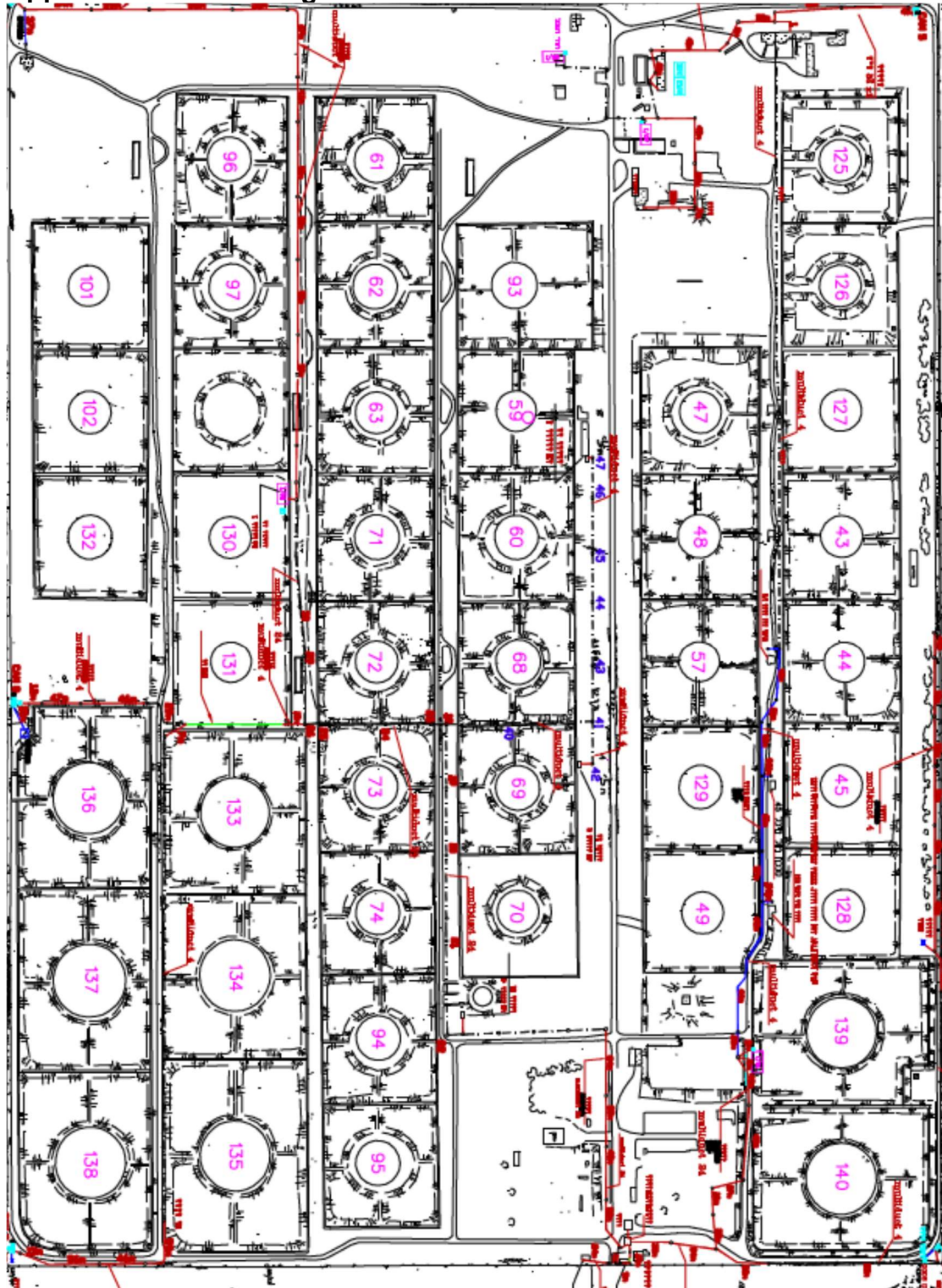
- Diameter – 36.6 m'
- Height- 14.15 m'
- Riveted shell constructed.
- Nominal capacity 14,50 m³
- Floating roof, single deck, with circumference pontoons
- Floating roof equipped with adjustable roof legs.
- Stairs are vertical to the shell.
- Rolling ladder from the upper shell to the roof.
- Two (2) 20" man holes on the shell and one on the roof.
- The tank has rim space fire extinguishing system.
- Shell Manhole location: 0.5 m from ground
- No drainage pits.
- Distance to tank no 127- approx. 300 m.
- Tank is near civilian population and the Contractor must prevent emission!

T-45

- Diameter – 36.6 m'
- Height- 14.15 m'
- Riveted shell constructed.
- Nominal capacity 14,50 m³
- Floating roof, single deck, with circumference pontoons
- Floating roof equipped with adjustable roof legs.
- Stairs are vertical to the shell.
- Rolling ladder from the upper shell to the roof.
- Two (2) 20" man holes on the shell and one on the roof.
- The tank has rim space fire extinguishing system.
- Shell Manhole location: 0.5 m from ground
- No drainage pits.
- Distance to tank no 127- approx. 400 m.
- Tank is near civilian population and the Contractor must prevent emission!

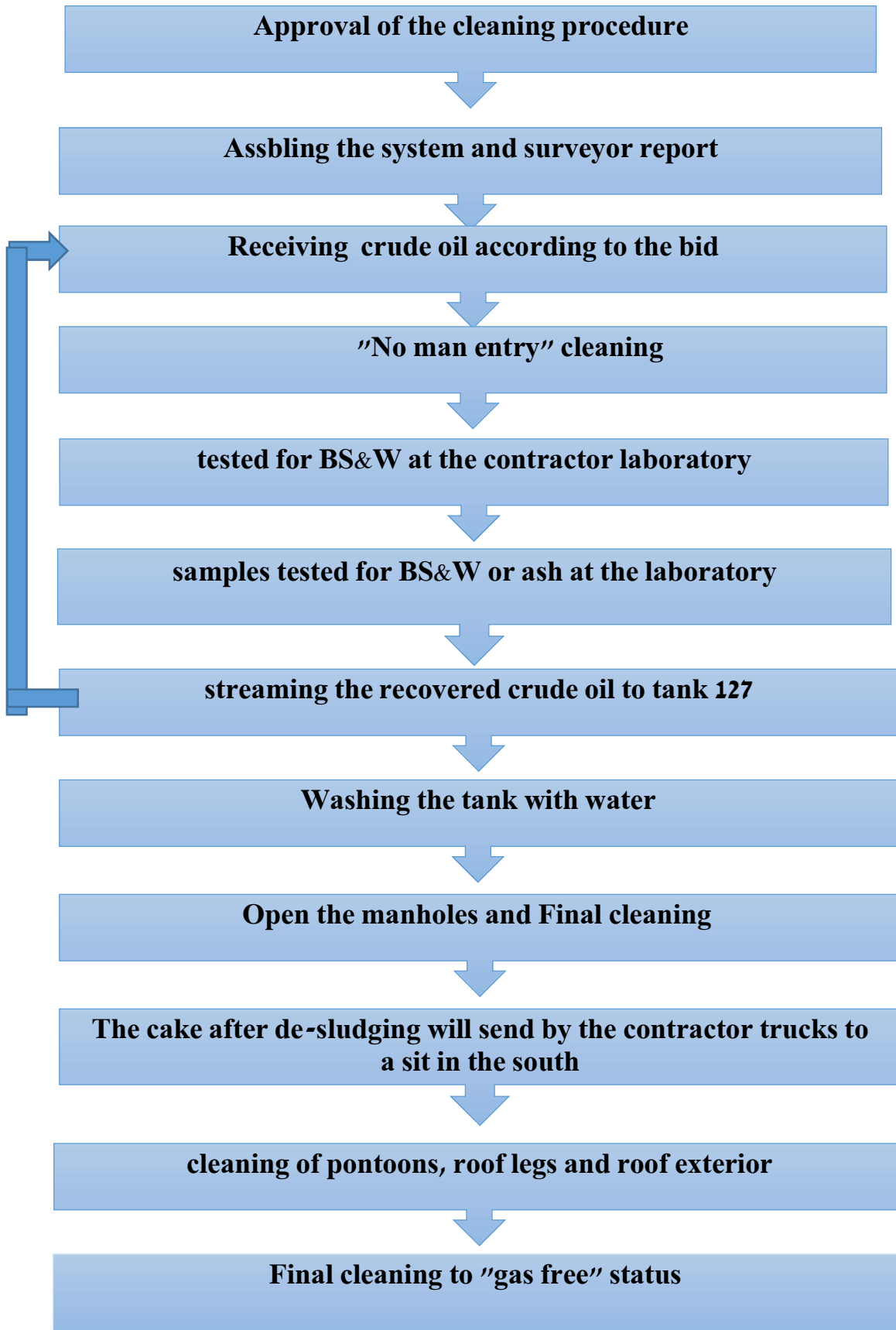


Appendix no 1- Drawings





The cleaning processes





Appendix no 2- surveyor analysis

אנליזת מיכל 44

תאריך ושעה	מס מיכל	נק בדיקה	שם בדיקה	תוצאה	
13/10/2020 13:43	T044	A	צפיפות ב-15 מ"צ	0.8222	ק"ג/ליטר
13/10/2020 13:43	T044	B	צפיפות ב-15 מ"צ	0.8222	ק"ג/ליטר
13/10/2020 13:43	T044	M	צפיפות ב-15 מ"צ	0.8222	ק"ג/ליטר
13/10/2020 13:43	T044	T	צפיפות ב-15 מ"צ	0.8222	ק"ג/ליטר
13/10/2020 13:43	T044	TT	צפיפות ב-15 מ"צ	0.8222	ק"ג/ליטר
13/10/2020 13:43	T044	A	תכולת מלח	1	P/1000 BBL
13/10/2020 13:43	T044	B	תכולת מלח	1	P/1000 BBL
13/10/2020 13:43	T044	M	תכולת מלח	1	P/1000 BBL
13/10/2020 13:43	T044	T	תכולת מלח	1	P/1000 BBL
13/10/2020 13:43	T044	TT	תכולת מלח	1	P/1000 BBL
14/10/2020 09:18	T044	A	תכולת גופרית	0.775	מסה %
14/10/2020 09:18	T044	B	תכולת גופרית	0.82	מסה %
14/10/2020 09:18	T044	T	תכולת גופרית	0.73	מסה %
13/10/2020 13:43	T044	A	תכולת מים	0.1	נפח %
13/10/2020 13:43	T044	B	תכולת מים	0.1	נפח %
13/10/2020 13:43	T044	M	תכולת מים	0.1	נפח %



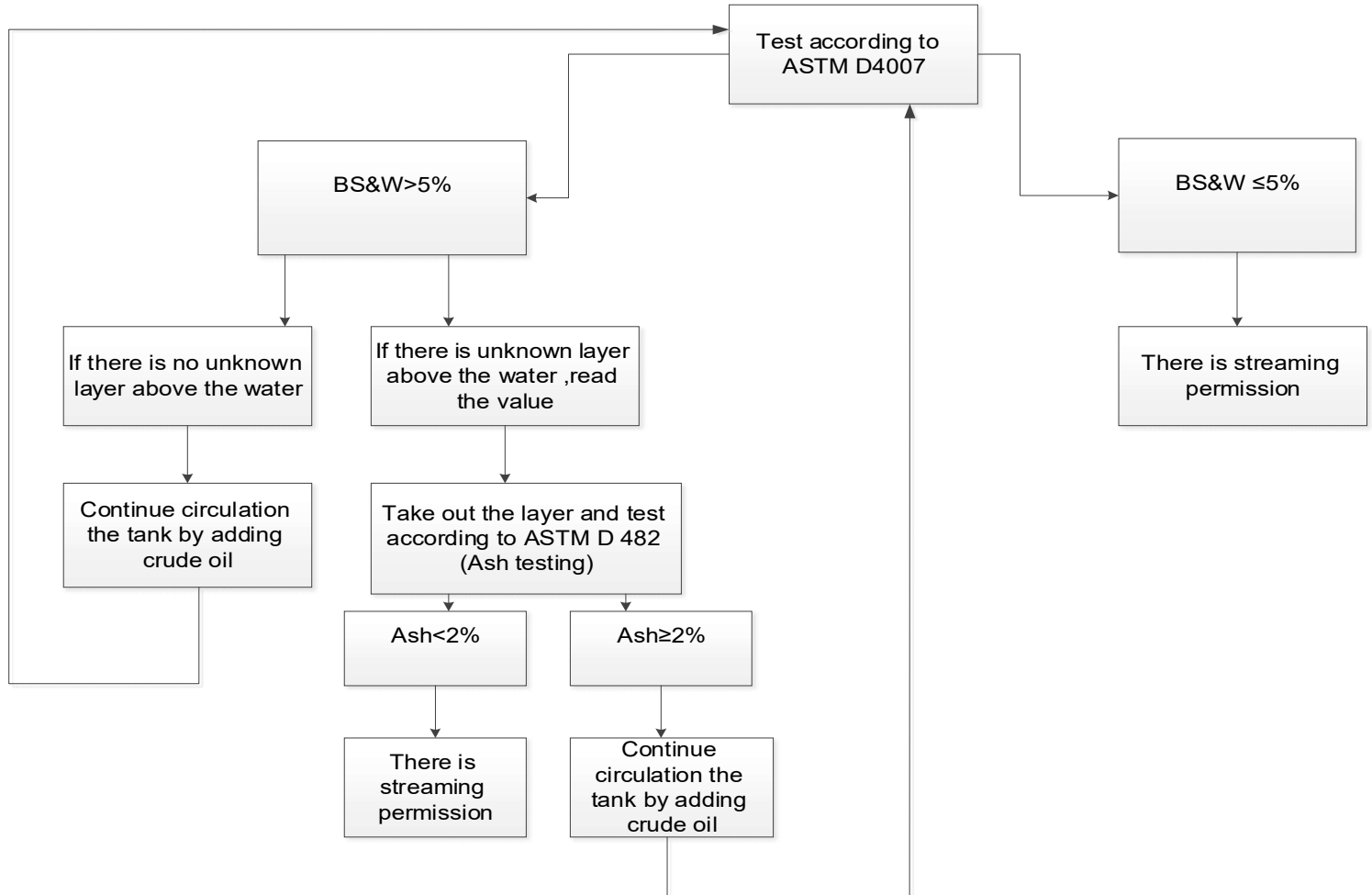
13/10/2020 13:43	T044	T	תכולת מים	0.1	נפח%
13/10/2020 13:43	T044	TT	תכולת מים	0.1	נפח%

אנליזת מיכל 45

תאריך	שעה	מס מיכל	נק בדיקה	שם בדיקה	תוצאה	
14/10/2020	13:00	T045	A	צפיפות ב-15 מ"צ	0.8219	ק"ג/ליטר
14/10/2020	13:00	T045	B	צפיפות ב-15 מ"צ	0.8214	ק"ג/ליטר
14/10/2020	13:00	T045	T	צפיפות ב-15 מ"צ	0.8224	ק"ג/ליטר
14/10/2020	13:00	T045	A	תכולת מלח	1	P/1000 BBL
14/10/2020	13:00	T045	B	תכולת מלח	1	P/1000 BBL
14/10/2020	13:00	T045	T	תכולת מלח	1	P/1000 BBL
14/10/2020	13:00	T045	A	תכולת גופרית	0.81	מסה %
14/10/2020	13:00	T045	B	תכולת גופרית	0.83	מסה %
14/10/2020	13:00	T045	T	תכולת גופרית	0.79	מסה %
14/10/2020	13:00	T045	A	תכולת מים	0.1	נפח%
14/10/2020	13:00	T045	B	תכולת מים	0.1	נפח%
14/10/2020	13:00	T045	T	תכולת מים	0.1	נפח%



Appendix no. 3- Diagram of the testing process





The process:

The sludge sample shall be tested according to ASTM D4007. Written in the standard that the BS&W need to be equal or less than five percent. In this case, there is streaming permission.

If the result is above five percent. We can get for BS&W two options:

- a. First layer (bottom) is the sediment. Second layer is the water.

In this case, continue circulation the tank by adding crude oil.

- b. First layer (bottom) is the sediment.

Second layer is the water.

Third layer is the "unknown layer" above the water.

In this case, take out the "unknown layer" and test according to ASTM D482 that check Ash counting:

1. If the result less than two percent. In this case, there is streaming permission.
2. If the result equal or above two percent. In this case, continue circulation the tank by adding crude oil.