ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

PO : Udayan Vihar
Guwahati – 781171, Assam (India)
Phone: +91-361-2595682
Email: balen_bharali@oilindia.in

INVITATION TO e-BID UNDER SINGLE STAGE TWO BID SYSTEM

OIL INDIA LIMITED invites electronic bids from Indian bidders under SINGLE STAGE TWO BID SYSTEM through its e-procurement site . Few salient points of the Tender (covered in detail in the Bid Document) are highlighted below:

(i)	E-Tender No.	:	**SGI6404P21**
(ii)	Description		**Design, supply, installation and commissioning of APPS (Leak Detection System and supplementary modules) FOR NUMALIGARH-SILIGURI MULTI PRODUCT PIPELINE IN CONJUNCTION WITH EXISTING SCADA SYSTEM**
(iii)	Type of Bidding	:	Online-Single Stage-Two Bid System
(iv)	Tender Fee	:	Not Applicable
(v)	Bid Closing Date & Time	:	As mentioned in Online E-tender portal
(vi)	Technical Bid Opening Date & Time	:	As mentioned in Online E-tender portal
(vii)	Price Bid Opening Date & Time	:	Will be intimated only to the eligible/qualified Bidders nearer the time.
(viii)	Bid Submission Mode	:	Bids must be uploaded online in OIL's E-procurement portal
(ix)	Bid Opening Place	:	Office of Office of The Deputy General Manager - Materials (PL), Oil India Limited (Pipeline Headquarter), P.O. Udayan Vihar, Guwahati - 781171
(x)	Bid Validity	:	120 days from date of Bid Closing
(xi)	Bid Security	:	**Not Required**

(xii)	Bid Security Declaration	:	Must be submitted as per Annexure AA1 along with Technical Bid.
(xiii)	Original Bid Security to be submitted	:	In the e-tender portal as a part of technical bid under tab “Technical Attachment”
(xiv)	Amount of Performance Security	:	3% of Total Order Value. Annexure M to be submitted as a part of Technical Bid
(xv)	Validity of Performance Security	:	3% of Total Order Value. The original Performance Security of order will be returned only after submission and verification of AMC Performance Security for 3% of total AMC value valid up to AMC period plus 3 months (if there is no other claim). (Undertaking of acceptance to be uploaded with bid).
(xvi)	Quantum of Liquidated Damage for Default in Delivery	:	Refer clause No. 31 of MM/LOCAL/E-01/2005
(xvii)	Integrity Pact	:	Must be digitally signed & uploaded along with the Techno-commercial Bid. Must be digitally signed & uploaded along with the Technical Bid. ANNEXURE- XII to be submitted along with technical Bid under “Technical Attachment” Tab in the E-tender Portal
(xviii)	Bids to be addressed to	:	Deputy General Manager - Materials (PL), Oil India Limited (Pipeline Headquarter), P.O. Udayan Vihar, Guwahati -781171.

The item details against the above tender are given below:

Sl.No	Item	Quantity	UOM
10	**Design, supply, installation and commissioning of APPS (Leak Detection System and supplementary modules) FOR NUMALIGARH-SILIGURI MULTI**	1	NO

	PRODUCT PIPELINE IN CONJUNCTION WITH EXISTING SCADA SYSTEM		

The general details of tender can be viewed by opening the eRFx [Tender] under RFx and Auctions in the e-portal through Guest Login. The details of tendered items can be found in the Item Data and details uploaded under Technical RFX. The bidding document is available in the Technical RFx -> External Area - > Tender Documents.

The complete bid documents and details for purchasing bid documents, participation in e-tenders are available on OIL's e-procurement portal https://etender.srm.oilindia.in/irj/portal as well as OIL's website https://www.oil-india.com/

NOTE: All addenda, Corrigenda, time extension etc. to the tenders will be hosted on above website and e-portal only. Bidders should regularly visit above website and e-portal to keep themselves updated.

OIL invites Bids for **Instrument Cable & Control Cable** through its e-Procurement site under **SINGLE STAGE TWO BID SYSTEM**. The bidding documents and other terms and conditions are available at Booklet No. MM/LOCAL/E-01/2005 for E-Procurement of Indigenous Tenders. The prescribed Bid Forms for submission of bids and details of the tender documents are available in the Technical RFx -> External Area - > Tender Documents

STANDARD NOTES

a) **For technical support on various matters viz. Online registration of vendors, Resetting of Passwords, submission of online bids etc, vendors should contact OIL's ERP MM Deptt at following: Tel Nos = 0374-2807178, 0374-2807171 , 0374-2807192. Email id = erp_mm@oilindia.in.**

b) **OIL's office timings are as below:**

	Time (in IST)
Monday – Friday	**07.00 AM to 11.30 AM; 01.00 PM to 03.30 PM**
Saturday	**07.00 AM to 11.00 AM**

Sunday and Holidays	**Closed**

The tender will be governed by:

1.0 The tender will be governed by "General Terms & Conditions for National Tender (National Competitive Bidding)" for e-Procurement as per Booklet No. MM/LOCAL/E-01/2005(For e-tenders).

2.0 This Bidding document consists of:

(i) Annexure AA : Technical Specification and Terms & Conditions
(ii) Annexure BB : Bid Rejection Criteria
(iii) Annexure CC : Commercial Compliance Sheet
(iv) Annexure DD : Price Schedule
(v) Annexure EE : Annual Turn Over and Net Worth Certificate
(vi) Annexure FF : Undertaking towards submission of authentic information/documents
(vii) Annexure XII : Integrity Pact
(viii) Annexure GG : Clause for Startup and MSE bidders.
(ix) Annexure AA1 :Bid Security Declaration
(x) Annexure XX : Undertaking towards a country which shares a land border with India
(xi) Annexure M : Undertaking By Vendor On Submission Of PBG
(xii) Annexure NN : Registration of supplier in Government E-market Place (GeM)

"General Terms & Conditions for National Tender (National Competitive Bidding)" for e-Procurement as per Booklet No. MM/LOCAL/E-01/2005(For e-tenders).

3.0 Bidders without having E-tender Login ID and Password should complete their online registration at least 7(seven) days prior to the scheduled bid closing date and time of the tender. For online registration, Bidder may visit the OIL's E-tender site **https://etender.srm.oilindia.in/irj/portal.**

4.0 Necessary Login ID & Password will be issued by OIL only after submitting the complete online registration by the Bidder. In the event of late registration/incomplete registration by Bidder, OIL INDIA LIMITED shall not be responsible for late allotment of User ID & Password and request for bid closing date extension on that plea shall not be entertained by Company.

5.0 Bidders to note that Govt. of India under Micro, Small and Medium Enterprises Development (MSMED) Act 2006, has proclaimed the Public Procurement Policy, 2012 with effect from 1st April, 2012 in respect of procurement of goods and services, produced and provided by micro and small enterprises, by its Ministries, Departments and Public Sector Undertakings for promotion and development of Micro and Small Enterprises. A new Clause on applicability of Public Procurement Policy for procurement of goods from Micro and Small Enterprises (MSE) in the tender is furnished vide Amendment to General Terms and Conditions for Global Tender (MM/GLOBAL/E-01/2005). Bidders are requested to take note of the same and to submit their offers accordingly.

5.1 For availing benefits of Purchase Preference under Public Procurement Policy, the interested MSE Bidders must ensure that they are the manufacturer of tendered item(s) and registered with the appropriate authority for the said item(s). The technical offer of

such MSE Bidders must include a valid copy of relevant MSE Certificate issued by appropriate authority specifying the item as per tender. Purchase Preference of 15% (fifteen percent) shall be extended to the eligible MSE Bidder (i.e. Manufacturer of tendered goods for procurement) over non-MSE L1 Bidder and PO shall be awarded for full tender quantity on such MSE bidder, subject to matching their quoted rates/costs with non-MSE L1 Bidder.

5.2 **Micro or Small Enterprises (MSE) registered with District Industry Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME shall submit copy of valid Registration Certificate for the items they intend to quote along with the bid. The Registration Certificate should clearly indicate the monetary limit, if any and the items for which bidder are registered with any of the aforesaid agencies. In case bidding MSE is owned by Schedule Caste or Schedule Tribe entrepreneur, valid documentary evidence issued by the agency who has registered the bidder as MSE owned by SC/ST entrepreneur/ Woman Entrepreneurs should also be enclosed. The turnover related figures of the bidders claiming as MSE bidders as mentioned above shall be considered based on Bidders self-declarations to be submitted with their bid as per new gazette notification no. CG-DL-E-26062020-220191 dated 26.06.2020. However, in case of any intentional misrepresents or attempts to suppress facts in the self-declaration, the bidder shall be liable to penalty as specified under section 27 of the Act.**

5.3 Bids without Bid Security Declaration shall be rejected. MSE bidder also required to submit Bid Security Declaration as per format along with technical Bid.

6.0 **Purchase Preference (Linked with Local Content) (PP-LC) :** Purchase Preference (Linked with Local Content) (PP-LC) is applicable against this tender. Bidders to note that Ministry of Petroleum & Natural Gas, Government of India implemented PPLC Policy to provide Purchase Preference (linked with local content) by notification no. Ref. FP-20013/2/2017-FP-PNG dtd.17.11.2020 and amended from time to time. Bidders are requested to take note of the same and to submit their offers accordingly wherever applicable. The bids shall be evaluated as per applicability of policy.

Bidders seeking benefits, under Purchase Preference Policy (linked with Local Content) (PP-LC) shall have to comply with all the provisions specified in **Annexure-X** and shall have to submit all undertakings / documents applicable for this policy.

7.0 Bidder seeking benefits of MSME and Purchase Preference Policy (Linked with Local Content) shall clearly indicate the same in the tender with proper documents as stipulated in the tender.

8.0 OIL INDIA LIMITED (OIL) has upgraded its E-tender Portal. As part of the new system, the intending bidder must have Encryption Certificate along with Digital Signature Certificate (DSC) of Class III [Organization]. **All the Bids must be Digitally Signed using "Class III" digital certificate (e-commerce application) with 'Certificate Type: Organisation Certificate' as per Indian IT Act obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying**

Authorities (CCA) of India. The bid signed using other than "Class 3 with Organisation's Name" digital certificate, will be rejected.

9.0 Bidders are requested to go through **the '*Vendor User Manual*', '*Guidelines to Bidders for participating in OIL e-tenders*', '*New Instruction to bidders for submission of bid*' and '*Vendor User Manual for e-tendering*'** available in the e-portal home page before submitting offer in system.

10.0 **Deemed export/Custom Duty benefits are not applicable against this tender and bidders should furnish prices without considering these benefits.**

11.0 Please note that all tender forms and supporting documents are to be submitted through OIL's e-Procurement site only except following documents which are to be submitted manually in sealed envelope super scribed with Tender no. and Due date to **The Deputy General Manager - Materials (PL), Oil India Limited (Pipeline Headquarter), P.O. Udayan Vihar, Guwahati -781171 before 14.00 Hrs. IST on the Bid Closing Date** mentioned in the Tender.

a) Detailed Catalogue (if any).
b) Any other document required to be submitted in original as per tender requirement.

All documents submitted in physical form should be signed on all pages by the authorised signatory of the bidder and to be submitted in triplicate.

12.0 Bidders are requested to examine all instructions, forms, terms and specifications in the tender. Failure to furnish all information required as per the tender or submission of offers not substantially responsive to the bid in every respect will be at the bidder's risk and may result in rejection of its offer without seeking any clarifications.

13.0 Any deviation(s) from the tender specification should be clearly highlighted specifying justification in support of deviation.

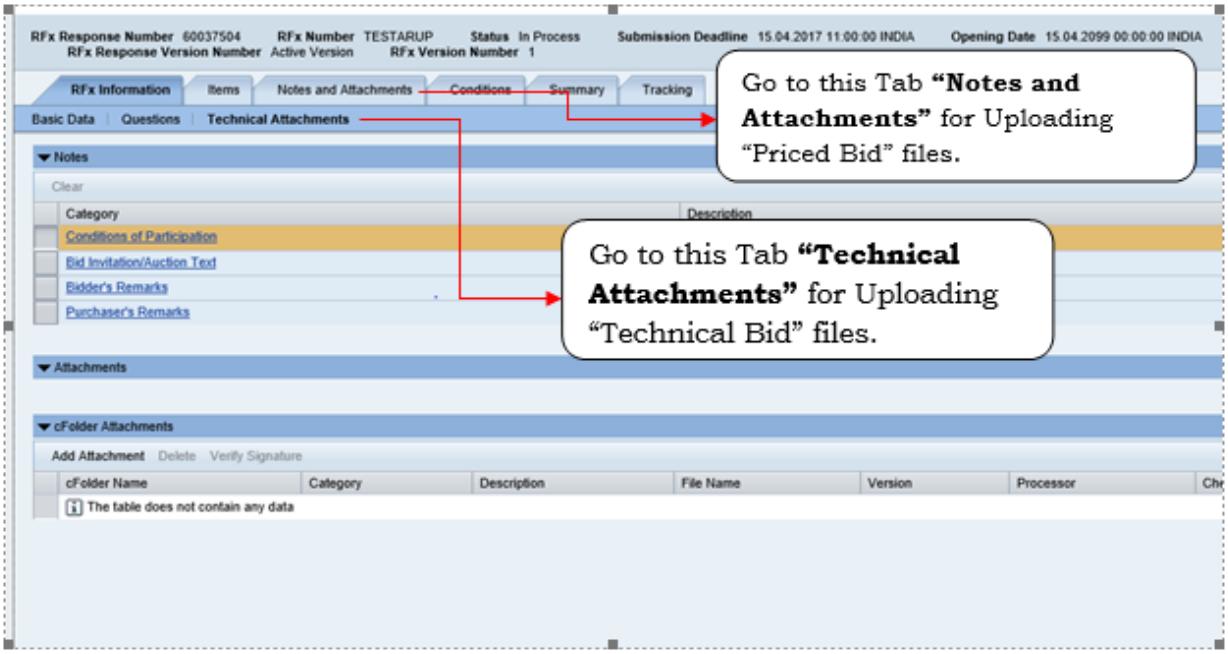
14.0 Original Bid Closing Date shall be considered by OIL for evaluation of BRC Criteria in case of any extension of the original bid closing date.

15.0 Along with the technical bid, bidders must submit duly filled undertaking as per format provided vide **Annexure-FF** as undertaking towards submission of authentic information/documents.

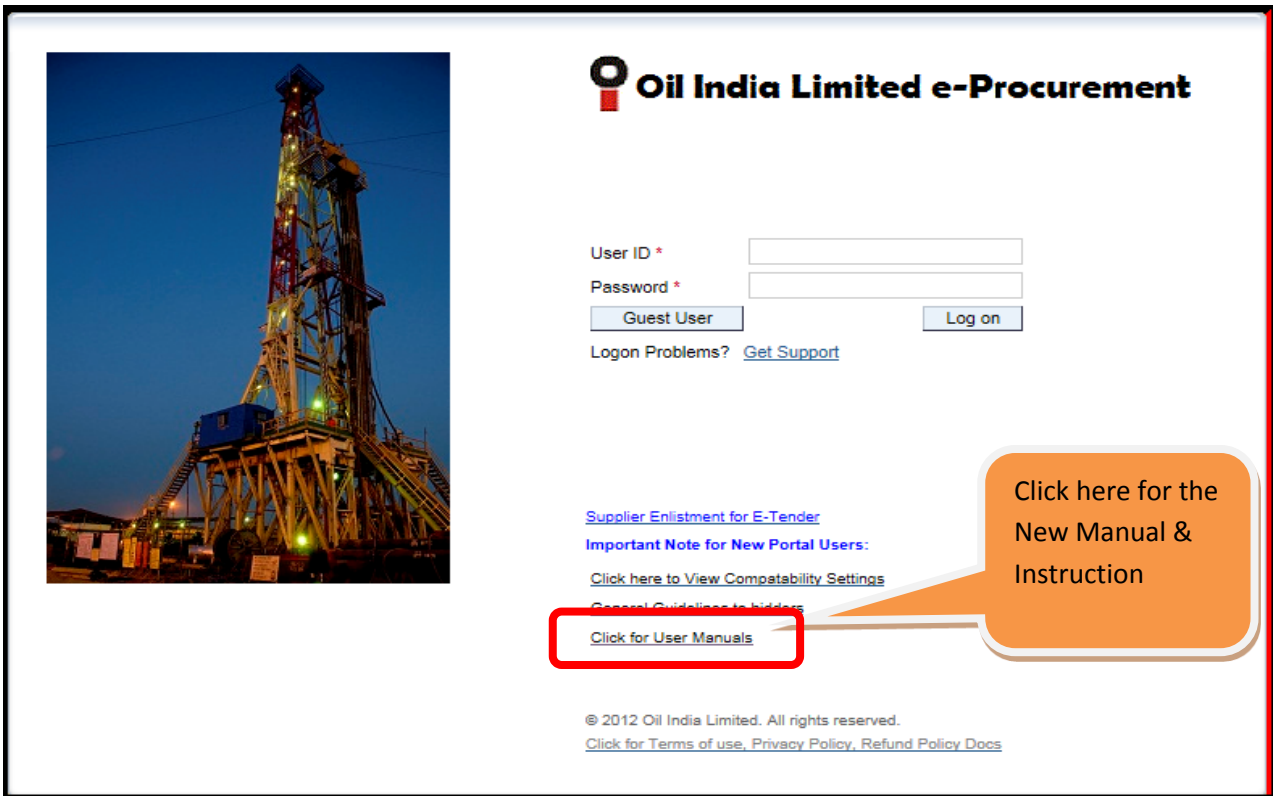
16.0 The tender is invited under **SINGLE STAGE-TWO BID SYSTEM**. The bidder has to submit both the "TECHNO-COMMERCIAL UNPRICED BID" and "PRICED BID" through electronic form in the OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. The "Techno-commercial Unpriced Bid" shall contain all technical and commercial details except the prices which shall be kept blank. Details of prices as per Price Schedule to be uploaded as attachment in the Attachment Tab "Notes and Attachments". Any offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in the tender.

17.0 In Technical Bid opening, only Technical Rfx will be opened. Therefore, the bidder should ensure that "TECHNO-COMMERCIAL UNPRICED BID should contain details as mentioned in the technical specifications as well as BEC/ BRC and upload the same in the Technical RFx Response-> User - > Technical Bid. No price should be given in above Technical Rfx otherwise the offer will be rejected. Please go through the help document in details before uploading the document and ensure uploading of technical bid in the Technical RFx Response-> User - > Technical Bid only. The "PRICE BID" must contain the price schedule and the bidder's commercial terms and conditions. Details of prices as per Price Schedule can be uploaded as Attachment under the attachment option under "Notes & Attachments".

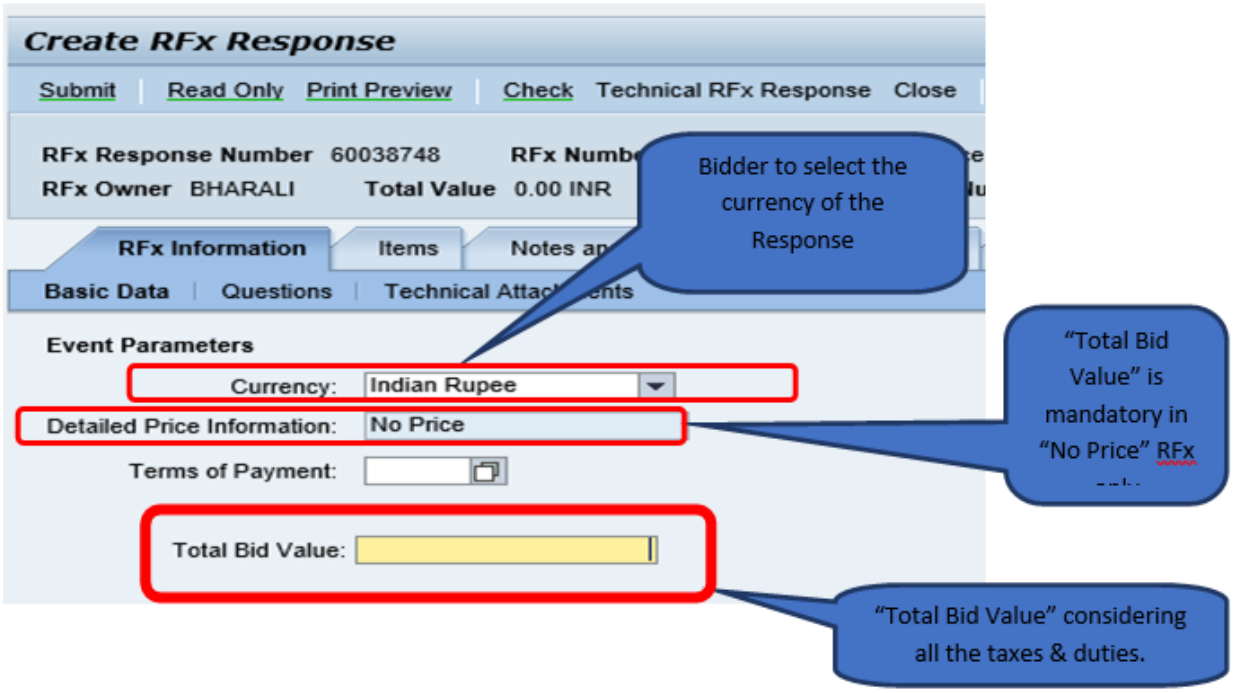
Notes and Attachments	➔ **Only price details should be uploaded**
Technical attachments	➔ **All technical bid documents except price details**



Bidders are requested to go through the 'New Vendor Manual', 'Guidelines to Bidders for participating in OIL e-tenders', 'New Instruction to bidders for submission of bid' and 'Vendor User Manual for e-tendering' available in the e-portal home page before submitting offer in system.



18.0 **For the convenience of the qualified Bidders and to improve transparency, the rates/costs quoted by bidders against OIL's e-tenders shall be available for online viewing by such Bidders whose price bids are opened by Company. A Bidder can view item-wise rates/costs of all other such peer bidders against the tender immediately after price bid opening, if the e-tender is floated by Company with PRICE CONDITION. In case the Price Bid is invited by Company through attachment form under "Notes & Attachments" (i.e., NO PRICE CONDITION), Bidder must upload their detailed Price-Bid as per the prescribed format under "Notes & Attachment", in addition to filling up the "Total Bid Value" Tab taking into account the cost of all individual line items and other applicable charges like freight, tax, duties, levies etc.. Under NO PRICE Condition (i.e. Price Bid in attachment form), the "Total Bid Value" as calculated & quoted by the Bidder shall only be shared amongst the eligible bidders and Company will not assume any responsibility whatsoever towards calculation errors/omissions therein, if any. Notwithstanding to sharing the "Total Bid Value" or the same is whether filled up by the Bidder or not, Company will evaluate the cost details to ascertain the inter-se-ranking of bidders strictly as per the unloaded attachment and Bid Evaluation Criteria only. Online view of pries as above shall be available to the Bidders only upto seven days from the date of Price-Bid opening of the e-tender.**



19.0 Bidders are requested to examine all instructions, forms, terms and specifications in the tender. Failure to furnish all information required as per the tender or submission of offers not substantially responsive to the bid in every respect will be at the bidder's risk and may result in rejection of its offer without seeking any clarifications.

20.0 Bidders must ensure that their bid is uploaded in the system before the tender closing date and time. Also, they must ensure that all documents which are to be submitted in a sealed envelope are also submitted at the address mentioned in note 12.0 above before **14:00 Hrs (IST)** on the bid closing date failing which the offer shall be rejected.

21.0 Other terms and conditions of the tender shall be as per "General Terms & Conditions for National Tender (National Competitive Bidding)" for e-Procurement as per Booklet No. MM/LOCAL/E-01/2005(For e-tenders). However, if any of the clause of the Bid Rejection Criteria / Bid Evaluation Criteria (BEC / BRC) contradicts the clauses in the General Terms & Conditions of the tender and/or elsewhere, those mentioned in the BEC/BRC shall prevail.

22.0 To ascertain the substantial responsiveness of the bid OIL reserves the right to ask the bidder for clarification in respect of clauses covered under BRC also and such clarifications fulfilling the BRC clauses in toto must be received on or before the deadline given by the company, failing which the offer may be summarily rejected.

23.0 Arbitration clause for Settlement of commercial disputes between Central Public Sector Enterprises (CPSEs) inter se and CPSE(s) and Government Department(s)/Organizations(s) - Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD).

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax,

Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD as mentioned in OPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018.

24.0 Bidders to note the following Addendum dated 04.12.2020 to the General Terms & Conditions of the tender pertaining to **TAX COLLECTED AT SOURCE(TCS)** and be guided
accordingly while submitting the offers:

Addendum dated 04.12.2020 to the General Terms & Conditions of tender:
New Provisions –
Tax Collectible at Source (TCS) applicable under the Income-tax Law and charged by the SUPPLIER shall also be payable by OIL along with consideration for procurement of goods/materials/equipment. If TCS is collected by the SUPPLIER., a TCS certificate in prescribed Form shall be issued by the SUPPLIER to OIL within the statutory time limit. Payment towards applicable TCS u/s 206C (1 H) of Income Tax Act.1961 will be made to the supplier provided they are claiming it in their invoice and on submission of following undertaking along with the invoice slating that:
a. TCS is applicable on supply of goods invoiced to OIL as turnover of the supplier in previous year was more than Rs. 10 Cr. And
b. Total supply of goods to OIL in FY … exceeds Rs. 50 Lakh and
c. TCS as charged in the invoice has already been deposited (duly indicating the details such as challan No. and date) or would be deposited with Exchequer on or before the due date and

a. TCS certificate as provided in the Income Tax Act will be issued to OIL in time.

However, Performance Security deposit will be released only after the TCS certificate for the amount of tax collected, is provided to OIL. Supplier will extend the performance bank guarantee (PBG), wherever required, till the receipt of TCS certificate or else the same will be forfeited to the extent of amount of TCS. if all other conditions of Purchase order are fulfilled. The above payment condition is applicable only for release of TCS amount charged by supplier u/s 206C (1 H) of Income tax Act, 1961.

25.0 **RESTRICTIONS ON PROCUREMENT FROM A BIDDER OF A COUNTRY WHICH SHARES A LAND BORDER WITH INDIA**: It is for information of all Bidders that Office Memorandum No. F.No.6/18/2019-PPD dated 23.07.2020 issued by Public Procurement Division under Department of Expenditure of Ministry of Finance will also be applicable against the tender. Therefore, all bidders are requested to be guided by the Clauses stipulated in the enclosed Annexure-N of this tender. In this respect, the format of Undertaking to be submitted by the bidders is given vide Annexure-XX of this tender.

26.0 **No press advertisement will be published regarding amendment to Bidding Document or extension of Bid Closing Date. The same will be uploaded in OIL's website and informed to all prospective bidders who have received the bidding documents. Bidders to keep themselves updated.**

Sd-
(B Bharali)
CHIEF MANAGER MATERIALS (PL)
FOR GENERAL MANAGER - MATERIALS (PL)
FOR: Chief General Manager (PLS)

ANNEXURE – BB

BID REJECTION CRITERIA/BID EVALUTION CRITERIA

Bid Rejection Criteria & Bid Evaluation Criteria.

(I) BID REJECTION CRITERIA (BRC)

The bid must conform to the specifications and terms and conditions given in the enquiry. Bid will be rejected in case the items offered do not conform to all the required technical parameters stipulated in the technical specifications and to the respective international / national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms and conditions, the following requirements shall have to be particularly met by the bidders, without which the offer will be considered as non-responsive and rejected.

BID REJECTION CRITERIA (BRC)

(A) TECHNICAL:

1.0 The bidder shall be an Original Equipment Manufacturer (OEM) of the tendered item and the tendered item shall be in operation in any of the multi-product (Hydrocarbon) pipelines in India and must have completed minimum 6(six) months of operation as on bid closing date. Documentary evidence in the form of certification from owner/client that the tendered items has completed 6(six) months of operation as on bid closing date must be submitted along with the bid.

OR

1.1 An authorized agent/dealer/distributor/supply house of an OEM of the tendered item(s) having valid authorization letter / dealership certificate with warranty/ guarantee back up from the principal (OEM). Copy of authorization letter / dealership certificate with warranty/ guarantee back up from the principal (OEM) must be submitted along with the technical bid. The tendered item shall be in operation in any of the multi-product (Hydrocarbon) pipelines in India and must have completed minimum 6 (six) months of operation as on bid closing date. Documentary evidence in the form of certification from owner/client that the tendered items has completed 6(six) months of operation as on bid closing date must be submitted along with the bid.

2.0 **IN CASE THE BIDDER IS AN ORIGINAL EQUIPMENT MANUFACTURER (OEM):**
If the bidder is an OEM, then it must satisfy the following criteria and furnish the relevant documentary evidence as under along with the bid:

2.1 The bidder must have experience of successfully executing at least 1(one) order for APPS (Leak Detection System and other modules)/LDS value not less than INR 85,90,000.00 in preceding 5(five) years from original bid closing date of the tender by themselves or through SCADA vendor.

2.2 The following supporting documents with respect to bidder's past supply experience as per para 21 above must be submitted along with the technical bid, failing which the bid shall be considered as incomplete/non-responsive -

(i) Copy) of Purchase Order(s) /Contract document(s),

And

(ii) Any one or combination of the following documents that confirms the successful execution of the purchase order(s) / contract(s) -

(a) Completion report / performance certificate from the clients,
(b) Bill of landing,
(c) Delivery challan / invoice etc.
(d) Any other documentary evidence that can substantiate the successful execution of each of the Purchase Order(s) / contract(s) cited above

2.2.1 The originals of these above mentioned documents shall have to be produced by the bidder as and when asked for by OIL.

Note*: For the purpose of above clause, the date of those purchase order(s)/Contract(s) need not be within five (5) years preceding the bid closing date of the tender, but the date of execution must fall within the period of five (5) years prior to the original bid closing date of the tender.*

3.0 **IN CASE THE BIDDER IS NOT ORIGINAL MANUFACTURER**:

If the bidder is an authorized agent/dealer/distributor/supply house of an OEM of the tendered item(s), then the bidder must furnish the following documentary evidences along with the technical bid, failing which the bid shall be rejected:

3.1 Copy of authorization letter/dealership certificate with warranty/ guarantee back up from the principal (OEM) must be submitted along with the technical bid. The authorization letter/dealership certificate should be valid at the time of bidding and should remain valid throughout the duration of purchase order execution, including extension, if any.

3.2 The bidder must have experience of successfully executing at least 1(one) order for APPS (Leak Detection System and other modules) / LDS value not less than INR 85,90,000.00 in preceding 5(five) years from original bid closing date of the tender by themselves or through SCADA vendor.

3.3 The following supporting documents with respect to bidder's past supply experience as per para 3.2 above must be submitted along with the technical bid, failing which the bid shall be considered as incomplete/non-responsive -

(i) Copy) of Purchase Order(s) /Contract document(s),
And
(ii) Any one or combination of the following documents that confirms the successful execution of the purchase order(s) / contract(s) -

(e) Completion report / performance certificate from the clients,
(f) Bill of landing,
(g) Delivery challan / invoice etc.
(h) Any other documentary evidence that can substantiate the successful execution of each of the Purchase Order(s) / contract(s) cited above

3.3.1 The originals of these above mentioned documents shall have to be produced by the bidder as and when asked for.

Note*: For the purpose of above clause, the date of those purchase order(s)/Contract(s) need not be within five (5) years preceding the bid closing date of the tender, but the date of execution must fall within the period of five (5) years prior to the original bid closing date of the tender.*

4.0 A job/supply executed by a bidder for its own organization/subsidiary cannot be considered as experience for the purpose of meeting Bid Rejection Criteria/Bid Evaluation Criteria.

6.0 Delivery: Delivery of the materials must be completed within 6(six) months from the date of issue of Purchase Order. The date of receipt of materials at site shall be considered as the date of delivery. However, Bidder to quote their best delivery period. Bidders should categorically confirm in their technical bid that the tendered items will be supplied within delivery period, without which the bid will be rejected.

Installation & Commissioning to be completed within 2(two) months from date of readiness of site. Site Readiness shall be intimate

9.0 GENERAL:

9.1 In case Bidder takes exception to any clause of Tender Document not covered under BEC/BRC, then the Company has the discretion to load or reject the offer on account of such exception if the Bidder does not withdraw/ modify the deviation when/as advised by the Company. The loading so done by the Company will be final and binding on the Bidders. No deviation will however, be accepted in the clauses covered under BEC/BRC.

9.2 Any exceptions/deviations to tender must be spelt out/discussed by Bidder in the Pre Bid Meeting which will be organized at Pipeline Head Quarter, Guwahati. Any additional information/terms/conditions furnished in 'Price Bid' will not be considered by Company for evaluation/award of contract.

(B) FINANCIAL:

1.0 Annual Financial Turnover of the bidder during any of preceding three financial/accounting years from the original bid closing date should be at least **INR 85,90,000.00**

2.0 Net Worth of the bidder should be positive for the financial/accounting year just preceding to the original Bid Closing Date of the Tender .

3.0 Considering the time required for preparation of Financial Statements, if the last date of preceding financial/accounting year falls within the preceding six months reckoned from the original bid closing date and the Financial Statements of the preceding financial/accounting year are not available with the bidder, then the financial turnover of the previous three financial/accounting years excluding the preceding financial/accounting year will be considered. In such cases, the Net worth of the previous financial/accounting year excluding the preceding financial/accounting year will be considered. However, the bidder has to submit an affidavit/undertaking certifying that the balance sheet/Financial Statements for previous financial year has actually not been audited so far.

Notes:
a) For proof of Annual Turnover & Net worth any one of the following document must be submitted along with the bid: -
i) A certificate issued by a practicing Chartered/Cost Accountant (with Membership Number and Firm Registration Number), certifying the Annual turnover & Net worth as per format prescribed in ANNEXURE EE.
OR
ii) Audited Balance Sheet along with Profit & Loss account.
b) In case the bidder is a Central Govt. Organization/PSU/State Govt. Organization/Semi-State Govt. Organization or any other Central/State Govt. Undertaking, where the auditor is appointed only after the approval of Comptroller and Auditor General of India and the Central Government, their certificates may be accepted even though FRN is not available. However, bidder to provide documentary evidence for the same.

(A) COMMERCIAL

1.0 Bids are invited under **SINGLE STAGE TWO BID SYSTEM**. Bidders shall quote accordingly. **Please note that no price details should be furnished in the Technical (i.e. Unpriced) bid.** The "Unpriced Bid" shall contain all techno-commercial details except the prices, which shall be kept blank. The "Price Bid" must contain the price schedule and the bidder's commercial terms and conditions. Bidder not complying with above submission procedure will be rejected. Bids shall be submitted under single stage Two Bid System i.e. Technical Bid and Priced Bid separately in the OIL's e-Tender portal. The Technical Bid is to be uploaded as per Scope of Work & Technical Specification of the tender in "Technical Attachments" Tab and Priced Bid uploaded in the "Notes & Attachments" Tab. Bids shall be rejected outright if the prices are indicated in the technical bids. Bids not conforming to this two-bid system shall be rejected outright.

2.0 Bid security/EMD is not required against the tender. However, **Bid Security Declaration** is required and same must be submitted along with technical bid. The Bid Security Declaration format is attached vide Annexure AA1. Any bid not accompanied with Bid Security Declaration (As per Format) will be rejected without any further consideration.

3.0 As per Clause No. G12.1 (Sr. No. 20), G12.2 (Sr. No. 15) and G12.3 (Sr. no. 20) under Annexure – AA (Technical Specification). Bidder to confirm the same in their offer

4.0 MSME Bidders are also required to furnish the Bid Security Declaration as per format.

5.0 The prices offered will have to be firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and rejected.

6.0 **Validity of the bid shall be minimum 120 days from the final Bid Closing date. Bids with lesser validity will be rejected.**

7.0 All the Bids must be Digitally Signed using Class III digital certificate (e-commerce application) with 'Certificate Type: **Organization Certificate'** as per Indian IT Act obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India. The bid signed using other than "Class 3" and "Organization" digital certificate, will be rejected.

8.0 Successful bidder will be required to furnish a **Performance Bank Guarantee @3%** of the order value. The Performance Security specified above must be valid for 3(three) months beyond the Warranty period indicated in the Purchase Order/contract agreement [Please refer General Terms & Conditions for National Tenders (National Competitive Bidding), Booklet No. MM/LOCAL/E-01/2005 (For E-tenders)]. Bidder must confirm the same in their Technical Bid. Offers not complying with this clause will be rejected.

9.0 Bids received after the bid closing date and time will be rejected. Similarly, modifications to bids received after the bid closing date & time will not be considered.

10.0 Bids containing incorrect statement will be rejected.

11.0 No offers should be sent by Telex, Cable, E-mail or Fax. Such offers will not be accepted.

12.0 The following points are deemed as "non-negotiable" and offer shall be rejected straightaway without seeking clarification:

i. Validity of bid shorter than validity indicated in the tender.
ii. Original Bid Security not received within the stipulated date and time mentioned in the tender.
iii. Bid security with (a) Validity shorter than the validity indicated in tender and/or (b) Bid security amount lesser than the amount indicated in the tender.
iv. In case the party refuses to sign Integrity Pact.

13.0 Bidder must accept and comply with the following clauses as given in the Bid Document, failing which bid shall be liable for rejection:

i. Performance Security Clause

(i) Liquidated Damages (Note: In case of deduction of LD, LD amount will be deducted along with applicable rate of GST) Refer to "General Terms & Conditions" for e-Procurement as per Booklet No. . MM/LOCAL/E-01/2005 for E-procurement
ii. Guarantee of material
iii. Arbitration / Resolution of Dispute
iv. Force Majeure
v. Applicable Laws

14.0 DELIVERY AND INSTALLATION LOCATION: SMCS AT GUWAHATI , ECS AT JORHAT.

15.0 PRICE SCHEDULE:

Bidder shall submit the Price Break up as per Annexure DD. Bidders should fill up the annexures, sign and upload under "Notes & Attachments" > "Attachments" only. Evaluation of offers shall be done on F.O.R. Destination basis.

15.1 The bids conforming to the specifications, terms and conditions stipulated in the enquiry and considered to be responsive after subjecting to the Bid Rejection Criteria will be considered for further evaluation as per the Bid Evaluation Criteria given below:

1. Basic Material Value including TPI & Spares, if any
2. Pre-despatch Inspection Charges, if any
3. Packing & Forwarding Charges, if any
4. **Total Ex-works Value (1+2+3)**
5. GST on Total Ex-Works Value (4)
6. Compensatory Cess, if any
7. **Total FOR Despatching Station Value (4+5+6)**
8. Freight Charges upto destination *(Guwahati, Assam)*
9. GST on Freight Charges (8)
10. Insurance Charges @0.5% of (7) inclusive of GST
11. Installation & Commissioning Charges
12. GST on Installation & Commissioning Charges
13. AMC Charges & Unplanned Visit (1st year, 2nd year and 3rd year to be shown separately)
14. Total GST on AMC Charges
15. **Total Value (7+8+9+10+11+12+13+14)**

15.2 Comparison of offers shall be done on Total Value vide Srl. No. 15 . Evaluation will be done on total cost basis for both the item as per Price Schedule (Annexure-DD)

15.3 Domestic bidders must quote inland freight charges upto Destination. In case bidder fails to quote inland freight charges, highest freight quoted by domestic bidder (considering pro-rata distance) against this tender or OIL's estimated freight, whichever is higher, shall be loaded to their offer for comparison purpose.

15.4 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be corrected. Similarly, if there is any

discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

15.5 Price bids of only those bidders will be opened whose offers are found to be techno-commercially acceptable.

15.6 Purchase Preference (Linked with Local Content) (PP-LC) is applicable against this tender. Bidders to note that Ministry of Petroleum & Natural Gas, Government of India implemented PPLC Policy to provide Purchase Preference (linked with local content) by notification no. Ref. FP-20013/2/2017-FP-PNG dtd.17.11.2020 and amended from time to time. Bidders are requested to take note of the same and to submit their offers accordingly wherever applicable. The bids shall be evaluated as per applicability of policy.

16. The Integrity Pact is applicable against this tender. OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure XII of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL's competent signatory. The proforma has to be returned by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who sign the Bid. The name of the OIL's Independent External Monitors at present are as under:

a. Shri Sutanu Behuria, IAS (Retd.),
E-mail: sutanu2911@gmaiI.com

b. Shri Rudhra Gangadharan, IAS (Retd.); Ex-Secretary,
Ministry of Agriculture
E-mail id: rudhra.gangadharan@gmail.com

c. Shri Om Prakash Singh, IPS (Retd.),
Former DGP, Uttar Pradesh
E-mail: Ops2020@rediffmail.com

17. **No press advertisement will be published regarding amendment to Bidding Document or extension of Bid Closing Date. The same will be uploaded in OIL's website and informed to all prospective bidders who have received the bidding documents. Bidders to keep themselves updated.**

18. Other terms and conditions of the enquiry shall be as per General Terms and Conditions for LCB Tender. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (BEC/BRC) mentioned here contradict the Clauses in the General Terms & Conditions of LCB Tender of the tender and/or elsewhere, those mentioned in this BEC/BRC shall prevail.

(Technical Specification as per Annexure – AA)

Design, supply, installation and commissioning of APPS (Leak Detection System and supplementary modules) **FOR NUMALIGARH-SILIGURI MULTI PRODUCT PIPELINE IN CONJUNCTION WITH EXISTING SCADA SYSTEM.**

SCOPE OF WORK

Design, supply, installation, testing and commissioning of APPS (Leak Detection System and supplementary modules) at Supervisory Master Control Stations, Emergency control station & other plants of NSPL pipeline as per tender requirement (including supply and installation of all required hardware, engineering of the complete system, integration, internal testing, FAT, post installation support during warranty period and PWMC period, shall be under the scope of this tender as per the technical specifications given in part –II of the Bid document.

THIS DOCUMENT CONSISTS OF PART I AND PART II

PART - I COMPRISES OF SECTION A WHICH GIVES DESCRIPTION OF OIL'S PIPELINES, NSPL OPERATION & BRIEF DECRIPTION OF OUR REQUIREMENTS FOR APPS UNDER THIS TENDER.

PART - II DESCRIBES EXISTING SYSTEMS UNDER DIFFERENT SECTIONS (B TO H & LIST OF APPENDIX) TOGETHER WITH TECHNICAL SPECIFICATIONS OF PROPOSED APPS (LEAK DETECTION SYSTEM AND SUPPLIMENTARY MODULES)

CONTENTS

PART I

OIL INDIA LTD.

TECHNICAL SPECIFICATION OVERVIEW

CONTENTS

DRAWINGS

OIL/NSPL/SCADA/01 – APPENDIX I(A)

OIL/NSPL/SCADA 02 – APPENDIX I(B)

OIL INDIA LIMITED

INTRODUCTION & OVERVIEW

INTRODUCTION AND OVERVIEW

A.1INTRODUCTION

Oil India Limited, a Public Sector Undertaking of Govt. of India, engaged in exploration, production and transportation of hydrocarbon materials in India and abroad, is proposing to procure APPS System (Leak Detection System and Supplementary Modules) to replace existing APPS system of Numaligarh Siliguri Multi Product Pipeline.

A.2 THE OIL INDIA PIPELINES

A.2.1 PRODUCT PIPELINE

Oil India Limited owns and operates a 16" cross country multi-product pipeline from Numaligarh Refinery in Assam to Rangapani (Siliguri) in West Bengal for transporting different products of Numaligarh Refinery Viz. Motor Spirit (MS), High Speed Diesel (HSD) and Superior Kerosene Oil (SKO). The pipeline is designed for a total throughput of 1.721 MMTPA. This 16" pipeline is 653.4 km in length.

Between Numaligarh Pumping station and Rangapani terminal there are 4 Intermediate pigging stations and nine sectionalizing valve stations. There is no intermediate pumping station.

This Product Pipeline operation is centrally controlled from central despatch Control center located at Numaligarh Despatch Terminal.

THE GEOGRAPHICAL ROUTE MAP OF OIL'S CRUDE OIL PIPELINE & NSPL MULTI PRODUCT PIPELINE

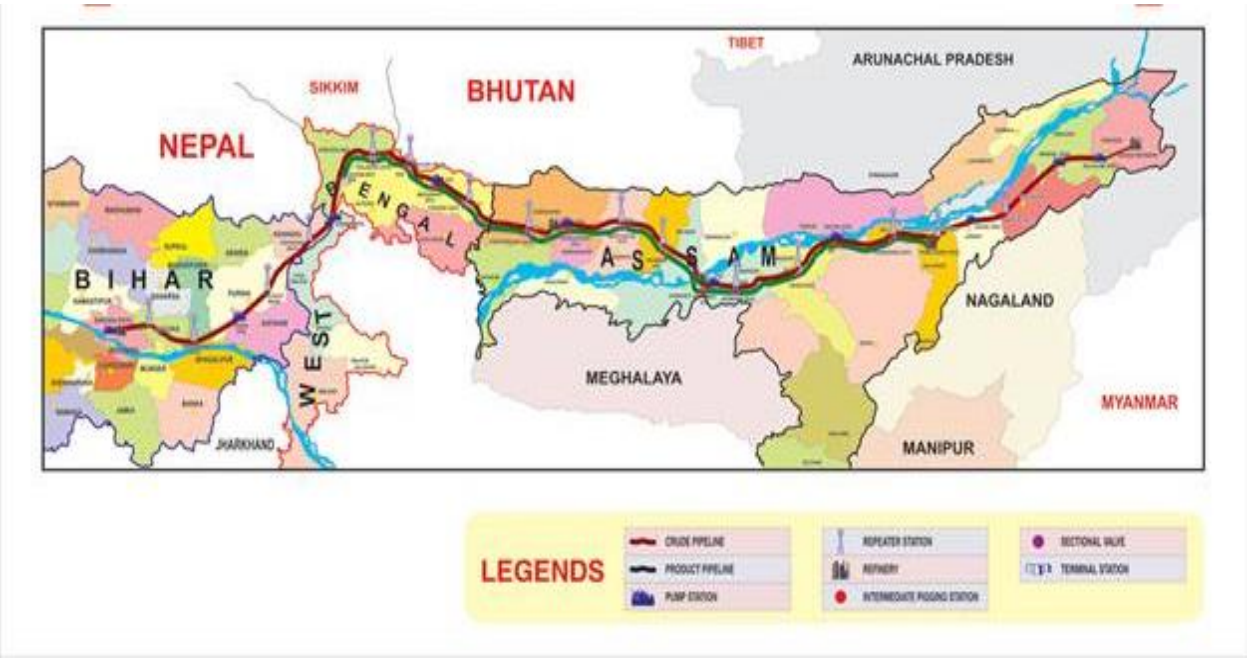


FIGURE 1

THE GENERAL PROCESS FLOW DIAGRAM OF NSPL MULTI PRODUCT PIPELINE

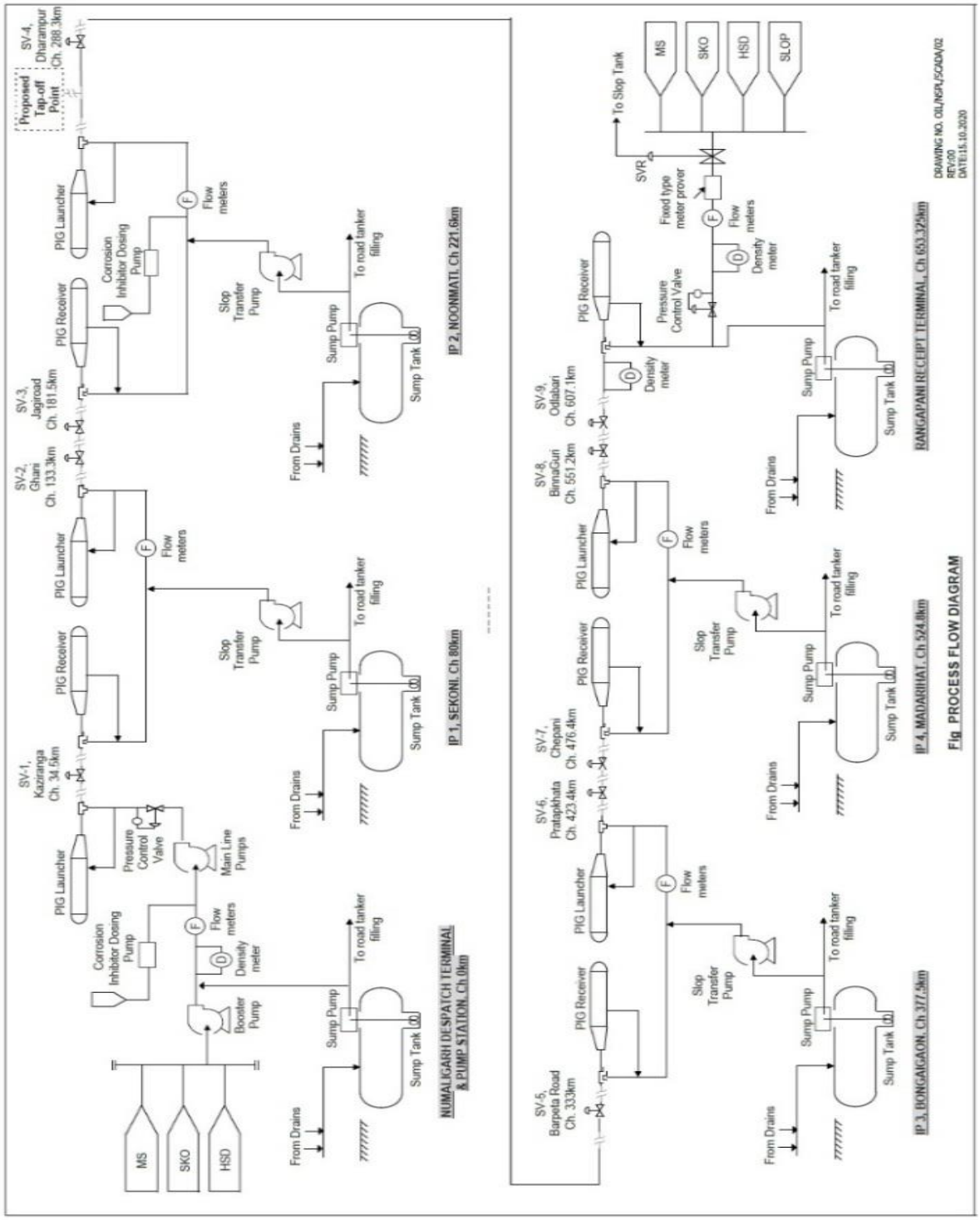

Proposed Tap-off Point
SV-4, Dharampur Ch. 288.3km
SV-3, Jagiroad Ch. 181.5km
SV-2, Ghuni Ch. 133.3km
SV-1, Kaziranga Ch. 34.5km
PIG Launcher
PIG Receiver
Flow meters
Corrosion Inhibitor Dosing Pump
Pressure Control Valve
Main Line Pumps
Booster Pump
Density meter
Slop Transfer Pump
Sump Pump
Sump Tank
To road tanker filling
From Drains
MS
SKO
HSD
SLOP
IP 1, SEKONI, Ch 80km
IP 2, NOONMATI, Ch 221.6km
NUMALIGARH DESPATCH TERMINAL & PUMP STATION, Ch 0km
SV-5, Barpeta Road Ch. 333km
SV-6, Pratapkhata Ch. 423.4km
SV-7, Chepani Ch. 476.4km
SV-8, BirinaGuri Ch. 551.2km
SV-9, Odalbari Ch. 607.1km
IP 3, BONGAIGAON, Ch 377.5km
IP 4, MADARIHAT, Ch 524.8km
RANGAPANI RECEIPT TERMINAL, Ch 653.325km
To Slop Tank
SVR
Fixed type meter prover
Pressure Control Valve
Fig. PROCESS FLOW DIAGRAM
DRAWING NO. OIL/NSPL/SCADA/02
REV:00
DATE:15.10.2020

FIGURE 2

A.2.1.1 SYNOPSIS OF INSTALLATION OF PRODUCT PIPELINE

FEATURES OF PRODUCT PIPELINES

The pipeline has the following features

- One Pumping station at Numaligarh (Numaligarh Despatch Terminal)
- One Receiving terminal at Rangapani
- 4 (Four) Intermediate Pigging stations.
- 9 Sectionalizing valve stations.
- Hand operated valves at different locations

A.2.1.2 NUMALIGARH DESPATCH TERMINAL (NDT)

The pumping station at Numaligarh Despatch Terminal has combination of plant which include Motorized Valves & Associated Pipework, Booster and Mainline Pumps, Sump pump & Slop Transfer pump, Field Instrumentation, PLC system, SCADA System, Communication system, Ancillary electrical, mechanical and electronic equipment etc. For local automation & control PC PLC based system from Rockwell Automation is being used.

A.2.1.3 RANGAPANI RECEIVING TERMINAL (RT)

The Receiving terminal at Rangapani is almost similar to Numaligarh pump station in configuration except it does not have Booster and mainline pumps.

A.2.1.4 INTERMEDIATE PIGGING STATION (IP STATIONS)

There are four IP station along the product pipeline viz. IP1 (Sekoni), IP2(Narengi), IP3(Bongaigaon) and IP4 (Madarihat). IP stations have combination of plant which include Sump tank, Sump pump, Slop transfer pump Motorized Valves & Associated Pipework, SACDA equipments, Field Instrumentation, Communication system, Ancillary electrical, mechanical and electronic equipment. For local control and automation SCADA remote work station with RTU is being used.

A.2.1.5 SECTIONALIZING VALVE STATION (SV STATIONS)

Between Numaligarh and Rangapani Terminal there are nine SV stations viz SV1 (Kaziranga), SV2(Ghani), SV3(Jagiroad), SV4(Dharampur), SV5 (Barpeta Road), SV6(Pratapkhata), SV7(Chepani), SV8(Binnaguri) and SV9(Odlabari).

At Sectionalizing valve stations, the installation is centered around motorized valves, scraper traps/ launchers/catholic protection equipment, small capacity diesel generating sets and pressure transmitters for line pressure measurement and temperature transmitter for temperature measurement. All SV stations are functionally same.

A.2.2. CRUDE OIL PIPELINE

Oil India's Crude Oil Pipeline consists of a 1157 Kilometer pipeline along the Naharkatiya-Guwahati- Barauni route in the Eastern States of India. The system operates on point to point pumping of crude oil from Naharkatiya, Moran and Jorhat oil fields to the refineries at Digboi, Numaligarh, Guwahati, Bongaigaon via intermediate pumping stations at various locations. The pipeline segment between Bongaigaon (PS-6) and Barauni is reversible i.e. crude to Bongaigaon Refinery is delivered from Barauni via intermediate pumping stations located at different locations. Recently pumping arrangement made at PS6 Bongaigaon to pump imported crude to Guwahati refinery as and when required. Between the pumping stations there are communication repeater/valve station, seventeen repeater stations and four refinery terminals which form OIL's pipeline network. The pipeline operation is centrally coordinated from central despatch Control center located at Guwahati adjacent to the pump station number 5. **The scope of work does not cover this crude oil pipeline under this tender**.

A.3. SYNOPSIS OF INSTALLATION OF OIL PIPELINES

A.3.1. EXISTING SCADA SYSTEM OF CRUDE OIL PIPELINE

For the entire crude oil pipeline a centralized SCADA & APPS system is presently in operation. This SCADA system has been supplied by M/S Yokogawa India Ltd (Model: Fasttools).

A.3.2. SCADA SYSTEM OF Product Pipeline

Existing SCADA system of product pipeline is from M/S ABB and APPS is from M/S Atmos International.

Process of integrating SCADA requirement of NSPL into YIL make SCADA system is going on and it is envisaged to be completed by now. Proposed **APPS system shall be integrated with the Yokogawa make SCADA system under this tender.**

After completion of the above mentioned integration, the architecture of the SCADA system of both the pipelines (Crude oil & Products) together with proposed APPS system of the NSPL pipeline is as mentioned in A3.3.

A3.3 ARCHITECTURE OF SCADA SYSTEM OF CRUDE OIL PIPELINE AND PRODUCT PIPELINE

As per following drawings:

OIL/NSPL/SCADA/01 - APPENDIX-I(A) for Architecture of SCADA system at SMCS and ECS

OIL/NSPL/SCADA 02 - APPENDIX-I(B) for channeling plan of SCADA system for NSPL

A.4 OPERATION OF NSPL Pipeline:

Numaligarh-Siliguri pipeline consists of one pumping station located at Numaligarh. The receipt terminal is located at Rangapani. SCADA system is there to ensure effective and reliable control, management and supervision of the pipeline from Centralized location using Remote Telemetry Units (RTU). MCS for this purpose is located at Numaligarh by extending Remote Workstations. A suitable real time leak detection system, batch tracking and scheduling software are integrated with SCADA network.

The control centre at Numaligarh Despatch Terminal has operational control on product despatch. All supply operations for the pipeline system are under the control of this Despatch Terminal and supply of the products at normal operating conditions is being

ensured from there. The Rangapani Receipt Terminal located at Siliguri communicates its requirement to the despatch station. The dispatch terminal makes all necessary arrangements for product despatch and ensure proper lining up of the system in conjunction with the Rangapani Receipt Terminal. The despatch of product shall start only after receiving the ready-to-receive communication from Rangapani Receipt Terminal. Numaligarh Despatch Terminal and Rangapani Receipt Terminal are manned stations and are being operated locally. However important parameters are available at MCS as indicated in the respective P&IDs. Pipeline operations can also be controlled from MCS if required. Four IP stations namely, IP-1 (Sekoni), IP-2 (Noonmati), IP-3 (Bongaigaon) and IP-4 (Madarihat) are there along the route with Pigging facilities. Additionally, flow metering provision is there for leak detection purpose. Eventually, these stations are intermediate pumping station for OIL's existing Crude Oil pipeline. The Control Rooms at NDT and RT are manned by Shift Engineers. The following sections elaborate the Operation and Control Philosophy for Numaligarh-Siliguri Pipeline.

A.4.1 OPERATION OF NUMALIGARH DESPATCH STATION:

Three types of petroleum products namely, MS, HSD and SKO are routed from tankage area to the Numaligarh pumping station using three individual headers. These headers are connected to the booster pump suction header. The individual headers of MS, HSD and SKO are provided with motor operated block valves close to the common header. Block valves are interlocked in such a way that when the pump station is operating, only one product valve is on-line (open). While switching over from one product to another product, the open switch of the desired product valve is actuated. Station start up logic executes the opening command of the desired product valve and closing command of the product valve whichever is in open position. Opening and closing command is executed simultaneously. Closing command of the product header valve shall be executed only after the desired product header valve is 25% open. This interlock prevents opening of two product valves at the same time. These valves are MOV's, which are quick opening and quick closing type.

Start-up of Numaligarh Despatch Station Pumps

The Numaligarh despatch station is controlled by station and unit control sequence implemented in the control logic. Every pump unit is controlled by a unit control sequence/ logic. The individual pump control sequence in turn is linked to the station control sequence, which also monitors and controls all the critical parameters of the pump station.

A.4.2 PUMPING OF A BATCH

When a batch is being pumped into the pipeline, it is necessary to keep an accurate account of the product being pumped and received. The Shift Engineer on duty at NSPL-MCS (Numaligarh) keeps record in the station log sheet regarding the product being pumped, rate of pumping, rate of receiving, the location of the interface etc. The Shift Engineer on duty at NSPL-MCS (Numaligarh) gets all this information from the SCADA. The location of interface at any time can be read out in the RWS (computer) at Numaligarh and Rangapani. This can also be manually calculated using the line fill volume per unit length and the pumping rate.

A.4.3 BATCH CHANGING

The Shift Engineer on duty at NSPL-MCS (Numaligarh) shall change the product batch from one to the other in pumping cycle as per the schedule. it shall get the appropriate tank lined up after checking the tank parameters. A close watch shall be kept on the density meter after switching over the product. When it registers a change in the density reading, that time shall be noted at the time of interface leaving the station. Shift Engineer on duty at NSPL-MCS (Numaligarh) shall inform that time to the Rangapani Receipt Terminal. The Shift Engineer on duty at NSPL-MCS (Numaligarh) shall always keep a close watch on the position of interface at any time. He/she shall get the interface position from the SCADA. At Rangapani Receipt Terminal as soon as the interface reaches the receipt station as indicated by the density transmitter, the Shift Engineer on duty at Rangapani Receipt Terminal Control Room shall remain alert and the necessary preparations for the switch over of the receiving tank shall be done. When the density recorder records change in the density, the pipeline Shift Engineer on duty at Rangapani Receipt Terminal Control Room shall be ready for switch over. Depending upon how the interface is to be cut (based on density meter input or physical sampling); the pipeline Shift Engineer on duty at Rangapani Receipt Terminal Control Room shall switch over the product receipt to the appropriate

storage tank taking into consideration the acceptable permissible contamination**.** In addition to density, manifold valve status (opening / closing) shall also be used for batch launching purpose.

A.4.4 INTERFACE STORAGE AND HANDLING

Generally following types of product interfaces are received at Rangapani Receipt Terminal- HSD-SKO SKO-MS MS-SKO SKO-HSD.

The permissible level of contamination of SKO in MS is 1% (vol.) and SKO in HSD is 2.0% (vol.). The product interface volume is tracked throughout the pipeline from densitometer at NDT, at IP1, IP2, IP3 and at IP4. IP4 data of density change is used to predict the actual arrival time of interface at Rangapani Receipt Terminal and particularly to pre-plan what quantity to accommodate at which tank. The IP4 information is shared with NRLSMT and plan is fixed jointly for upcoming interface handling.

A.4.5 STATION PRESSURE CONTROL

This is the main control to be affected at Numaligarh Despatch Terminal in order to protect the main pumps from operation below the minimum required NPSH. During normal operation, the Control is automatic. The station Pressure Control Valve 10-PV-1201 receives signals from the pump suction pressure indicator controllers 10-PIC-1201 and will maintain the desired mainline pump suction pressure at Numaligarh. When the pump suction pressure drops below the minimum set value, the low signal will operate the station pressure control valve to maintain the required pressure at the suction of Pumps.

A.4.6 DOWNSTREAM/BACK PRESSURE CONTROL

Downstream / backpressure control is important at Rangapani Receipt Terminal in order to have a tight line operation. This helps to minimize inter – mixing of products and keeps interface to minimum. The tight line operation also helps to prevent hydraulic surging by minimizing the vaporization of products in the line. Back pressure controller 10-PIC-1703 is provided which controls the line pressure at Rangapani Receipt Terminal.

A.4.7 SECTIONALIZING & MAINLINE STATION INLET/OULET VALVES OPERATION

As per approved operational manual

A.4.8 SHUTDOWN

As per approved operational manual

A.4.9. SHUTDOWN OF NUMALIGARH PUMPING STATION

- **NORMAL SHUTDOWN**

As per approved operational manual

- **SHUTDOWNOF RANGAPANI RECEIPT TERMINAL**

As per approved operational manual

- **SHUTDOWN OF PIPELINE**

As per approved operational manual

- **SHUTDOWN OF RANGAPANI RECEIPT TERMINAL**

As per approved operational manual

A.5. CONTROL PHILOSOPHY OF NSPL PIPELINE

A.5.1. NUMALIGARH DESPATCH TERMINAL

Reference P&ID no. 6487-02-41-10-1211, 6487-02-41-10-1212(APPENDIX-IV-A)

Three types of petroleum products namely, MS, HSD and SKO are routed from the tankage area of Numaligarh Refinery Limited to the Numaligarh Despatch Terminal using three individual headers. These headers are connected to the booster pump suction header. The individual headers of MS, HSD and SKO are provided with motor operated block valves close to the common header. Block valves are interlocked in such a way that when the pump station is operating, only one product valve is on-line (open). While switching over from one product to another product, the open switch of the desired product valve is actuated. Station start up logic executes the opening command of the desired product valve and closing command of the product valve whichever is in the open position. Opening and closing command is executed simultaneously. Closing command of the product header valve shall be executed only after the desired product header valve is 25% open. This

interlock prevents opening of two product valves at the same time. These valves are MOV's, which are quick opening and quick closing type. The interlock no. is designated as 10-I-1 (Refer P&ID No.6487-02-41- 10-1211). This logic checks the closure of product header valve (MOV-1101) after 45 seconds. If the valve is not closed, the logic generates an alarm "Manifold valve Malfunction" and trip all booster and mainline pumps at Numaligarh Despatch Terminal.

INTERLOCK	ACTUATED BY	ACTION
10-I-1	Opening command for MOV 1100/1102/1103 {Opening command for 10-MOV-1014/ 1015/1016/ 1017/ 1018/ 1019 (any one of above)}.	Open the desired product valve and close any other opened product valve.

A.5.1.1 Start-up of Numaligarh Despatch Terminal Pumps

As per approved operational manual

Booster Pumps

At Numaligarh there are two (1 working + 1 standby) booster pumps 10-PA-CF-101 A/B. During normal operation one pump will be operating and one pump will be standby. To start the booster pumps, booster pump start-up push button is actuated. Start-up push button actuates interlock 10-I-2 as explained below:

INTERLOCK	ACTUATED BY	ACTION
10-I-2A	Pump unit start-up push button 10-PB-101 A1	Bring 10-MOV-1105 to open and 10-MOV-1107 to close position
10-I-2B	Pump unit start-up push button 10-PB-101 B1	Bring 10-MOV-1106 to open and 10-MOV-1108 to close position

After ensuring the above mentioned conditions, the selected booster pump is started, and after a time delay (adjustable) the discharge valve of the selected pump is opened. Once,

one booster pump starts, one mainline pump is started. Each booster pump is also controlled by the following interlocks:

INTERLOCK	ACTUATED BY	ACTION
10-I-3A	Tripping of pump 10-PA-CF-101A	For ESD: Close 10-MOV-1105 & close 1107 For other trips: Close 10-MOV-1107 with a time delay sufficient for pump coast down
10-I-3B	Tripping of pump 10-PA-CF-101B	For ESD: Close 10-MOV-1105 & close 10-MOV-1108 For other trips: Close 10-MOV-1108 with a time delay sufficient for pump coast down
10-I-4A	10-PI-1104	Trip 10-PA-CF-101A
10-I-4B	10-PI-1104	Trip 10-PA-CF-101B
10-I-4C	PSH-1101	Trip 10-PA-CF-101A
10-I-4D	PSH-1102	Trip 10-PA-CF-101B

Logic is such that during start-up operation interlock bypass for 10-I-4C and 10-I- 4D can be achieved with the indication for the same. Once the booster pump is started, booster pump control sequence sends signal to station control sequence for the mainline pumps start up. There are two mainline pumps, 10-PA-CF-102 A/B. During normal operation one pump will be operating and one pump will be standby. To start mainline pumps, the mainline pump unit start-up push button is actuated. Start-up switch actuates interlock 10-I-5 as explained below.

INTERLOCK	ACTUATED BY	ACTION
10-I-5A	Pump unit start-up push button 10-PB-102 A1	Bring 10-MOV-1201 to open and 10-MOV-1202 to close position
10-I-5B	Pump unit start-up switch 10-PB-102 B1	Bring 10-MOV-1203 to open and 10-MOV-1204 to close position

After ensuring the above mentioned conditions, the selected mainline pump unit is started, and after a time delay (adjustable) the discharge valve of the selected pump is opened. Each mainline pump is also controlled by the following interlocks as mentioned below:

INTERLOCK	ACTUATED BY	ACTION
10-I-6A	Tripping of pump 10-PA-CF-102A	For ESD: Close 10-MOV-1201,1202 For other trips: Close 10-MOV-1202 with a time delay sufficient for pump coast down.
10-I-6B	Tripping of pump 10-PA-CF-102B	For ESD : Close 10-MOV-1203 &close 10-MOV-1204 For other trips: Close 10-MOV-1204 with a time delay sufficient for pump coast down
10-I-7A	PSL-1201	Trip 10-PA-CF-102A
10-I-7B	PSL-1202	Trip 10-PA-CF-102B
10-I-7C	PSH-1201	Trip 10-PA-CF-102A
10-I-7D	PSH-1202	Trip 10-PA-CF-102B
10-I-7E	10-PI-1205	Trip 10-PA-CF-102 A/B, whichever is running

At the mainline pump discharge, a pressure control valve 10-PV-1201 is provided to control the pipeline inlet pressure as well as mainline pump suction pressure. The discharge pressure controller overrides the suction pressure controller when the discharge pressure increases above the set value and pipeline inlet pressure is maintained at the desired value. At the discharge of the mainline pump, another pressure control valve 10-PV-1202 is provided to control pipeline inlet pressure during turndown (50% flow case). The discharge pressure controller overrides the suction pressure controller when the discharge pressure increases above the set value and pipeline inlet pressure is maintained at the desired value. Apart from the interlocks described above, for the whole Dispatch Terminal 10-I-8, 10-I-8A,10-I-10(ESD) is also provided. Description of the above mentioned Interlocks are as follows:

INTERLOCK	ACTUATED BY	INTERLOCK ACTION
10-I-8	• Tripping of Booster Pump Unit whichever is in operation	Trip all Mainline pumps and Booster Pumps.

	• Tripping of Mainline Pump Units whichever is in operation • PSLL-1201 • Voting System of PSHH-1201/1202/120 3(2 OO 3 logic) • Closure ofMOV-1209 • FAL-1101 orFAL-1102	
10-I-8A	Closure of MOV-1207	Trip all booster and Mainline pumps
10-I-10	PB-1203, ESD	Trip all Mainline pumps and Booster Pumps Trip Sump Pump (10-PA-SM-103), C.I. Dosing pump(10-PARP- 104 A/B) Close MOV-1207 at Numaligarh Terminal

Logic is such that during start-up operation interlock bypass for 10-I-7D, 7E, 10-I-8 (FAL-1101/1102) and 10-I-8A can be achieved with the indication for the same. At Numaligarh Despatch Terminal, densitometer (DT-1101) is provided close to the flow meters to measure the density of petroleum products. Signal from densitometer is fed to the flow computer.

Flow computer

Flow computer indicates the corrected volumetric flow rate of the petroleum products to be transported. Numaligarh Despatch Terminal is a manned station and is to be operated locally. However important parameters are monitored and can be controlled from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller settings and monitoring, density, batch change over, pump operation status are monitored at MCS. These data are telemetered to MCS through RTU.

Sump Tank and Pump

Sump tank 10-TT-00-101 has been provided at Numaligarh despatch station for the collection of slops from various points such as scraper drain, line flushing, TSV relief etc. The collected slop is pumped into HSD product passing through mainline. Provision is also

kept to load the slops into road tanker, if the situation demands. The sump pump 10-PA-SM-103 is interlocked to trip in case of low liquid level in the respective sump tank.

INTERLOCK	ACTUATED BY	ACTION
10-I-9	10-LSL-1101	Trip Sump Pump 10-PASM-103

Corrosion Inhibitor Tank and Pumps

Corrosion Inhibitor is required to be dosed in the pipeline to reduce the pipeline corrosion rate. For this purpose, a corrosion inhibitor tank (10-TT-00-102) and Corrosion Inhibitor Dosing Pumps (10-PA-RP-104 A/B) have been provided. The corrosion inhibitor is injected upstream of mainline pumps. The corrosion Inhibitor system has been provided with a manual system for dosing rate adjustment based on product flow rate and corrosion rate. Based on corrosion rate ppm level of CI is to be set. Based on product flow rate corrosion inhibitor dosing rate is adjusted to maintain set ppm. After a certain time (adjustable) the ratio of cumulative quantity of product pumped and cumulative quantity of corrosion inhibitor dosed is to be compared with set ppm to have close loop control.

A.5.2 IP1 -SEKONI INTERMEDIATE PIIGGING STATION

Reference P&ID no. 6487-02-41-20-1213 (APPENDIX-IV B)

Products travel from Numaligarh to Sekoni intermediate pigging station. The distance between Numaligarh to Sekoni is 84.7 km (approx.). One number MOV is provided en-route the section. The prerequisite for starting Sekoni pigging station is that the Numaligarh Despatch Terminal is operating. Sekoni intermediate pigging station is started by actuating the Station start up switch. With the actuation of Station start up switch, station inlet MOV, i.e., MOV-1301 is brought into open condition. Sekoni intermediate pigging station is a manned station and is operated locally. However important parameters are monitored and can be controlled from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller settings and monitoring, density, batch changeover are mentioned at MCS.

Sump Tank & Pump

Sump tank 20-TT-00-101 is provided at Sekoni Intermediate Pigging station for the collection of slops from various points such as header drain, scraper drain, line flushing, TSV discharge etc. The collected slop is pumped into HSD product passing through mainline with the help of Sump Pump (20-PA-SM-101) and slop transfer pumps (20-PARP-102 A, B). Provision is also kept to load the slops into road tanker, if the situation demands using only Sump Pump. The following Interlocks are there at IP-1 for Sump Pump and C.I. dosing pumps:

INTERLOCK	ACTUATED BY	ACTION
20-I-1	20-LSL-1301	Trip sump pump 20-PA-SM-101 and Slop Transfer Pumps(20-PA-RP-102A,B)
20-I-2	20-PSH-1301	Trip sump pump 20-PA-SM-101 and Slop Transfer Pumps(20- PA-RP-102A,B)
20-I-3	Tripping of Sump Pump20-PA-SM-101	Trip Slop Transfer Pumps(20- PA-RP-102 A,B)

A.5.3 IP2 -NOONMATI INTERMEDIATE PIIGGING STATION

Reference P&ID no. 6487-02-41-30-1214 (APPENDIX-IV C)

Products will travel from Sekoni to Noonmati intermediate pigging station. The distance between Sekoni to Noonmati is 141 km (approx.). Two numbers of MOVs are provided en-route the Section. Operation of Noonmati intermediate pigging station is similar to Sekoni station. Noonmati intermediate pigging station is started by actuating the Station start up switch. With the actuation of Station start up switch, station inlet MOV i.e. MOV-1401 is brought to open condition. Noonmati intermediate pigging station is a manned station and is operated locally. The important parameters are monitored and can be controlled from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller settings and monitoring, density, batch changeover are mentioned at MCS.

Sump Tank & Pump

Sump tank 30-TT-00-101has been provided at Noonmati Intermediate Pigging station for the collection of slops from various points such as header drain, scraper drain, line flushing, TSV discharge etc. The collected slop is pumped into HSD product passing through mainline with the help of Sump Pump(30-PA-SM-101) and slop transfer pumps (30-PA-RP-102 A and B). Provision is also kept to load the slops into road tanker, if the situation demands using only Sump Pump.

The following Interlocks are there at IP-2 for Sump Pump and slop transfer pumps:

INTERLOCK	ACTUATED BY	ACTION
30-I-1	30-LSL-1401	Trip sump pump 30-PA-SM-101 and Slop Transfer Pumps 30-PARP-102 A,B
30-I-2	30-PSH-1401	Trip sump pump 30-PA-SM-101 and Slop Transfer Pumps 30-PARP- 102 A,B
30-I-3	Tripping of Sump Pump 30-PA-SM-101	Trip Slop Transfer Pumps PA-RP, 102, A, B

Corrosion Inhibitor Tank & Pumps

Corrosion Inhibitor is required to be dosed in the pipeline to reduce corrosion in the pipeline. For this purpose, a C.I. Tank 30-TT-00-102 and Corrosion Inhibitor dosing pumps (30-PARP- 103 A and B) has been provided. The Corrosion inhibitor is injected in the 14" pipe. The dosing capacity can be adjusted by stroke adjustment of pumps.

A.5.4 IP3-BONGAIGAON INTERMEDIATE PIGGING STATION

Reference P&ID no. 6487-02-41-40-1215 (APPENDIX-IV D)

Products will travel from Noonmati to Bongaigaon intermediate pigging station. The distance between Noonmati to Bongaigaon is 145 km (approx.). Two numbers of MOVs are provided en-route the pipeline. Operation of the Bongaigaon intermediate pigging station is similar to Sekoni station. Bongaigaon intermediate pigging station is started by

actuating the Station start up switch. With the actuation of Station start up switch, station inlet MOV i.e. MOV- 1501 is brought to open condition. Bongaigaon intermediate pigging station is a manned station and is operated locally. However important parameters are monitored and can be controlled from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller settings and monitoring, density, batch changeover are mentioned at MCS.

Sump Tank & Pump

Sump tank 40-TT-00-101has been provided at Noonmati Intermediate Pigging station for the collection of slops from various points such as header drain, scraper drain, line flushing, TSV discharge etc. The collected slop is pumped into HSD product passing through mainline with the help of Sump Pump(40-PA-SM-101) and slop transfer pumps (40-PA-RP-102 A, B). Provision is also kept to load the slops into road tanker, if the situation demands with the help of only Sump Pump (40-PA-SM-101).

The following Interlocks are there at IP-III for Sump Pump and slop transfer pumps:

INTERLOCK	**ACTUATED BY**	**ACTION**
40-I-1	40-LSL-1501	Trip sump pump 40-PA-SM-101and slop transfer pumps 40-PARP-102 A,B
40-I-2	40-PSH-1501	Trip sump pump 40-PA-SM-101and slop transfer pumps 40-PARP-102 A,B
40-I-3	Tripping of Sump Pump 40-PA-SM-101	Trip slop transfer pumps 40-PARP-102 A,B

A.5.5 IP4- MADARIHAT INTERMEDIATE PIGGING STATION

Reference P&ID no. 6487-02-41-50-1216 (APPENDIX-IV E)

Products will travel from Bongaigaon to Madarihat intermediate pigging station. The distance between Bongaigaon to Madarihat is 147 km (approx.). Two numbers of MOVs are provided en-route the pipeline. Operation of Madarihat intermediate pigging station is similar to Sekoni station. Madarihat intermediate pigging station is started by actuating the Station start up switch. With the actuation of Station start up switch, station inlet MOV i.e. MOV-1601 is brought to open condition. Madarihat intermediate pigging station is a

manned station and is operated locally. However important parameters are monitored and can be controlled from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller settings and monitoring, density, batch changeover are mentioned at MCS.

Sump Tank & Pump

Sump tank 50-TT-00-101 has been provided at Noonmati Intermediate Pigging station for the collection of slops from various points such as scraper drain, line flushing, TSV discharge etc. The collected slop is pumped into HSD product passing through mainline with the help of Sump Pump (50-PA-SM-101) and slop transfer pumps (50-PA-RP-102 A, B). Provision is also kept to load the slops into road tanker, if the situation demands with Sump Pump only.

The following Interlocks are there at IP-4 for Sump Pump and slop transfer pumps:

INTERLOCK	ACTUATED BY	ACTION
50-I-1	50-LSL-1601	Trip sump pump 50-PA-SM-101 and Slop Transfer Pumps 50-PARP-102 A,B
50-I-2	50-PSH-1601	Trip sump pump 50-PA-SM-101 and Slop Transfer Pumps 50-PARP-102 A,B
50-I-3	Tripping of Sump Pump50-PA-SM-101	Trip slop transfer pumps 50-PARP-102 A,B

A.5.6 RT- RANGAPANI RECEIPT TERMINAL

Reference P&ID no. 6487-02-41-60-1217 (APPENDIX-IV F)

Products will travel from Numaligarh to Rangapani Receipt Terminal through Sekoni, Noonmati, Bongaigaon & Madarihat stations. The distance between Numaligarh to Rangapani is 653.325 km. Nine numbers of sectionalizing valves are provided en-route the pipeline. At Rangapani Receipt Terminal, one densitometer (60-DT-1701) is provided at a distance of 800m on the mainline to alert the terminal operator about batch/interface arrival in advance. Another densitometer (60-DT-1702) is provided close to the product manifold for density measurement and further data transmission to flow computer for mass metering.

At Rangapani Receipt Terminal pressure control valve, 60-PV-1701 is provided to control upstream as well as the downstream pressure of the control valve. High pressure protection is provided at downstream of 60-PV-1701. For this a pressure switch and 'PT' is provided. In case of high pressure, switch and 'PT' is interlocked to close Rangapani Receipt Terminal piping inlet valve i.e. 60-MOV-1703 and product manifold MOV, whichever is open during that time for product receipt.

INTERLOCK	ACTUATED BY	ACTION
60-I-1	PSHH-1701	Close 60-MOV-1703

All the products including slop are received in Siliguri Marketing Terminal storage tanks of NRL. The individual receipt Headers are provided with block valves one each near the respective tanks and common manifold. Block valves near the common manifold are interlocked with Station receipt start up switch 60-I-2 in such a way that when the station is receiving products, only one product valve is on-line (open). While switching over from one product to another product, the open switch of the desired product valve is actuated. Station receipt start up logic executes the opening command of the desired product receipt valve and closing command of the product receipt valve which is in the open position. The opening and closing command is executed simultaneously. This interlock prevents opening of two product valves at the same time.

INTERLOCK	ACTUATED BY	ACTION
60-I-4	Opening command for MOV-1704,1705,1706,1707, 1708(any of the above)	Open desired product valve and close other opened product valve.

The Rangapani Receipt Terminal is a manned station and is operated locally. However, the important parameters are monitored from Numaligarh MCS. The critical MOV status, corrected and uncorrected flow, totalized flow, all trip alarms, pressure controller setting and monitoring, density, batch change over, etc. are monitored at MCS. These data are telemetered to MCS through RTU.

The following repeat signals from Siliguri Marketing terminal shall be repeated at Rangapani Receipt Terminal control room:

1.Level indication from tanks

2.MOV status indication for tank valves, open/close status, remote/local status.

Interlock 60-I-2 as indicated below is provided for Station ESD. An ESD reset button is provided for clearing the ESD condition.

INTERLOCK	ACTUATED BY	ACTION
60-I-2	Station ESD	Close all MOV at Siliguri Receipt Terminal

Sump Tank & Pump

Sump tank 60-TT-00-101 has been provided at Rangapani Receipt Terminal for the collection of slops from various points such as scraper drain, line flushing, PSV, TSV discharge, etc. The collected slop is pumped into HSD product passing through mainline with the help of Sump Pump (60-PA-SM-101). Provision is kept to route the slop into receipt manifold. Provision is also kept to load the slops into road tanker, if the situation demands. The sump pump 60-PA-SM-101is interlocked to trip the running pump in case of low liquid level in the respective sump tank. An additional interlock is provided to actuate the Station ESD in case of sump tank level HI HI.

INTERLOCK	ACTUATED BY	ACTION
60-I-3	60- LAL-1701	Trip sump pump 60-PA-SM- 101
60-I-5	60-LAHH-1701	Actuate ESD

Provision for product sampling is provided at Numaligarh and Siliguri. Apart from Densitometer and sampling, interface arrival can also be done by volume balancing in the pipeline.

A.5.7 SV -SECTIONALISING VALVE STATIONS

Reference P&ID no. 6487-02-41-00-1225 (APPENDIX-IV G)

Along the Numaligarh-Siliguri pipeline 9 remotely operated sectionalizing valves (MOVs) and 30 nos. of hand operated sectionalizing valves (HOVs) are provided as per ANSI/ ASME B31.4 and safety requirements. When required, the sectionalizing valves MOVs are closed from MCS after ensuring the shutdown of the entire pipeline operation. On issuance of a close command from MCS for any of the sectionalizing valves, a prompt is made available to operator for verification of shutdown of the pipeline operation prior to closing of valves. After close command of any sectionalizing valve, a prompt is made available to operator for verification of shutdown of the pipeline operation prior to closing of valves. Close command of any sectionalizing valve gives prompt for shutdown of the entire pipeline operation. It is mandatory for the operator to honor the prompt in order to close any mainline valve. All hand operated sectionalizing valves shall be closed only after a proper communication with/permission from SMCS.

A.5.8 LEAK DETECTION OF NSPL PIPELINE

The existing leak detection system is from M/S Atmos International, which will be replaced under this scope of work.

A.5.9 EMERGENCY / NORMAL SHUTDOWN NUMALIGARH-SILIGURI PIPELINE

Emergency shutdown of the individual station is done by individual station ESD and it is the responsibility of the station taking an emergency shutdown that informs MCS for the shutdown of the station. Emergency shutdown of the entire pipeline is not provided. However, normal shutdown of the pipeline can be done by the actuation of a single Shut down switch in MCS to take action for the shutting down of the entire pipeline operation. Sectionalizing valves (MOVs) will be closed by MCS operator individually. The corrosion inhibitor dosing pump will be stopped by IP Station Engineer.

A.6. SCOPE OF WORK UNDER THIS PROJECT

OIL India is in the process of replacing and upgrading APPS for NSPL pipeline, which will be integrated with Yokogawa, make SCADA system.

As can be seen from the above, this replacement and upgrading project involves supply, installation and commissioning of APPS requirements of NSPL (multi product pipeline) in conjunction with YIL make SCADA system.

A.7. COMPLIANCE OF SAFETY MANAGEMENT SYSTEM NORMS TO BE COMPLIED WHILE EXECUTING THE JOB

The vendor must comply with various guidelines on safety management system being followed ting works under the scope and also during Warranty and Post Warranty (AMC) period. Salient points of this Safety Management System are mentioned below:

1. The vendor shall engage only highly skilled, capable and competent personnel who are fully conversant with the existing system, proposed system, installation & commissioning, repair/maintenance jobs.

2. The vendor's personnel shall abide by all relevant statutory safety and environment rules, regulations, applicable codes and standards.

3. Tool Box Meeting to be regularly held.

4. The vendor shall ensure complete safety of the personnel engaged by him, and of all the equipment they will handle and must take full responsibility for their safety.

5. The vendor's personnel shall follow safe operating procedures while carrying out any work.

6. The vendor shall ensure the quality and reliability of all the tools, equipment and instruments they use.

7. The vendor's personnel shall follow and take necessary work permit before carrying out any work.

8. The vendor shall provide comprehensive & well documented plan for implementation, monitoring & reporting.

9. The vendor's personnel shall take every possible care to keep the environment clean and free from pollution.

10. The vendor's personnel should understand the implication of the known hazards related to the work undertaken by them and the necessity of having an emergency plan ready to counter them, should anything go wrong.

11. While providing the services, the vendor's personnel shall follow the procedures and also take control measures in all the stages of works to avoid any untoward incidents/accidents.

A.8. INTRODUCTION TO THE TECHNICAL SPECIFICATION

The entire **Part II** of this document constitutes the technical description of the SCADA system of NSPL pipeline and the technical specifications of the APPS proposed to be integrated with the YIL make SCADA system for NSPL Multi product Pipeline.

The above is split into several sections consisting of:

Section B. SMCS and ECS System

Section C. Numaligarh Despatch Terminal (NDT) System

Section D. Rangapani Receiving Terminal(RT) System

Section E. Intermediate Pigging Station(IPs) System

Section F. Sectionalizing valve stations

Section G. Technical Specifications of proposed APPS

Section H. Project Program & Delivery Requirement

Appendices

Wherever necessary, lists, tables and drawings have been included for a comprehensive understanding of the system facilities and functional requirements and Technical specifications of the APPS mentioned in Section G of Part II.

The bidder shall prepare and submit the technical proposal in conformity with this specification and in response to the requirements specified herein.

PART II

SECTION B

SMCS AND ECS

CONTENTS

PART II

SECTION B

B.1. SMCS& ECS SYSTEM CONFIGURATION

Reference to be made to Drawing No: OIL/NSPL/ SCADA/01APPENDIX-I (A)

B.2. SCADA SYSTEM FOR CRUDE OIL NSPL PIPELINE

For the Crude oil pipeline and Product Pipeline a centralized SCADA is presently in operation. The SCADA System has been supplied by M/s Yokogawa India (Model: Fasttools). The system is centrally managed & operated from SMCS at Noonmati & Its Backup control centre (ECS) at PS-3 Jorhat. For product pipeline, all RTUs are polled by SCADA Servers and data of product pipeline are available at SMCS and ECS. Graphics for HMI are developed in Work stations / Remote workstations for pipeline operation and these Work stations / Remote workstations are deployed at different locations of NSPL pipeline namely, NDT, IP1, IP2, IP3, IP4, and RT as shown in diagram Drawing No OIL/NSPL/SCADA-01(APPENDIX-IA). There are two OPC servers in the SCADA Network work. One is installed at SMCS and the other at ECS. The proposed APPS Servers and HMI(APPS)workstations shall be part of the SCADA Network and data transfer between APPS system and SCADA shall be through OPC servers.

B.3. TECHNICAL SPECIFICATIONS OF PROPOSED APPS for NSPL

As detailed in **Section G**

B.4. SCADA NETWORK AND COMMUNICATION CHANNEL FOR NSPL SCADA

Reference to be made to Drawing No. OIL/NSPL/SCADA 02 APPENDIX-I(B)

OFC based SDH equipment and Network components constitute the communication channels as shown in the drawing. In addition to OFC based network two leased lines are being used for back up communication.

SECTION C

NUMALIGARH DESPATCH TERMINAL (NDT)

CONTENT

PART II

C.1. SCADA & LOCAL CONTROL SYSTEM AT NUMALIGARH DESPATCH TERMINAL

The Numaligarh despatch terminal is a manned pump station and operated locally. For local process monitoring and control there is a PC and PLC based combination (This PC PLC system is from Rockwell Automation) in conjunction with separate unit control panels for each Main Pumping Equipment.

For SCADA there is a RTU and redundant RWS from YIL SCADA system. The RTU communicates with SCADA Servers through an Ethernet link using DNP3 protocol. The Rockwell PLC system directly interfaces with field instruments and provide Inputs / Outputs to RTU through TIC as shown in the figure 3 below. However, all the important parameters are also available at SMCS & ECS. These data are telemetered to SMCS/ECS through RTU (Remote telemetry unit).

.

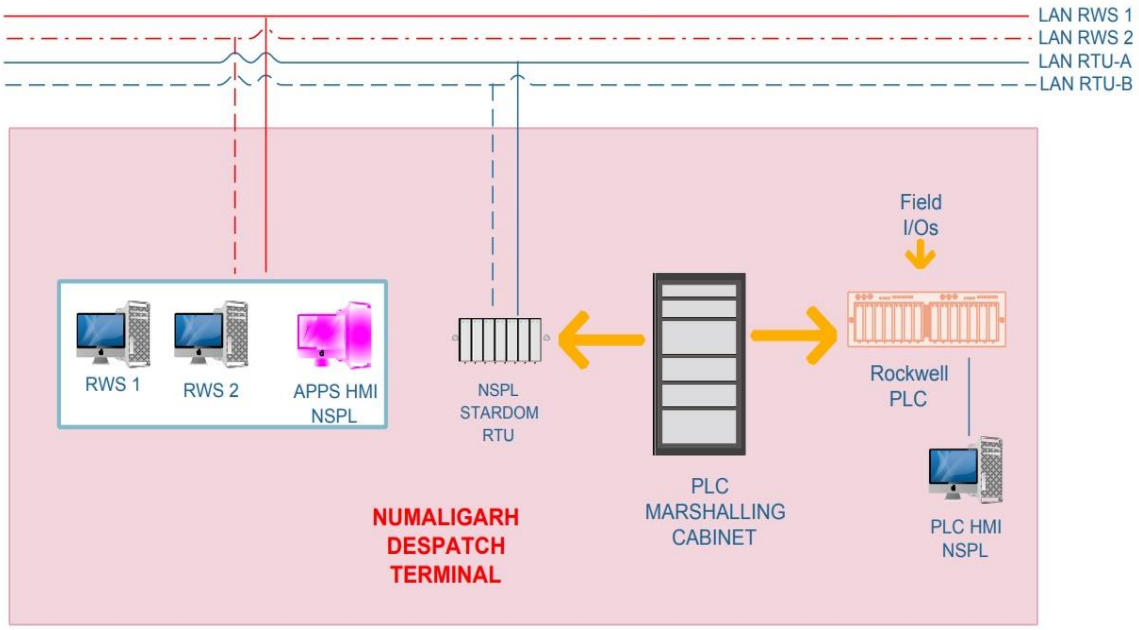


FIGURE 3

C2. CONTROL CENTRE AT NDT

The Despatch Pump Station at Numaligarh which maintains a predetermined throughput rate down the product pipeline through the Booster and Main pumping equipment. At present the NUMALIGARH DESPATCH TERMINAL is acting as control centre for NSPL operation. Authority for overall control is given to RWS installed at NDT

C.3.PROCESS DESCRIPTION

Please refer to following:

- P&IDs as given in APPENDIX- IV(A)
- The IO lists for this NDT is given at the end of this section as APPENDIX-III(A).
- Control philosophy of NSPL pipeline as mentioned in Section A.5 of Part I.

PART II

SECTION D

RANGAPANI TERMINAL

D.1. RANGAPANI TERMINAL

D.2.EXISTING SYSTEM AT RT

D.3. PROCESS DESCRIPTION

D.1. RANGAPANI TERMINAL

For local process monitoring and control there is a PC and PLC based combination from Rockwell Automation). This system interfaces with the field instruments directly and provide Input/output to RTU as shown in the figure4 below. The RTU directly communicates with SCADA Server using the DNP 3 protocol. Accordingly all parameters of RT are available at SMCS and ECS through the RTU for remote monitoring and control.

D.2. EXISTING SYSTEM AT RT

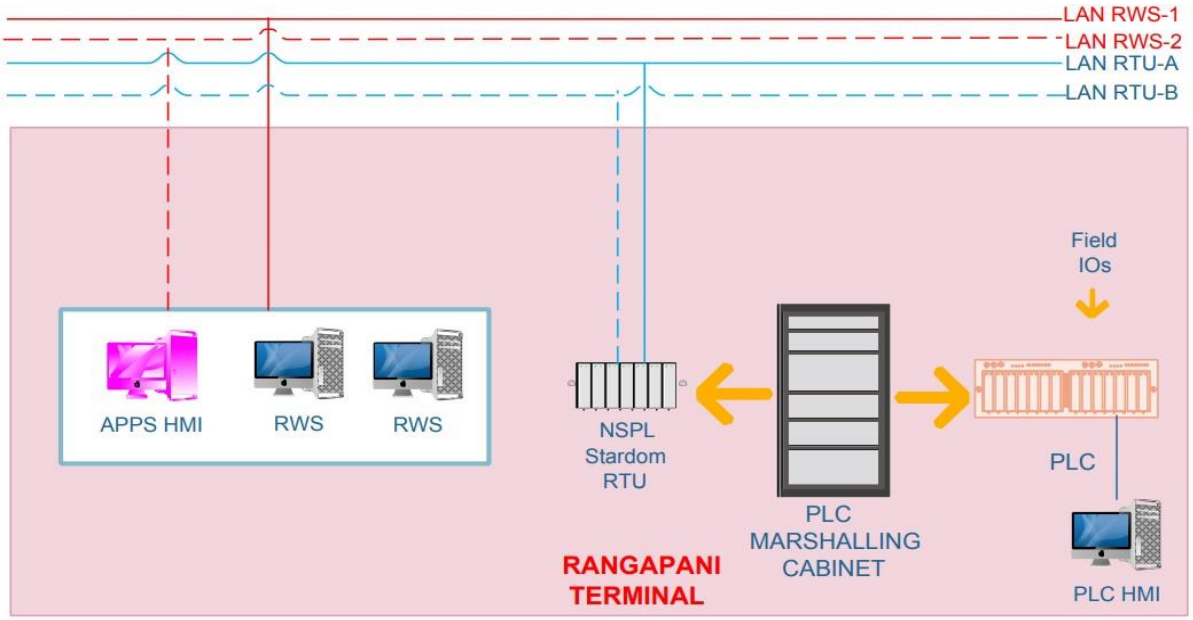


FIGURE 4

D.2.1. RWS

There are redundant Remote Work Stations with limited authority for control and monitoring at Rangapani Terminal.

D.3. PROCESS DESCRIPTION

Please refer to following:

- P&ID as given in APPENDIX- IV(F)
- The IO lists for this RT station as given at the end of this section as APPENDIX-III(F).
- Control philosophy of NSPL pipeline as mentioned in Section A.5 of Part I.

PART II

SECTION E

INTERMEDIATE PIGGING STATION

E.1 OVERVIEW OF INTERMEDIATE PIGGING STATION

E.2 SYNOPSYS OF INSTALLATION

E.3. EXISTING SYSTEM AT IP STATIONS

E.4 PROCESS DESCRIPTION

E.1. OVERVIEW OF INTERMEDIATE PIGGING STATION

Intermediate Pigging Stations (IP-1,2,3 &4) of the Product Pipeline are located at the existing Pump Stations at Sekoni-PS4, Noonmati-PS5, BongaigaonPS6 and MadarihatPS7 of the Crude Pipeline. At each of IP station there is a RTU which directly reports to SCADA servers of SMCS /ECS. Field Instruments are directly interfaced with RTU through TIC.

E.2. SYNOPSYS OF INSTALLATION

Each IP station has combination of plant which include Sump tank, Sump pump, Slop transfer pump Motorized Valves & Associated Pipework, SACDA equipments, Field Instrumentation, Communication system, Ancillary electrical, mechanical and electronic equipment. For local control and automation SCADA remote work station with RTU is being used.

E.2.1. EXISTING RTU AND HMI OF IP STATION

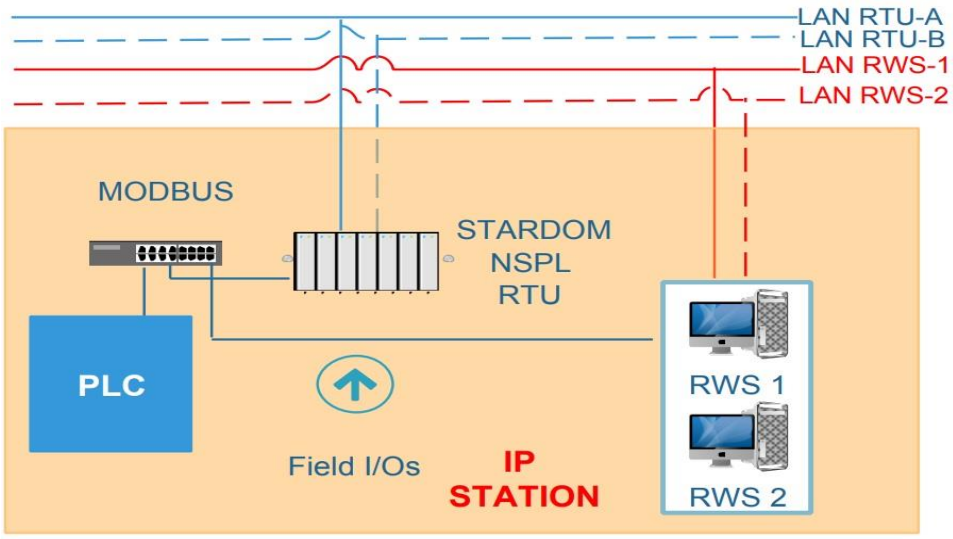


Fig 5

For local / remote control and monitoring, there is a RTU and RWS (Fig 5) in redundant mode at each of four IPs as a part of YIL SCADA system.

All process instruments are directly interfaced with RTU through TIC.

All logics and interlocks for local monitoring and control are implemented in the RTU.

PART II

SECTION E

For HMI, RWS is being used which directly communicates with SCADA servers installed at SMCS/ECS. The PLC shown in Fig 5 is being used for local HMI when there is a communication break between SMCS/ECS and local SCADA system at each of four IP stations.

E.3. PROCESS DESCRIPTION

Please refer to following:

- P&ID as given in APPENDIX- IV(B), IV(C), IV(D) and IV(E).
- The IO lists for this RT station as given at the end of this section as APPENDIX-III(B), III(C), III(D) and III(E).
- Control philosophy of NSPL pipeline is as mentioned in Section A.5 of Part I.

SECTIONALIZING VALVE STATION

CONTENT

PART II

SECTION F

F.1. OVERVIEW-SV-STATION

There are 9 Sectionalizing Valve Stations (SV-1,2,3,4,5,6,7,8 & 9) of the Product Pipeline and are located at the existing Repeater Stations at Kaziranga, Ghani, Jagiroad, Dharampur, Barpeta Road, Pratapkhata, Chepani, Binnaguri and Odlabari (RS-3, RS-4, RS-5, RS-8, RS-9, RS-10, RS-11, RS-12 and RS-13) of the Crude Pipeline.

F.2 REMOTE TERMINAL UNITS FOR SV STATION

At Sectionalizing valve stations, the installation is centered around motorized valves, scraper traps/ launchers/cathodic protection equipment, small capacity diesel generating sets and pressure transmitters for line pressure measurement and temperature transmitter for temperature measurement.

All SV stations are functionally same.

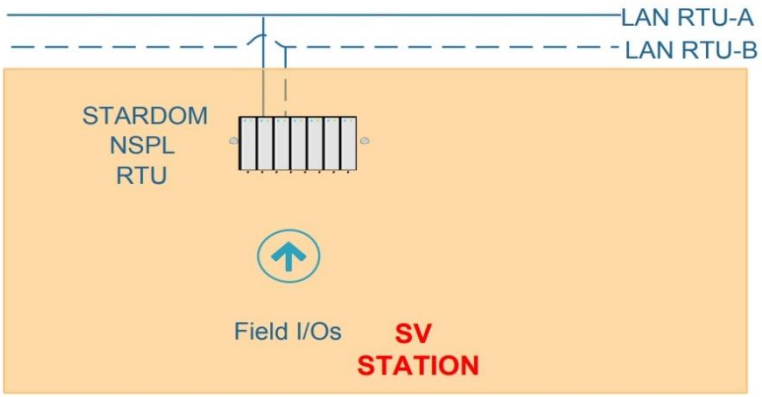


FIGURE 6

F.2.1EXISTING RTU & HMI OF SV STATION

For control and monitoring of process at SV station there is an RTU installed at each of SV stations. All process parameters (analog and digital) are directly connected to RTU. Local HMI for this process at SV station is achieved through discrete LEDs and push button, selector switch.

All inputs/outputs required for remote control and monitoring from the Master Station are being terminated in the RTU cabinet installed at each of 9(Nine) SV Stations.

F.2.2 PROCESS DESCRIPTION:

Please refer to following:

- P&ID given in APPENDIX- IV(G)
- The IO lists for SV station as given at the end of this section as APPENDIX-III(G)
- Control philosophy of NSPL pipeline as mentioned in Section A.5 of Part I.

PART II

SECTION G

APPS - PIPELINE APPLICATION SOFTWARE

CONTENT

APPS - PIPELINE APPLICATION SOFTWARE

G.1 INTRODUCTION

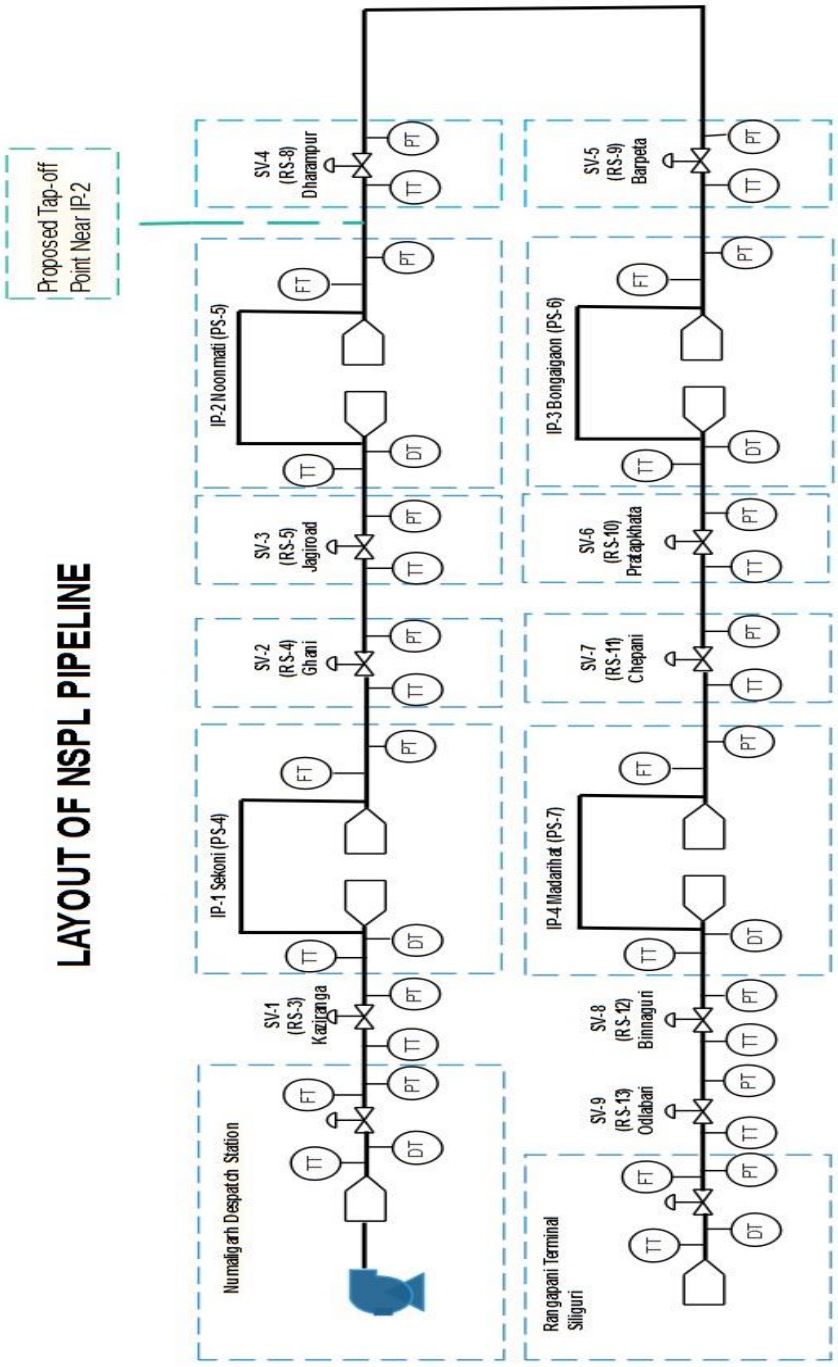


FIGURE 7

This section of the document defines the technical specifications for APPS (Leak Detection System and supplementary modules) in conjunction with the existing Supervisory Control and Data Acquisition (SCADA) System for monitoring and control of leak detection facilities for Numaligarh Siliguri Multiproduct Pipeline. Refer to Fig: 7, APPENDICES and other relevant documents of this tender for understanding of the requirement.

PART II

SECTION G

Specific data for this project being furnished as per following annexure, appendices & clauses

- Instruments data: As per Annexure-APPS-1.
- Pipeline Data: As per Annexure-APPS-2.
- List of APPENDICES
- Leak Detection criteria: As detailed in clause G.5.4

G.2 SCOPE OF WORK

Design, supply, installation and commissioning of APPS including Leak Detection System and other modules described elsewhere in this section shall be under the scope of this tender below but not limited to:

G.2.1 Design, supply, installation, testing and commissioning of Application Software (APPS) servers at Supervisory Master Control Station & Emergency Master Control Station as per tender requirement (including supply and installation) of all required hardware, engineering of the complete system, post installation support during warranty and annual maintenance contract, shall be under the scope of this tender.
The APPS system shall conform to the basic requirement of API RP 1130, 1149 & 1154.

G.2.2 The Leak Detection System (LDS) shall provide functionality specifically targeted to detect and locate leaks and thefts through the use of a real time leak detection system. The following key performance criteria will be used to determine the most suitable technology for this project:

- **Sensitivity:** minimum detectable leak size and the detection time of different leak sizes.
- **Reliability:** level of false alarms i.e. a leak alarm when no leak is present
- **Robustness:** ability to continue the detection of leaks during large operational changes when pumps/compressors are switched on or off, valves are opened or closed and also during data faults.
- **Accuracy:** leak rate and location error.

G.2.3. SYSTEM ARCHITECTURE

System Configuration

The proposed system shall have two APPS servers in dual redundant configuration i.e. one primary and the other is secondary as per standard practice. The primary server shall be installed at SMCS and the Secondary server shall be in the ECS. Both servers shall be connected through dedicated redundant communication channels which will be provided by OIL. The APPS system shall have five workstations / Remote work stations for dedicated APPS HMI and location of these shall be installed as shown in the Diagram.

The following tables Table A & Table B give configuration of SCADA and proposed APPS system

Table A

S. No.		Options	
1.	**Existing SCADA Configuration**		**Remarks**
a)	SCADA Master Control Station(SMCS)	Dual Servers	Quad Redundancy in SCADA Servers considering SMCS & ECS
b)	Emergency Master Control Station (ECS)	Dual Servers	
2.	**Proposed APPS configuration**		Dual redundancy in APPS Server considering SMCS & ECS
a)	SCADA Master Control Station(SMCS)	Single Server	
b)	Emergency Control station Station(ECS)	Single Server	

(i) Database of APPS servers at SMCS and ECS shall be online synchronized at regular intervals without operator intervention.

(ii) Under normal conditions, the application servers shall communicate with the online SCADA server. However, APPS functionality shall be achieved through the main APPS server at the SMCS primarily.

(iii) The APPS servers shall have the total responsibility of the entire pipeline system and shall send alarms and messages to SCADA system / operator work stations.

G.2.4 SYSTEM DESIGN COVERING FUTURE EXPANSION

The APPS system shall be adequate to accommodate 50% future expansion (without adding any hardware to the SMCS, ECS to APPS Servers) w.r.t additional pipeline facilities viz. expansion of RTUs, additional Operator workstations, additional RTUs to take care of pipeline expansion, without affecting the various system performance parameters as per this specification.

PART II

SECTION G

Note:

Data need to be transferred to SCADA system for monitoring of all legs/sections simultaneously in SCADA HMI both for dynamic and shut in condition for the following:

- Alarm status
- Leak size
- Leak location
- Watchdog

2. Servers Communication preferences

Table B

S. No	Scenario		Applicable
1	**Normal Scenario**		
a)	SMCS primary APPS Server	SMCS primary SCADA Server	Yes
b)	ECS APPS Server	SMCS primary APPS Server	Yes
2	**Failure of SMCS primary APPS Server**		
a)	ECS APPS Server	SMCS primary SCADA Server	Yes
3	**Failure of SMCS Primary SCADA Server**		
a)	SMCS primary APPS Server	SMCS secondary SCADA Server	Yes
b)	ECS APPS Server	SMCS primary APPS Server	Yes
4	**Failure of both SMCS SCADA Servers**		
a)	SMCS primary APPS Server	ECS SCADA Server	Yes
b)	ECS APPS Server	SMCS primary APPS Server	Yes

1. The changeover to back up server shall be seamless without any break in the operation and without the requirement of any operator intervention. On the restoration of the communication and main server getting available, the APPS server at SMCS shall have the priority.
2. In case of failure of communication link between the SMCS & ECS, complete data synchronization between, the two APPS Server will take place on the priority upon restoration of the communication link.

G.3. LEAK DETECTION METHODS

The offered solution shall be based on either of the following methods:

a) Real Time Transient Modeling (RTTM)

b) Real Time Statistical Analysis (RTSA)

The bidder shall be responsible for selection of the LDS model to meet the purchaser's specifications. In case the model is required to be changed at a later stage, to meet the purchaser's specifications, the same shall be done by the bidder without any price and delivery implications to OIL.

G.3.1 Leak Detection and Location - General Requirements

1. LDS shall be designed to be independent of SCADA system hardware and software, the LDS shall be provided with the tools necessary to access real-time data from the SCADA system as required for running the LDS and for transferring the LDS results and alarms back to the SCADA system.
2. LDS software shall run on dedicated APPS servers.
3. LDS shall be easy to configure, implement, operate and maintain with online tuning and maintenance tuning functions.
4. LDS shall provide input screen/facility to define conditions at system start up and on recovery of the LDS computer and LDS system where the LDS parameters can be modified if necessary.
5. The APPS system shall be easy to configure, implement, operate & maintain with on line tuning and maintenance tuning (operational & seasonal variations) functions.
6. APPS system shall provide input screen/ facility to define conditions at system start up and on recovery of the APPS computer & APPS system where in default fluid positions in the pipeline can be modified, so that the profiles & leak detection system can take care of modified pipeline configuration.
7. Complete APPS MMI functionality with dedicated Operator & Engineer displays shall be provided by the APPS server. Leak detection alarms, other important APPS modules events shall also be passed on from APPS server to active SCADA server through LAN

for display in SCADA MMI.

8. The change in fluid inventory due to line pack changes shall include the effects of pressure and temperature changes on the pipe and fluid itself and shall be taken from the calculations of APPS model. The method shall utilize the computation of density along the pipeline taking into account pressure & temperature profiles and adjusting for inventory changes due to transient operational conditions from the APPS model, thereby providing accurate line-fill calculation & inventory changes under pipeline operational conditions.
9. The temperature changes caused at dispatch terminal/pump/ compressors station shall be transferred down the pipeline from each pipeline modeling segment to the next segment with the model compensating for pipe wall expansion, elevation changes & heat losses and provide the APPS model with the basis to track temperature changes and also calculate their dissipation due to conduction to the ground over the length of the pipeline.
10. The model shall have a tuning permitting automatic on line tuning, manual tuning and maintenance tuning functions.
11. To take advantage of the improved response time & sensitivity, the multiple averaging periods shall be utilized using different averaging periods & leak detection thresholds corresponding to different sub-networks of the pipeline and corresponding to different flow ranges. The long term model compensated mass balance to give high sensitivity to small leaks (normally to detect small seeping type leaks) and the short term model compensated mass balance to give fast response for large leaks with the other medium term model compensated mass balance averaging periods shall give results in between the short term & long term mass balance.
12. On occurrence of leak, the deviations between the computed and measured flow/pressure data becomes large and exceeds the threshold, indicating the possibility of leak and the corresponding leak responses will be generated. The weightage algorithm shall be used for integrating multiple leak responses to declare confirmed leak alarm.

13. Confirmed leak alarm shall also have the leak detection time, leak location (in Km) and leak size.
14. Subsequent to generation of leak detection responses (and building the responses towards fulfillment of weightage criteria of leak detection), the leak location algorithm will become active, to indicate the location of leak for confirmed leak alarm.
15. In the leak location process, simulations shall be performed by logically placing leaks at various positions in the network and the resultant generated profiles compared against the current real time profiles and selecting the leak location with the highest probability and with best comparison fit.
16. Leak sizing algorithm shall be executed, in conjunction with leak detection & location algorithm to serve as an indicator of order of magnitude of leak size to be declared as part of confirmed leak alarm.
17. The leak detection system shall detect leaks under flowing (various flowing condition) with scenarios for valve opening /closing, pump start/ stop etc and under shut-in conditions, when the pumps have stopped and/or the valves are closed. The pressure/ temperature available at each end of the pipeline shut in segment shall be used for shut in leak detection (For project specific instruments availability vendor shall refer P&IDs enclosed with this requisition).
18. The system shall automatically detect current shut in sections within the pipeline. The system shall provide thermal modeling and shall account for heating or cooling of the fluid by ambient environment, pipeline wall thickness and due to changes in operating pressure. The module shall permit the detection of leaks in multiple shut in sections.
19. The method shall be retrospective method in the sense that a calculation of flow imbalance shall be continuously carried out and the leak above the detectable limit will not be missed.
20. The APPS sub vendor will tune the thresholds and filters at site after compiling/ studying the data of rate of change of flows to prevent false alarms.
21. Further the data pre-processing & Instrument drift analysis functions available as part of APPS model shall filter out noise, bad data & unwanted effects and together with dynamic inventory calculations available from APPS model shall make the model compensated mass balance Leak detection to be more reliable, sensitive and robust.

PART II

SECTION G

22. The properly configured and tuned APPS modeling enveloping mass balance leak detection system shall provide the best compromise of all the four performance indices of Reliability, Sensitivity, Accuracy and Robustness. The priority being reliability followed by sensitivity, accuracy and robustness.
23. It shall have all the following necessary features, mechanisms and safeguards to prevent false leak alarms: Perform data validation in each execution cycle to alarm and filter out bad/noisy/ unreasonable data and previous good/ default calculated values to be used, so that the efficiency of leak detection system does not get impaired.
24. Model tuning and adjustment of system parameters shall be applied, as part of leak detection. To minimize non-zero discrepancies resulting from causes other than leaks such as instrument static errors, timing skew errors etc to result in improved sensitivity of leak detection system ensuring that the accuracy of calculations becomes dependent only on the repeatability of measurements other than on absolute accuracy.
25. The instrument monitoring function with drift analysis shall be carried out as part of APPS model execution for monitoring the performance of instruments used in leak detection and detecting their deviations from normal operating parameters and taking corrective action for reducing the effect of the same. The data validation coupled with instrument drift analysis shall prevent false leak alarms generation upon instrument failures, instrument errors, change in calibration data etc.
26. As part of tuning process during installation phase, adjustments shall be made to the configuration parameters & algorithm parameters using real time pipeline operational measurements data to compensate for the uncertainties in pipeline system data and measurements data resulting in more accurate and reliable implementation. The pipe roughness factor and ambient temperature around the pipeline shall be tuned for each section of the pipeline in reference to the operating data in order to improve leak detection system accuracy while maintaining system stability.
27. The leak detection system shall have built in mechanism not only to detect the leaks reliably but also discriminate against other events that are not leak. So the flow transients shall be easily accounted for in the Leak detection system and false alarm

generation shall be prevented due to accurate prediction of all the effects of transient flows, product properties changes etc. in the APPS model.

28. The leak detection system shall accurately track the pressure transients caused by pump/ compressors start/stop, valves open/close, operating set point changes, pigging operation, in order that these transients do not cause false alarm and do not inhibit the sensitivity to leaks. The leak detection system shall employ sensitive leak detection algorithm during steady state operation and shall switch to less sensitive leak detection thresholds (through automatic adjustment of leak detection thresholds) and other parameters when it senses transient operating conditions so that these transients can be taken care, thereby enhancing robustness of leak detection performance.
29. The proper leak detection thresholds shall be determined taking into account the instrumentation performance characteristics, time skew errors, modeling errors along with physical pipeline characteristics, operating range of the pipeline, product parameters, instruments & equipments locations to achieve field achievable leak detection performance.
30. The leak detection system shall use several thresholds and averaging times corresponding to different sections of the pipeline and also utilize multiple thresholds corresponding to different flow ranges for various leak responses to get the improved performance covering all pipeline operating conditions.
31. The instrumentation signals and leak detection thresholds, which meet all the above requirements to be finally used for leak detection. Sufficient time shall be given for development of proper leak responses and only when the leak responses are greater than the leak detection thresholds and remain so for specified time, ruling out the possibility of factors other than leak, shall then be subsequently used for leak detection algorithm.
32. Finally, multiple such leak responses shall be integrated through appropriate weightage factors (or voting algorithm), integrating the responses of multiple time windows averaging intervals with multiple levels of thresholds corresponding to different sections of the pipeline, for generation of confirmed leak alarm (with leak detection time, leak location and leak size), while preventing false alarm under both the steady state and transient operational states of the pipeline.

PART II

SECTION G

33. The APPS model shall support Supplementary Application Modules to enhance the pipelines operational aspects.
34. Complete LDS HMI functionality with dedicated authority assignment for operator and engineer administrator shall be provided by the LDS server. Leak alarms, other important LDS events shall also be passed on from LDS server to active SCADA server through a LAN for display in SCADA HMI.
35. LDS shall operate accurately and reliably under steady-state, transient, segmented, dynamic and shut-in operation of the pipeline.
36. The sensitivity level of the system should correspond to various states of operating conditions; the following three operating statuses is to be included:
    - Steady state
    - Small/Medium operational changes (e.g. increasing throughput gradually, control set point change)
    - Large operational changes (e.g. Pump starts, trips of pumping station, valve closures)
37. Leak detection system shall change the leak detection sensitivity level automatically as operational changes take place in the pipeline, including the presence of different density product along the pipeline.
38. No false alarm shall be generated by the LDS when operational changes occur.

    Both leak size and location estimates shall be provided after a leak alarm is generated:
    - The leak size estimate shall be reported to the SCADA HMI as soon as a leak alarm is generated. The estimate will be updated at each sample interval. The leak size shall be issued in the format: “Leak Size: …. (X) standard m3/h”.
    - Upon detection and generation of a leak alarm the LDS shall calculate a probable location for the leak. Location shall be identified as the estimated location downstream from a reference point. The location shall be identified in the format: “Leak location: …. (Z) km from the inlet”.
39. The leak detection results shall also be made available to the SCADA system for display using the SCADA GUI.

G.3.3 Field Instrumentation (Ref: Annexure-APPS-1)

1. LDS shall be capable of detecting leaks in the pipeline with the following minimum instrumentation requirements:
   - Flow, density, pressure, temperature measurements and MOV status at pumping station, intermediate pigging stations and receiving terminal.
   - Pressure, temperature measurements and MOV status at sectionalizing valve stations.
2. Additional and complementary instrumentation are also available, e.g. Pump and valve status etc. and LDS shall use it to improve leak detection and location.
3. The flow measurement data will be given as a standard volumetric flowrate. However, the system should have provision for both volumetric and mass flowrate, as we may go for mass flowmeter in the near future. Density measurement data shall also be used for LDS. As on date Density measurement only available at Numaligarh Despatch Terminal and Rangapani Terminal. However, in the near future there is a plan to install density meter at all Intermediate pigging stations.

G.3.4 Application Software (APPS)

1. The APPS system shall be reliable, field proven and state of the art. The offered APPS system shall be designed to be independent of SCADA system hardware and software and shall be provided with tools necessary to access real time data from the SCADA system as required for running the APPS and for transferring the APPS results and alarms back to the SCADA system through a LAN for display in the SCADA HMI. The APPS software shall be compatible to multiple SCADA software. The interface between SCADA and APPS should be based on OPC Client/Server architecture. As on date existing OPC is configured as server in the SCADA system for third party system.
2. APPS system shall be easy to configure, implement, operate & maintain with on line tuning and maintenance tuning (operational and seasonal variations) functions.
3. The prime objective of application software shall be to aid the dispatcher in making control decisions and to enable him to take optimal control actions while ensuring the safety and security of the pipeline network. The core of the system shall be linked to

data acquisition facility and provide for the acquisition of real-time process data from the SCADA System at regular intervals (5 sec max) and carry out pre-processing such as evaluating the credibility of the incoming data through a series of validity checks specifically designed for real-time pipeline modeling.

4. The APPS software shall develop profiles for different pipeline sections for known starting pressure, temperature and flow rate. In doing so the software shall take into account heat transfer to / from soil and Pipeline ID/WT changes and heating and cooling of the fluid due to the ambient environment. Pipeline data like diameter, thickness, length, depth, coat and wrap thickness and thermal conductivity shall be used for each pipeline section. Based on the operating data, parameters used in correlations shall be changed so that there is an agreement between the estimated and actual profiles.
5. As on date provision of DRA injection in the pipeline is not available. However, in near future DRA injection may be implemented. Hence at that time the APPS shall take care of this DRA injection i.e. the efficiency of the APPS shall not be affected by DRA injection at different stations of pipeline. The software shall take into account the effects of DRA injection at each station for particular batches or at particular times so that the accuracy and reliability of LDS functionalities are not affected.

   Bidder shall submit an undertaking for successful testing of the system with DRA injection within the warranty and PWMC period, whenever DRA injection is implemented.

   DRA tracking – I/O points and details required to configure and implement the module shall be shared once DRA injection is implemented and integrated with the NSPL SCADA
6. There is a plan to make a tap off point near IP2 Noonmati. In that scenario, there shall be modification in the configuration of proposed APPS. **Bidder shall quote separately for the same. The offered price shall be valid for 1(one) year from the date of bid opening and this price shall be considered for bid evaluation. OIL may consider the above modification and will amend the PO for the said job within the offer validity.**

7. The APPS software shall preferably have self-diagnostic features to tell which model is not working up to the full efficiency.
8. In case of failure of any instrument such as pressure transmitter, temperature transmitter, flow meter etc. in some section the module shall work with limited accuracy in that particular section. However, if other instrument available which can be used as an alternative in such cases the same is to be mapped in APPS database and system shall work without affecting accuracy.
9. Due care to be taken so that failure or change in calibration of any field instruments will not cause false alarms.
10. In case of a difference between the theoretical value at a point and the reading of instrument at that point for a prolonged period the system should be able to detect that the instrument is faulty and should be able to inform the same to the operator.
11. Offered APPS should be compatible with existing McAfee Antivirus software implemented in OIL's SCADA system. Regular Antivirus updates shall be done online. The same should not affect the performance of the system. The details of Antivirus package of OIL shall be shared during detailed engineering.
12. Maintenance support for APPS shall be available for minimum ten (10) years. Software vendor or its channel partner should have Operational Service support office in India.
13. The Server redundancy shall be monitored from dedicated GUI which shall be available in APPS SERVERS where the status in reference to ONLINE/HOT STANDY status, Synchronization status, watchdog etc. shall be available. The server status shall also be available in APPS HMIs and SCADA HMIs.
14. APPS HMIs shall have audible alarm options where alarm for leak alarms/warnings or events shall generate a tonal alarm.
15. Alarms/warnings shall be transferrable to SCADA HMI where the leak size, location and leg shall be clearly defined. Alarms/Warning for all Sections/legs considered for APPS shall simultaneously be transferable to SCADA HMIs without any limits.
16. At least one scan period for all legs in Dynamic, Shut-in and Theft unit shall be available in SCADA HMIs for monitoring and actual status of all these legs shall be available to be displayed in SCADA HMI as graphics showing the leak size, location and watchdog value.

PART II

SECTION G

17. SCADA/ APPS interface data interchange, APPS software execution including LDS model, leak detection, supplementary modules and updating on database shall be completed every 5 seconds.

G.3.4.1 SCADA/APPS INTERFACE

SCADA/ APPS interface shall be shall be latest, field proven and based on OPC interface with SCADA Servers via open connectivity provided by Ethernet / TCPIP. SCADA/ APPS interface shall fulfil the following requirements: -

a) The interface shall transfer data with time stamping & status information between SCADA & APPS and match data quality flags and codes, match data interchange transfer intervals/ frequencies, match execution cycles and prioritization of APPS modules to achieve the desired performance. Further interface shall accept all types of data including real and integer values between SCADA & APPS in both directions.

b) Time synchronization of APPS Server with SCADA Servers. RTUs time stamped data shall be used for SCADA and APPS database.

c) The interface to take care of continuous uninterrupted execution of APPS in case of switchover of active SCADA Server to standby SCADA server, LAN switchover, switchover of channels, link/ channel failure / communication switchover without any loss of performance & functionality.

d) The interface shall properly handle data confidence attributes/ data quality tags, perform operational checks (e.g. to ignore transmitter values which gets isolated at a result of valve closure), APPS software health status flags etc. to enhance the reliability of APPS execution.

e) The interface shall have enhanced bandwidth to permit all data changes (no filter to be used) to be transferred between SCADA & APPS within the time required for the execution of real time model.

f) The APPS shall continue to operate in the event of degraded inputs and have the facility for handling the reduced quality, outside the range data, bad data for number of scans by downgrading the status of data items and replacing with preset, last good values or calculated values as necessary.

g) APPS system to take care of automatic back-up of memory resident database every 10 minutes' interval (configurable). In order to take care of situation wherein there is a possibility of data corruption in the saved file due to abrupt termination of APPS processes (say on account of abrupt disconnection of power to APPS server) suitable mechanism shall be implemented to enable recovery of APPS database from earlier revision of saved file.

h) The critical APPS model execution results as indicated below shall be transferred from APPS to SCADA & built as a part of SCADA database for display in the integrated MMI for the purpose of integrated alarms/events trending and archiving: -

Leak status (confirmed leak detection with leak sizing & leak date & time, leak location
Pipeline efficiency alarms
Pipeline inventory values
Scraper tracking events
Pipeline integrity alarms
Instrument drifts with alarms and events
Alarms & Events pertaining to predictive modelling, survival time & look ahead modules
Alarms & events pertaining to Compressor Optimization module.
APPS modules execution status
APPS MMI

The APPS sub-vendor shall provide his own easy-to-use APPS MMI having user friendly standard displays, which shall be fully integrated with the APPS system to provide the purchaser benefits of ease of operational use, configuration and maintenance and smooth APPS upgradation to take care of pipeline expansion in future.

PART II

SECTION G

The APPS MMI shall provide APPS operational displays and also APPS engineering & configuration displays for maintaining of the system, trouble shooting, etc. APPS MMI management, presentation & control functions of the entire pipeline shall be implemented on APPS server, which shall be also accessible from MMI workstations and Remote workstations in Client-server architecture. {Suitable triggering buttons/ soft keys shall be provided on MMI workstations and Remote workstations to access APPS MMI client}

APPS sub-vendor shall be fully responsible for implementation of SCADA/APPS interface and APPS MMI including all APPS displays, modelling profiles, modelling results, modelling configuration parameters pertaining to the thresholds/ filters/ weightage factors, APPS alarms/ events, APPS operator actions, etc.

Online configuration changes of leak threshold values, weightage factors, and inventory alarm limits, pipeline efficiency alarm limits etc. shall be permitted.

The APPS MMI shall include the standard displays for all the APPS modules, linked as a standard with the APPS configuration database including analog & digital pipeline real time data, profiles and all modelling parameters, which shall be easily configurable for project-specific requirements. The APPS displays shall include the following displays as a minimum: -
Profile displays - Pressure, flow, temperature, density, product properties (Viscosity, Celerity, velocity etc.), Pressure head profile superimposed on pipeline elevation profile, Pipeline Integrity profiles.

All modelling profiles shall use distance (in Km) as X-axis and various parameters as Y-axis. APPS sub-vendor shall ensure that APPS MMI be complete in all respects for displaying and printing the results of all the APPS modules and giving complete information for monitoring & control of APPS package. It shall be possible to display the values from the profiles for any point by pointing the cursor.

Leak detection displays – flow/ pressure imbalance alarms, leak detection, leak location, leak size, overall leak alarms, leak thresholds, base leak thresholds editor, weightage factors editor etc. Instrument drift analysis display and instrument drift maintenance scheduler Supplementary modules displays

G.3.5 Application Software Modules:

The following minimum modules shall constitute the Application Software:

1. Leak detection system suitable for dynamic and shut in condition
2. Leak Detection and Leak Location under dynamic condition
3. Shut-in Leak Detection & Leak Location
4. Theft detection, it should avoid false alarm.
5. Rupture detection
6. Pipeline transportation efficiency & scraper tracking/Pig tracking
7. Pipeline Integrity (over pressure / under pressure analysis) Function
8. Batch Tracking
9. Instrument health monitoring/Instrument drift analysis

G.3.5.1 Leak detection system suitable for dynamic and shut in condition

1. The dynamic real time module shall use the process data from SCADA as boundary conditions in order to track the actual pipeline operating conditions as closely as possible. Leak detection system shall be suitable for dynamic and shut in condition.
2. The software shall pre-process and validate the data to take care of any erroneous data, which may result in in-accurate modeling. The module shall be fine-tuned to meet the requirements of accuracy and processing time.
3. To improve the model accuracy and to truly represent the pipeline operations, parameters such as pipe roughness and ambient temperature shall be tuned for each section of the pipeline. The model shall take into account any transient conditions due to opening / closing of valves, change in operating set points, pigging operations so that these transients do not result in false alarms and do not inhibit the sensitivity to leaks.

4. The modeled profiles (pressure, temperature, flow and density) shall be continuously updated taking into account any operational changes, terminal flow / pressure requirements and variations in fluid characteristics etc. The real time model shall take into account the pipeline elevation profile and ground terrain changes.
5. Bidder to clearly indicate in detail any other specific requirement for performance of APPS, otherwise the description / drawings / instrument details / annexure here shall be taken as complete and shall be binding in terms of the Contract.

G.3.5.2 Leak Detection & Location under dynamic condition

1. Leak detection shall be accomplished by using validated relevant dynamic point database values in conjunction with pipeline real time model for detection, sizing and location of leaks.
2. The leak detection system shall be designed to take care of remote valve change (close/ open), the terminal flow requirement changes, pigging operation, other operational changes etc. by automatically raising the leak thresholds and preventing false alarms.
3. The leak detection shall operate accurately and reliably under static/ transient/ segmented / shut-in operation of the pipeline. The proposed leak detection techniques for implementation under this project are detailed as under:
    a) The modeled profiles (pressure, temperature, flow and density etc.) shall be updated continuously taking into account the valves and pumps/compressors operational changes and the terminals flow/pressure/temperature, tracking product temperature as the product moves through the pipeline along with variations in fluid properties, varying friction factors and heat loss to the ambience. The real time model shall take into account the pipeline elevation profile and ground terrain changes as part of modeling. Even if one pressure or temperature signal fails at the telemetered location, the LDS shall utilize the other available pressure or temperature instruments without any loss of performance.
    b) The data necessary for accurate transient hydraulic calculations shall include pipe lengths, diameters, wall thickness, route topology, elevation changes

along the pipeline, product properties, pipeline operating conditions, pipeline roughness, pumps/compressors, valves and equipment, chainages, instrumentation data, properties of the pipeline and insulation material, soil conductivity, ambient temperature and pipeline heat transfer co-efficient etc. The requisite inputs shall be finalized during detailed engineering.

c) Change in pipeline inventory shall include the effects of pressure and temperature and density changes on the pipe and fluid itself and shall be taken from the calculations of the APPS model. The method shall utilize the computation of density along the pipeline taking into account pressure and temperature profiles and adjusting for inventory changes due to transient operational conditions from the APPS model, thereby providing accurate line-fill calculation and inventory changes under pipeline operational conditions.

d) To improve response time and sensitivity, the LDS shall include different detection time for different leak sizes and different settings corresponding to different sub- networks of the pipeline. The long detection time covers high sensitivity for small leaks and the short detection time gives fast response for large leaks with the other medium time covering leaks between the small and large ones.

e) Necessary precautions to be taken for inhibiting false alarms automatically due to start and stop of pumps, surge conditions, transients, line packing and unpacking conditions etc. of the pipeline.

f) The system shall automatically detect current shut-in sections within the pipeline. The system shall provide thermal modeling and shall account for heating or cooling of the fluid by ambient environment, pipeline wall thickness and changes in operating pressure. The LDS shall permit the detection of leaks in multiple shut in sections.

4. The system shall have provision for accurate and speedy leak detection for leaks of reasonable magnitude during operations and shut down condition of the respective sections of pipeline including transient conditions. Leak detection shall be done by dynamic model based techniques including static pressure testing facility (under shut down condition of pipeline section).

5. Properly configured and tuned LDS shall provide the best compromise of all four performance indices of reliability, sensitivity, and robustness. The priority being reliability followed by sensitivity, accuracy and robustness.
6. It shall have all the following necessary features, mechanisms and safeguards to prevent false leak alarms:
    a) Perform data validation in each execution cycle to alarm and filter out bad/noisy/unreasonable data.
    b) Model tuning and adjustment of system parameters shall be applied, as part of leak detection. To minimize the impact of instrument errors on the performance of leak detection system, state estimators such as Maximum Likelihood State Estimation shall be used.
    c) As part of tuning process during installation phase, adjustments shall be made to the configuration parameters and algorithm parameters using real time pipeline operational data to compensate for the uncertainties in pipeline system and measurement data in order to achieve more accurate and reliable implementation. The pipe roughness factor and ambient temperature around the pipeline shall be tuned for each section of the pipeline in reference to the operating data to improve leak detection system accuracy while maintaining system stability.
    d) The leak detection system shall have built in mechanism not only to detect the leaks reliably but also discriminate against other events that are not leaks. Thus transient operations, pigging or control set point changes shall be accounted for in the leak detection system and false alarms shall be minimized.
    e) The proper leak detection thresholds shall be determined taking into account the instrumentation performance characteristics, time skew errors, modeling errors along with physical pipeline characteristics, operating range of the pipeline, product parameters, instruments and equipment locations to achieve the best possible leak detection performance.

7. The leak detection program shall run between different sections of the pipeline. All the

leak detection program shall run independently for each of the sections and any of the section program can be inhibited without affecting the performance of the other section.

8. Techniques shall be implemented to prevent false leak alarms. Pattern recognition method can also be applied to check how the flow and pressure change relative to each other such that an operational change or data fault will not generate a leak alarm.

G.3.5.3 Shut-In Leak Detection and leak location

Shut-in leak detection model shall look for shut-in sections of the pipeline for static portions of the network during each poll from SCADA. This model shall use pressure and temperature available from the shut-in section. Based on the difference between the mass/volume of the shut-in section at the base time and current time leak alarms shall be generated. The model shall also detect leaks in multiple shut-in sections. Location of leak shall also be indicated by the software.

G.3.5.4 Theft detection: Avoid false alarm

Offered LDS system shall have separate theft detection feature to detect small and infrequent leaks up to 1% of normal flow rate.

G.3.5.5 Rupture detection

Offered LDS system shall able to detect pipeline rupture within 1-minute time.

G.3.5.6 Pipeline Transportation Efficiency Module

The module will calculate pipeline transportation efficiency by value for each section of pipeline by comparing frictional losses with respect to clean pipe losses. This will guide dispatcher to determine whether Scrapper should be run in corresponding section to increase pipeline transportation efficiency. Provision for low pipeline efficiency alarm should be available.

G.3.5.7 Pipeline Integrity (over pressure / under pressure analysis) Function

The modeled pressure profiles shall be superimposed on maximum allowable operating pressure and minimum allowable operating pressure to generate alarm to the operator indicating locations of possible over pressure / under pressure conditions and initiate necessary corrective actions.

G.3.5.8 Batch Tracking

PART II

SECTION G

1. The objective of batch tracking program is automatic tracking of the progress of different type of product batches through the pipeline. The progress of the product to be under the control of the master station.
2. The batch tracking program provides the operator with the estimated times of arrival (ETA) of the head of the product interface at different stations. This information is to be made available for display and the program raises an alarm if any of the calculated estimated time of arrival is 15 minutes or less.
3. The program also makes the current status of the pipeline with respect to batches & interfaces in progress and their content, volume and position available on display w.r.t. pipeline length and location in each section.
4. The ETA shall be dynamically calculated and to be displayed based on variation of flow, pressure etc. of the pipelines at different section. It shall be possible to edit batch length during delivery of batches at the originating station.
5. Interface Detection/ Composition Tracking: All the custody transfer manned stations and scrapper station shall be provided with interface detection with density metering facilities. SCADA system should access these data and process it for necessary display for the operator's convenience and these actual data may be utilized in the batch tracking program for correlating the actual arrival of the batch and the calculated value of the batch arrival by batch tracking program for further section of the pipeline. This module shall track the interface between different types of products of different density and batches & calculate the volume and size of the interface. It shall be notified through separate color code while the said interface is under progress.

G.3.5.9 Scrapper / Pig Tracking Module

Pig / Scraper detectors are provided at originating station, intermediate pigging stations & terminal station. Pig tracking program shall be started whenever it receives 'pig launch' signal. The progress of the pig along the pipeline shall be calculated from the advancement of the flow in the pipeline. The program shall correlate the actual arrival time of the pig with the estimated position of the pig and synchronize the same for further estimation for indicating estimated time of arrival (ETA) of

pig at pump stations, scraper stations and delivery/ terminal station. This program shall run independently between any of the sections from launching barrel to receiving barrel of the section. The estimated time of arrival at certain mileposts on the pipeline network and at the receiver trap to be predicted accurately and accordingly alarm to be raised to the operator at least 15 minutes in advance.

G.3.5.10 Instrument health monitoring

This is employed to monitor the performance of instruments in use for APPS, for data reliability and, performance before use in APPS. It shall monitor the deviation of instrument value from its normal operating parameter. Corrective action if required will be taken to reduce the false alarms to increase the reliability of leak detection system. The health status of all instruments shall be available on APPS HMI for operator view.

G.4 DATA VALIDATION

G.4.1 LDS shall use techniques which depend upon the repeatability of measurements rather than absolute accuracy. In addition, the LDS shall have the capability to compensate for measurement inaccuracies and instrumentation drifts in leak detection. These corrections shall occur over a sufficiently long enough period not to mask leak conditions.

G.4.2 Data received from the SCADA system will have a quality tag attached indicating the status of the data, for example:

a) If the data received from the SCADA exceeds the instrument range, the data shall be identified as out of range.

b) If the data value has been manually overwritten by the SCADA operator, this shall be identified.

c) If the data is old because of a communication error, this shall be identified.

G.4.3 The LDS, from data validation algorithms, shall also make determinations on the quality of data received from SCADA. These validation algorithms will consider the

actual value of the data and compare it with other field data. Typical data faults caused by the field meters, telemetry or SCADA system should be detected and the fault information sent to the SCADA.

G.4.4 Where the data used in the LDS is of less than 100% quality, either as a result of the quality determination procedure in the SCADA system or LDS data validation, the LDS will increase the detection time of the system corresponding to the data fault and the number of faults at the same time.

G.4.5 When the LDS increases the detection time significantly due to bad or missing data, an event message shall be issued to the system operator.

G.4.6 To achieve the performance of system comprising functionality of all the recommended Application Software Modules as above, bidder shall offer Suitable System solution for Pipeline Application software. Bidder may also offer additional supporting modules to achieve/ improve the functionality as an offered solution.

G.4.7 Preparation of FDS

FDS shall be prepared for OIL NSPL pipeline for proposed APPS package to meet the specification. FDS shall be submitted within 30 days from the date of issue of LOA for approval from OIL. However, it is to be noted that the performance of the LDS shall be verified after SAT only and if any changes is required at that stage to meet the technical specification; same shall be carried out by vendor without any cost implication.

G.5 LEAK DETECTION TUNING AND CALCULATIONS CRITERIA

G.5.1 LEAK SENSITIVITY STUDY

The properly configured and tuned APPS software enveloping leak detection system shall provide the best compromise of all the four performance indices of Reliability, Sensitivity, Accuracy and Robustness.

The priority being reliability followed by sensitivity, accuracy and robustness.

It shall have all the following necessary features, mechanisms and safeguards to prevent false leak alarms:

Perform data validation in each execution cycle to alarm and filter out bad/ noisy/ unreasonable data and previous good/ default calculated values to be used, so that the efficiency of leak detection system does not get impaired.

Model tuning and adjustment of system parameters shall be applied, as part of leak detection. To minimize non-zero discrepancies resulting from causes other than leaks such as instrument static errors, timing skew errors etc. to result in improved sensitivity of leak detection system ensuring that the accuracy of calculations becomes dependent only on the repeatability of measurements other than on absolute accuracy.

The instrument monitoring function with drift analysis shall be carried out as part of APPS model execution for monitoring the performance of instruments used in leak detection and detecting their deviations from normal operating parameters and taking corrective action for reducing the effect of the same. The data validation coupled with instrument drift analysis shall prevent false leak alarms generation upon instrument failures, instrument errors, change in calibration data etc.

As part of tuning process during installation phase, adjustments shall be made to the configuration parameters & algorithm parameters using real time pipeline operational measurements data to compensate for the uncertainties in pipeline system data and measurements data resulting in more accurate and reliable implementation. The pipe roughness factor and ambient temperature around the pipeline shall be tuned for each section of the pipeline in reference to the operating data in order to improve leak detection system accuracy while maintaining system stability.

The leak detection system shall have built in mechanism not only to detect the leaks reliably but also discriminate against other events that are not leak. So the flow transients shall be easily accounted for in the Leak detection system and false alarm generation shall be prevented due to accurate prediction of all the effects of transient flows, product properties changes etc.

The leak detection system shall accurately track the pressure transients caused by pump/ compressors start/stop, valves open/close, operating set point changes, pigging operation, in order that these transients do not cause false alarm and do not inhibit the sensitivity to leaks. The leak

detection system shall employ sensitive leak detection algorithm during steady state operation and shall switch to less sensitive leak detection thresholds (through automatic adjustment of leak detection thresholds) and other parameters when it senses transient operating conditions so that these transients can be taken care, thereby enhancing robustness of leak detection performance.

The proper leak detection thresholds shall be determined taking into account the instrumentation performance characteristics, time skew errors, modeling errors along with physical pipeline characteristics, operating range of the pipeline, product parameters, instruments & equipment locations to achieve field achievable leak detection performance.

The leak detection system shall use several thresholds and averaging times corresponding to different sections of the pipeline and also utilize multiple thresholds corresponding to different flow ranges for various leak responses to get the improved performance covering all pipeline operating conditions.

The instrumentation signals and leak detection thresholds, which meet all the above requirements to be finally used for leak detection. Sufficient time shall be given for development of proper leak responses and only when the leak responses are greater than the leak detection thresholds and remain so for specified time, ruling out the possibility of factors other than leak, shall then be subsequently used for leak detection algorithm.

Finally, multiple such leak responses shall be integrated through appropriate weightage factors (or voting algorithm), integrating the responses of multiple time windows averaging intervals with multiple levels of thresholds corresponding to different sections of the pipeline, for generation of confirmed leak alarm (with leak detection time, leak location and leak size), while preventing false alarm under both the steady state and transient operational states of the pipeline.

The APPS model shall support Supplementary Application Modules to enhance the pipelines operational aspects

The details of the pipeline topology, pipe thickness/ elevation profile, instrumentation characteristics, pipelines data operating conditions, product data etc. for complete pipeline shall

be taken into account in the Leak sensitivity study. APPS sub-vendor shall carry out the Leak sensitivity study, after award of contract and submit the report in support of fulfillment of Leak detection criteria as per clause G.5.4 and showing improvement figures (as applicable) and take care of the corresponding leak thresholds, weightage factors, filters time-periods etc. as part of APPS configuration & implementation.

As part of this project vendor shall carry our leak sensitivity study and submit the detailed report regarding best achievable leak detection figures like leak detection time, leak size and location as part of Functional Design Specifications & detailed design activity as per the table 1, 2 & 3 and chart 1.

G.5.2 The scope of Leak Sensitivity Study (LSS) covering all the phases of the project shall be as follows: -

a) To study the complete pipeline network with all the data furnished with respect to Pipeline Process, Pipeline Engineering and Instrumentation and furnish the leak sensitivity study report with optimal determination of various thresholds and averaging times (filters) for fulfillment of leak detection target figures (enclosed as Attachment to the MR) and showing improvement figures. Identification of the best field achievable target figures for leak size, leak location and leak detection time with the available instrumentation in the pipeline P&IDs, while preventing false alarms.

b) The APPS package based on methodology be studied considering various pipeline sections and boundary measurements in conjunction with various test cases and the results furnished to support the fulfillment of the leak detection target figures.

c) Steady State Operation to be studied shall include all the product configurations in the pipeline.

d) Leak Sensitivity Study shall have chapter for handling of all the Transients (valves open/ close, pump/ compressors units start/ stop, pigging operation, set-point changes etc.). The detailed implementation of tracking of these transients & algorithms for raising

the leak thresholds and the corresponding levels thereof and subsequently bringing them back to normal etc. as part of leak detection system be highlighted separately for each of the above transients.

e) Shut-in operation to be studied shall include no flow condition on account of closure of valves and pump/ compressors stations on pipeline sections. All pipeline sub-sections along with complete pipeline sections shall be studied.

f) The optimal leak detection system parameter configuration of the leak detection system be studied and furnished as part of the report taking into account realistic field existing conditions, so that the results of the study are field reproducible while preventing false alarms. The LSS results for optimal determination of various leak thresholds & averaging times (filters) & associated results of analysis, associated APPS parameters configuration need be indicated corresponding to each pipeline section/ sub-section along with process conditions need to be furnished. The parameters to be finalized & furnished shall cover the following:

1. Weightage factors for integrating various leak responses
2. Leak threshold values correlating with different averaging periods for each pipeline sub-section.

g) APPS vendor shall study all the test cases and furnish the results in the attached table formats and plots for all the pipeline sections & sub-sections. The results will also be analyzed with write-up in detailed manner regarding leak detection through APPS modeling, mass balance and shut-in leak detection correlating with pipeline sub-section and test cases.

The Leak sensitivity analysis test environment shall be as described below: -

a) In order that leak sensitivity analysis for leak detection system produces correct realistic and field reproducible results, it is important that the test environment shall analyze the simulation conditions pertaining to the worst case location, various test cases and take into account the instruments inaccuracies, modeling errors and timing skew errors.

b) The SCADA vendor/APPS sub-vendor is required to generate real time model of the pipeline network complete in all respects including all network components, pipes, valves, pumps/ compressors, measurands, indicators, internal variables, profiles, control objects, process objects etc., based on data provided regarding pipeline process design and pipeline engineering, so that realistic & field representative Leak sensitivity study can be carried out and leak detection system can be implemented.

c) In the test environment for APPS modeling enveloping mass balance leak detection methodology, two distinct models need to be configured as per the attached Leak sensitivity study flow Chart. The one model pertaining to Dynamic pipeline leak configuration model with SCADA simulator and the other model pertain to APPS model enveloping mass balance leak detection. The dynamic simulator model shall also be used during Factory acceptance testing to test the result of leak sensitivity study. The leak configuration model for testing purposes shall be supplied data through SCADA simulator which uses the configuration that would be exact copy of the real time configuration with addition of external regulators at the worst leak points determined by the Vendor/ APPS sub-vendor. The leaks (each time) to be modeled should be introduced after the system is fully stabilized.

d) The data used by the SCADA simulator are the model generated values at the locations where the RTUs are placed after taking into account the scanning of RTUs over communication channels. This is to take into account time delay of APPS data pre-processing and application run with respect to data reception and sampling interval deviation with respect to fixed cycle, differences in time delay between individual measurements etc. The field system simulation gets complete once the simulated field instrument data and boundary conditions set is put into SCADA buffer.

e) Upon completion of the update or refresh of the SCADA buffer the other model pertaining to

PART II

SECTION G

APPS modeling enveloping mass balance leak detection system is started. The additional external regulators in the leak configuration are unknown to the APPS model. Therefore, when a leak is started at the leak external regulator, its effect at measurement points are provided to the APPS model. In this way the APPS model shall respond to the simulated leak in the exactly same manner as it would in the field. The flow rate in the leak simulator on the SCADA simulator leak configuration model can be changed and leak responses generated with respect to leak size, time, location accuracy etc. The APPS model configuration settings with respect to leak thresholds, filters, time periods can be changed and selected for optimal leak detection system performance.

G.5.3 Bidder shall clearly indicate the size of the smallest detectable leak in the pipeline and accuracy in locating the same (minimally as defined below) with respect to the time and shall be binding upon the bidder. The leak detection system shall be designed in such a way that under normal operating conditions the uncertainty in the receipt and delivery values used in the mass/ volume balance calculation including uncertainties attributable to processing, transmission and operational practices shall not exceed 5% per five minutes, 2% per week and 1% per month of the sum of the actual receipts and deliveries. Also Bidder to recommend accuracy & repeatability limits (if better than specified in the data sheets) of various field instrumentation, which shall guarantee accuracy of leak detection and location.

Leak Sensitivity study for test cases shall be furnished as per the tables mentioned below:

Table :1

Sl No	Leak Size in % of flow Rate	Leak Location Accuracy	Time to detect confirmed leak	Pipeline Condition
1	1%			Steady State condition
2	2%			
3	5%			
4	10%			
5	20%			
6	60%			

Table :2

Leak detection results table for all pipeline modelling sections

Name of the pipeline section:
Test case:

Sl No	Actual Leak size & Location simulated in the Pipeline Section		Model Response				
	Leak Size	Actual Leak position (Km)	Identification of individual leak responses and their corresponding time in minutes	Time to detect confirmed leak alarm (when weightage criteria fulfilled) (minutes) (X)	Leak size determined at the time of confirmed leak alarm (under „X")	Leak location algorithm accurate results for leak location (km) (Y)	Corresponding time for determination of leak location (under „Y") (minutes)
1	Leak size as per leak detection criteria)			*(To be within the time period indicated in leak detection criteria)*		*(to meet the leak location error as per leak detection criteria)*	*(To be within the time period indicated in leak detection criteria)*
2	(Leak size equivalent to 1% flow rate)						
3	(Minimum leak size which can be detected)						

Notes:

1. Test cases separately for all pipeline sub-sections & phases of the pipelines operation shall be considered and above table shall be furnished corresponding to each of the test case for each pipeline modelling section.

2. The leak size as per leak detection criteria shall be considered in these tables (S. No. 1). Further the results identifying the minimum leak size which can be detected with the available instrumentation shall be furnished (S. No. 2)

3. The actual leak position to be considered shall be such that it represents the most difficult leak position for the corresponding pipeline section (so that leak at any other location within the same pipeline section could be detected faster than it).

4. All the timings (in minutes) indicated shall have common reference i.e. with reference from start of the leak in the pipeline.

Table: 3

Leak Detection under Shut-in conditions results table for all pipeline sections

Name of the pipeline section:

Test Case:

Sl No	Leak Size in the Pipeline shut in sub-section	Shut in leak detection time (minutes) and Leak position (Km)		
	Leak size	Shortest sub-section in the corresponding pipeline section	Longest sub-section in the corresponding pipeline section	Complete corresponding pipeline section
1	(Leak size as per leak detection criteria**)**			
2	(Leak size equivalent to 1% flow rate)			
3	(8 mm hole size leak)			
4	Smallest leak size detectable)			

Notes:
1. Test cases separately for all pipeline sub-sections (after identifying the same) & phases shall be furnished.

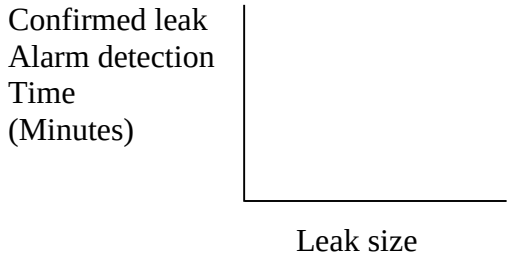
2. The shut in mass/ volume for all pipeline sub-sections and pipeline sections shall be furnished. The configurable setting of temperature change (in °C) for re-calculation of reference mass shall be furnished.

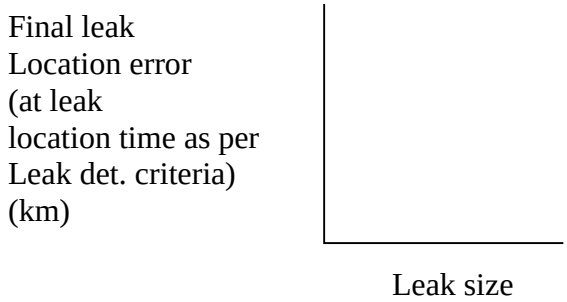
3. All the timings (in minutes) indicated in the above table shall have common reference i.e. with reference to start of the leak in the pipeline after the pipeline sub-section, section has reached shut in condition.

Chart 1

Leak detection & location results plots (various leak sizes)

Name of the pipeline section: [All pipeline sections to be included]
Test case:





Notes:

(1) The above plots shall be furnished for all pipeline sections & phases considering the various leak sizes (and including the leak size as per leak detection criteria. However, leak is to be considered at the most difficult leak position in line with table 1.

(2) Leak location error (in km) is the difference (in absolute) between the actual leak position and calculated leak position by the model.

G.5.4 Leak Detection Criteria

In order to achieve overall objective of performing leak detection and location under various conditions of the pipeline, the methodology of leak detection based on RTTM/RTSA modeling has been envisaged. The minimum leak detection criteria for this project shall be as indicated below

i. Detection of 2.0% leak of rated flow rate in pipeline within 30 minutes' duration or better and with a leak location accuracy of +/- 3.0 Km or better.

ii. Leak detection system should cater to all sections/ subsections of the pipeline irrespective of different products in the pipeline.

iii. Leak detection system should cater to shut in condition of the section/sub-section of pipeline as well.

G.5.5 APPS MMI & REPORTS

The APPS MMI shall include the following displays as minimum:

1. Profile displays – Pressure, flow, temperature, product properties etc and the displayed process profiles shall allow to export/save the trend.
2. Leak detection displays – flow imbalance alarms, pressure imbalance alarms, leak location, overall leak alarms, leak thresholds, base leak threshold editor etc
3. Display for all modules.
4. Instrument health display.
5. Pipeline overall status display.
6. Alarm and event display.
7. Real time and historical trending for at least 3 months.
8. Display for configuration and management of APPS.
9. APPS reports.
10. Task bar shall be disabled and other windows application shall not be accessible to operator login in APPS HMI.

The APPS reports shall include the following reports as minimum:

1. Modeling reports with measured and calculated data averages (daily reports)
2. Leak detection reports for various responses, filters, thresholds etc (daily and on demand) under all conditions.
3. Events available in database shall be printable or saved in pdf format with selectable time period both from LDS Server and LDS HMIs
4. All shifts and daily APPS reports-shall be configurable as per requirement, which are scheduled to be generated automatically at predefined time, shall be automatically stored on hard disk and printed (if "Report Printing" option is enable). User shall be able to enable

or disable the “Report Printing” option.

G.5.5.1 APPS configuration

Graphical configuration editor shall be supplied with the system. It should facilitate editing, addition or deletion of addition or deletion of supply/ delivery points/ pump units/ station, change in properties, change of instrumentation, change in threshold, create new and edit exiting network configuration with user friendly graphical editor.

G.5.5.2 Software Tuning

Software tuning shall also be applied as a part of leak detection software to minimize false leak alarms. These tuning techniques shall improve the sensitivity of Real Time Model by ensuring that the accuracy of calculations is dependent on repeatability of measurements rather than on absolute accuracy. Data validation shall be performed after each update to filter out erroneous data and default calculations shall be used so that the efficiency of on line modeling system is not degraded.

G.5.5.3 Software Module Requirement

Contractor shall give the detailed estimate for memory requirement for main memory and hard disk memory to be supplied with the system considering a maximum of 50% loading. The system should not consume more than 50% of the memory without degrading the performance in case all possible interrupts occur simultaneously in the pipeline network. It is also required to furnish the details of the memory to be consumed by the respective S/W and the memory left for future use.

G.6. INSPECTION, INSTALLATION AND COMMISSIONING

G.6.1 Inspection

1. All factory tests will be witnessed by Client/ Clients representative.
2. Client/ Clients representative shall have free entry and access at all phases of the project to parts of APPS vendor's facilities associated with manufacturing and testing of system.
3. APPS vendor shall invite Client/ Clients representative well in advance with minimum 1 months’ notice of the date at which the system is ready for testing.

4. The equipment will not be shipped before they have been officially released in the form of release notes by Client/ Clients representative.
5. APPS vendor shall provide Client/ Clients representative with all reasonable facilities necessary to determine compliance to the system specification.
6. APPS vendor to note that acceptance of the equipments and the system by Client/Clients representative or exemption of inspection & testing shall in no way absolve the APPS vendor of his responsibility to deliver the APPS system meeting all the requirements specified in the specification. APPS vendor shall be responsible till the completion of the warranty, for any corrections/ modifications including supply and implementation of hardware & software to fulfill the requirements of the contract/ upgradation including supply and implementation of hardware & software to meet the functionality and performance of the contract.
7. APPS vendor & APPS sub-vendor personnel shall be actively involved during factory acceptance and site acceptance testing.

G.6.2 Testing

Testing shall include APPS systems of SMCS and ECS with HMI stations with application software system for other locations. The tests shall consist of:

- Pre-Factory Acceptance Test (Pre-FAT)
- Factory Acceptance Testing (FAT)
- Pre-Site Acceptance Test (Pre-SAT)
- Site Acceptance Testing (SAT)
- Trial run

APPS vendor shall submit to Client detailed test plans and procedures, one month prior to actual testing for all factory and site acceptance tests for review.

G.6.2.1 Pre-Fat

Pre-FAT shall be conducted for integrated APPS system based on the approved FAT document and the same shall be duly witnessed & cleared by the system engineering group (who has been

involved during the engineering phase of the project) of the APPS vendor. During the Pre-FAT testing phase, the APPS vendor shall check the system performance according to the requirements of the tender, FDS & other finalized engineering documents and furnishes the written undertaking of compliance to the Client in this regard, prior to offering the APPS system for FAT by OIL.

G.6.2.2 Factory Acceptance Testing (FAT)

1. The FAT document shall be prepared covering all hardware, software including application software and system functionalities including system expansion requirements of PR & FDS and submit it 1 month in advance for Client review.
2. Factory acceptance test will be done based on the stipulations in the approved FAT document, which shall completely fulfill the contract specifications and approved APPS documents. FAT of APPS system shall be conducted at the APPS Vendors Premises.
3. FAT shall cover the testing of the following:
   - Fully Integrated APPS System with vendors SCADA/OPC Server via simulation.
   - Fully Integrated APPS system with application software and associated Hardware
4. Testing shall systematically, fully and functionally test all the hardware and software in the presence of Client/ Clients representative to ascertain compliance with the contract document and approved FDS documents. TEST BED shall be prepared with all the equipment interconnected to actual configuration to perform the testing on total integrated APPS system.
5. Factory Acceptance Testing for application software shall be conducted by the APPS vendor by using APPS simulator utility.
6. The FAT environment shall allow testing of all functions of application software including the following on fully interactive basis:
   a) Data validation, filtering, Threshold setting, parameter tuning, loss of data/ instruments needing calibration or out of range.
   b) Performance testing of APPS package for leak detection/ location/ sizing under static/ transient/ segmented operation of P/L, shut-in leak detection testing. Testing w.r.t leak sensitivity analysis meeting the leak detection criteria.
   c) Supplementary application modules
   d) Configuration Editor functions for all functionalities.

PART II

SECTION G

MMI functions for display/control

a) Reports/logs
b) APPS/APPS interface testing
c) Switchover testing in respect of APPS servers, LAN, Communication switchover, various failovers and fail back and demonstrating no effect on APPS system execution.

G.6.2.3 Site Acceptance Testing (SAT)

1. The SAT document shall be prepared for integrated SCADA & APPS system and submit in 1 month in advance for Client review and approval.
2. SAT shall involve integrated testing of complete SCADA & APPS system. Site Acceptance Testing will be done based on the stipulations in the approved SAT document. Once the SCADA & APPS integrated SAT test is successfully performed, then the system would be ready for commencement of Trial run.
3. SAT for APPS system shall be done by actual field signals and integration with Telecom system has been carried out. SAT shall be conducted by the experienced system engineering group of the APPS vendor (earlier involved in system design, engineering, integration & FAT phase of the project).
4. Site Acceptance testing shall be based on Factory Acceptance testing but with live APPS data. The functionality of real leak testing shall be included by APPS vendor for APPS site acceptance testing, in order to demonstrate the fulfillment of PR requirements in the field.

G.6.2.4 TRIAL RUN

Test for continuous functional operation of the system with the required system reliability and availability. This test aims at keeping the complete APPS integrated system operation for a period of 21 days for all the 24 hours a day. Trial run of 21 days will commence on successful completion of integrated APPS system SAT.

In case of failure, the tests will be restarted taking into consideration all corrective measures by the vendor at their own cost till the system operates without failure of any system functionality for 21 days. Failure of tests shall be limited to such system failures which will affect system availability & reliability and shall not be dependent upon established failure of third party supplied items. **After the successful completion of Trial run, the PRE WARRANTY COMPLETION CERTIFICATE shall be issued by the CLIENT and thereafter Warranty phase will start**.

G.7. TEST REPORTS

The observations, exceptions and test results obtained during the various tests shall be documented and produced in the form of a report by the APPS vendor.

G.7.1 Failure of Components

a) A log of all failed hardware and software modules shall be maintained which shall give date and time of failure, description of the failed components & cards/ software along with designation, effect of failure on the system, cause of failure and number of hours of operation of the part before it failed.

b) Upon failure of the components/ cards/ modules, the same shall be replaced preferably by better graded components/cards. And the test shall be restarted from the beginning or the previous logical point as the case may be. If after this one replacement the unit of sub-system still fails to meet the specifications, the APPS vendor shall replace the complete unit or sub-system with the one that meets the requirements and restarts the test all over again.

G.7.2 At least one APPS vendor engineer fully conversant with the system hardware and software shall be present at SMCS during the entire period of Trial run.

G.7.3 All the APPS tests as per the approved documents shall be carried out at the APPS vendor's works and work sites of the Client at APPS vendor's cost. The APPS vendor shall provide assistance; instruments, labour and materials as are normally required for the examining, measuring and testing any workmanship as may be selected and required.

G.7.4 These tests will encompass all the material and equipment delivered and software pertaining to APPS system including the equipment and software supplied by APPS vendor. Pre-FAT report duly witnessed and cleared by APPS vendor shall be available during FAT phase.

G.7.5 If a unit or sub-system has failed during the test and is not repaired and made successfully operational or not replaced within few hours of active repair time after the failure, the test shall be suspended and restarted all over again only after the APPS vendor has placed the device back into acceptable operation. The client's approval shall be obtained for any allowable logistic time required to replace the failed component/sub-system. All cost for repair/ replacement of defective component/system shall be to APPS vendor's account.

G.7.6 The client shall be free to request any specific test on any equipment and the system considered necessary by him, although not listed in the testing documents to verify the compliance with the specifications.

G.7.7 Any statutory test/ inspection certificate, as may be required, under any law or directive issued by competent authority, shall be furnished by APPS vendor to the client.

G.7.8 Installation and commissioning:

The whole project is required to be completed on Turn-Key basis. All technical personnel assigned to the site by APPS vendor for installation and commissioning must be fully conversant with the specific system and its software packages, the field personnel shall have both hardware and software capabilities to bring the system online quickly and efficiently and with a minimum interference with other activities.

For carrying out commissioning of APPS servers, personnel shall visit all the locations namely SMCS PHQ and ECS Jorhat.

Installation and commissioning includes all activities as detailed in clauses including sub-clauses from G.6.2.3 to G.7.

G.7.9 **Force Majeure**

G.7.9.1Should any Force Majeure circumstances arise, each of the contracting party shall be excused for the non-fulfilment or for the delayed fulfilment of any of its contractual obligations, if the affected party within fifteen (07 days) of its occurrence informs the other party in writing.

G.7.9.2Force Majeure shall mean fires, floods, natural disasters or other acts, that are unanticipated or unforeseeable, and not brought about at the instance of the party claiming to be affected by such event, or which, if anticipated or foreseeable, could not be avoided or provided for, and which has caused the non- performance or delay in performance, such as war, turmoil, strikes, sabotage, explosions, quarantine restriction beyond the control of either party.

G.7.9.3A party claiming Force Majeure shall exercise reasonable diligence to seek to overcome the Force Majeure event and to mitigate the effects thereof on the performance of its obligations under this contract.

G.8 TRAINING

Bidder shall provide training on offered system including the following but not limited to:

- APPS Operation
- APPS database and HMI modification for addition/ deletion of node.
- Software maintenance functions
- Tuning functions

G.8.1. At OEM's Factory in India

Training at Vendor's manufacturing facilities for 1(one) batch comprising of maximum 5(five) personnel as per following: -

The training course covers the operation and maintenance of APPS system for the personnel responsible for maintenance of the system.

The course shall cover:

- Familiarization with APPS including: Detailed System Functionality, Metering, Data pre-processing, Product modeling, real time / predictive functions, System Hardware.
- Maintenance of APPS system including: Routine System Maintenance, System Back-up, Alarm Settings, System Management, Analysis and Trouble Shooting.

PART II

SECTION G

- Configuration/Modifications: overview of the steps to perform modifications to the pipeline system configuration and tuning parameters.
- The training shall include hands on experience on the system. The depth of the training required should be adequate enough to enable the Clients to carry out expansion of the system for any changes in the database & MMI/pipeline configuration and also to enable Clients' personnel to be self-sufficient for the maintenance of APPS system.
- Travel, transportation, boarding, lodging, living and personal expenses of Owner's personnel shall be borne by OIL.

G.8.2. AT SITE

G.8.2.1. The training shall include hands on experience on the system. The depth of the training required should be adequate enough to enable the Clients to carry out the following

- Expansion of the system for any changes in the database & MMI/pipeline configuration and also to enable Clients' personnel to be self-sufficient for the maintenance of APPS system.
- Operation and maintenance of the system. The course on operation of equipments shall include complete familiarization with actual operation of the equipment in the normal mode and also under abnormal operating conditions.

G.8.2.2. There shall be training for two batches at two locations namely at PHQ, Narangi and Numaligarh Despatch Terminal. The duration of training at each site shall be of three days and batch shall consist of 6(six) personnel.

G.8.2.3. Training schedule, in-house and site training aspects shall be mutually agreed between client and the APPS vendor. Vendor shall furnish tentative training schedule to M/s OIL for prior-approval.

G.8.2.4. Vendor shall, forty-five (45) days prior to start of training, send complete training program including details of each course, duration, subject matter, etc.

G.8.2.5. Owner/Engineer reserves their right to suggest any additions/deletion in the program, which shall be incorporated by the vendor at no additional cost.

G.8.2.6. Bidder to quote price separately for two locations viz. at factory and at site as mentioned in the price schedule

G.8.2.7. OIL will bear the expenditure pertaining to air ticket, daily allowance, hotel expenditure and local conveyance for the Client's personnel.

G.9 SCOPE OF WORK DURING WARRANTY AND POST WARRANTY COMPREHENSIVE AMC

G.9.1 Scope of work during warranty period and during post warranty Comprehensive Annual Maintenance Contract (PWMC) for APPS System including all hardware supplied under this tender.

G.9.2 APPS system (Software) is to be maintained during the PWMC period after completion of warranty period. OIL may decide to go for Annual Maintenance Contract for a period of five years after the warranty period is over. Charges for the Annual Maintenance Contract (AMC) for five years, after the warranty period is over, should be quoted with year-wise break up. These charges will be used for evaluation purposes only. The AMC requirements are mentioned below. However, the detailed and final scope for the AMC shall be as per contract of AMC at the time of awarding AMC contract. Performance Security @3 % of the order value. The original Performance Security of order will be returned only after submission and verification of AMC Performance Security for 3% of total AMC value valid up to AMC period plus 3 months (if there is no other claim). (Undertaking of acceptance to be uploaded with bid).

G.9.3 Vendor to provide APPS patch/performance updates time to time during the entire PWMC period. Any reconfiguration/ fine tuning required after installation of patches/ performance updates shall be part of PWMC.

G.9.4 Any software upgrade (APPS Package) if required in the system, to support the patches/ performance, updates of APPS shall be part of PWMC.

G.9.5 Any changes required to be done in APPS due to change in the pipeline instrumentation in existing Pumping Station, IP Stations, SV Stations and Receiving Terminal for addition/deletion of process instruments shall be under the scope of warranty/PWMC provided the pumping process remains the same.

e.g. addition of I/O points.

PART II

SECTION G

G.9.6 As a part of PWMC, APPS vendor (OEM person) shall visit in every 4(four) months to carry out preventive maintenance at SMCS, PHQ (Planned visit). Each visit shall be of minimum 2(two) day duration. The timing of visit shall be notified well in advance to OIL and only after confirmation by OIL, visit shall commence. The visiting personnel shall have experience of maintaining the system.

For this planned visit all expenses which include travel fare, local conveyance, food and lodging shall be in Vendor's scope.

G.9.7 For unplanned call/visit due to work exigencies (including breakdown) for operational requirement, OIL shall intimate the Vendor as and when required. The bidder personnel shall be available at site within 72 hours from the time of intimation by OIL and shall restore the system. **Bidder has to quote per day rate for such unplanned visit separately as mentioned in the price schedule. For this unplanned visit, transportation fare local conveyance, food and lodging shall be in Bidder's scope and the per diem quoted rate shall be inclusive of all**. **Per diem charges shall be payable from the day bidder's person reaches the site up to the day he leaves the site.**

No payment will be made for travel days/period.

In case bidder's representative takes leave, per diem charges for that day shall not be payable.

Working hours prevailing at site, normally 8 hours/day - Monday through Saturday and holidays as applicable to Purchaser's site personnel shall apply.

Tax(s) as per Government policy shall be deducted at source by Purchaser while making payments against each invoice.

5(five) days for unplanned visit per annum shall be considered for bid evaluation.

G.9.8 During these visits (planned and unplanned) the APPS vendor shall carry out the following in presence of OIL personnel but not limited to:

- Verification of active status and proper functionality of all the tasks of APPS servers
- Database backup.
- Monitoring of Data communication with SCADA Servers

- Monitoring of Data communication with all the clients in RWS locations
- Verification of batch tracking and line fill data.
- Verification of leak detection models and tuning of models to prevent false leak alarms and for better leak detection
- Verification of functionality of all the other modules
- Carrying out software modifications as per the requirement of operations team of M/s OIL
- Annual Leak test in coordination with operations team of M/S OIL.
- Carry out manual tuning of the APPS system if required.
- Rectification of any faults in the modules of the APPS system.

G.9.9 APPS vendor shall also assist OIL personnel during mandatory annual testing of leak detection by simulating a leak in mainline and / or station/MOV location. Any fine tuning required during this testing shall be carried out by the APPS vendor. These activities shall be done during planned quarterly visits or as a separate under breakdown/ call visit.

G.9.10 The PWMC shall be for five years from the date of end of warranty. Vendor has to quote as mentioned in the price schedule for the following:

- Quote for five years PWMC with year wise breakup.
- Per diem rate for visit to attend breakdown call as detailed in clause G.9.7.

The Quoted price for PWMC (including breakdown calls) shall be considered for bid evaluation.

G.9.11 APPS vendor shall also assist OIL personnel during mandatory annual testing of leak detection by simulating a leak in mainline and / or station/MOV location. Any fine tuning required during this testing shall be carried out by the APPS vendor. These activities shall be done during planned quarterly visits or as a separate under breakdown/ call visit.

G.9.12. Requirement of Employment Visa for Foreign Nationals:

All foreign nationals coming to India for execution of Projects / Orders will have to apply for Employment Visa only and that grant of Employment Visa would be subject to strict adherence of following norms:

PART II

SECTION G

Employment Visa is granted only for the skilled and qualified professional or to a person who is being engaged or appointed by a company, organization, Industry or undertaking etc. in India on contract or employment basis at a senior level, skilled position such as technical expert, senior executive or in managerial position etc.

Request for employment Visa for jobs for which large number of qualified Indian are available, is not considered.

Bidders are advised in their own interest to check latest Visa rules from Indian Embassy/ High Commission in their country in case foreign nationals are required to be deputed to Indian during execution of the Order.

G.10: DOCUMENTATION

The language used in all correspondence, documentation, literature, drawings, markings etc., shall be English. APPS vendor shall furnish all relevant technical manuals, literature and other technical data as required by Client after order and as final/as-built documentation after system commissioning.

Documentation should include design details, detailed engineering, equipment datasheet, detailed drawings, Data Engineering, Maintenance procedure, Standard operating procedure, Backup & restore procedures, operator manuals, user guides, system generation, Calculations, Functional design specifications, Database configuration and maintenance etc of APPS package and all other third party equipments. Also commissioning document is required for both SMCS and ECS.

All the drawings and documents shall be verified by the APPS vendor before presenting the same for Client review.

G 10.1 Final documentations and software:

a. Five sets of composite documentation of all system, subsystem, software, datasheets, maintenance manual etc. for SMCS & ECS.

b. Vendor shall hand over project backup, original APPS package software DVDs, Windows DVDs, License Files/key to OIL after successful commissioning of the system.

b. Final as-built documents/ drawings [5 sets of binders/ folders] and 5 sets of CDs/DVDs shall be handed over to OIL prior to the commencement of warranty, after incorporating all modifications made at site.

All these documentations shall be supplied in hard cover/ ring folders in A4 size (210mm x 297 mm).

The APPS vendor shall be fully responsible for producing documents related to all the activities pertaining to APPS design, FDS, Leak sensitivity study, engineering, SCADA/APPS interface & integration, APPS MMI & reports, FAT for APPS system, APPS installation, commissioning, SAT, Trial run, warranty, APPS documentation and training as per the requirements of the bid document.

G.11. BILL OF MATERIAL FOR APPS SYSTEM

BOM for APPS for NSPL Multi product pipeline												
				Numaligarh	IP1 Sekoni	IP2 Noonmati	IP3 Bongaigaon	IP4 Madarihat	Rangapani Terminal	SMCS Noonmati	ECS Jorhat	Total
S. No.	Item Description	Model / Make	Unit									
Stations				NDT	IP1	IP2	IP3	IP4	RTS	PHQ	PS3	
1	Hardware											
1.1	APPS Servers with 21" LED Monitor	HP / IBM	Nos.	0	0	0	0	0	0	2		2
1.2	Workstation with Redundant 21" Monitor for APPS HMI	HP / IBM	Nos.	1	0	0	0	0	1	2	1	5
1.3	KVM Extender		Lot	0	0	0	0	0	0	1	0	1
1.4	Mounting Rail for APPS Servers (19" rack)		Set	0	0	0	0	0	0	2	0	2
2	Software											
2.1	APPS software for Servers and HMI works station as per tender requirement		Set	1								1
2.2	Operating System (Windows) as per tender requirement		Set	1								1
2.2	Antivirus (Exiting SCADA system has antivirus from McAfee)	McAfee antivirus	Nos.	1					1	4	1	7

PART II

SECTION G

Note: The above BOM is tentative only. Bidder has to supply additional items if required to meet the technical specification at the time of submission of the bid within the quoted price.

G.12. PLATFORM AND OPERATING SYSTEM

G12.1 Specifications of proposed APPS server:

1. Server with following specifications:

Sr. No.	Functionality	Specifications
		Windows server loaded with OS
1	Make & Model	HP / DELL (19" rack mountable)
2	Processor	INTEL® XEON® GOLD 5215 PROCESSOR (13.75M Cache, 2.50 GHz)
3	No. of Processors	2 (Minimum)
4	Memory	32 GB
5	Cache	13.75 MB Cache or higher.
6	HDD	Hot pluggable type (each HDD of 600 GB, 2.5" SAS 10000 rpm) or higher (in RAID-5 configuration) Refer Note 1
7	Hard Drive Bays	8 nos. 2.5" drive cage.
8	Optical drives	Slim line DVD ± R/RW 8X Slim or better
9	I/O Expansion slots	Minimum 02 Nos. PCI slots
10	BIOS	Flash ROM, Plug and Play, ACPI
11	Hard Disk controller	Min. dual port SAS Integrated controller with min. 256MB DDR battery backed write cache and RAID – 0, 1, 5, 6 with supporting RAID controller (PERC 6/I or H700 controller)
12	Network Interface	Integrated dual 10/100/1000 MBPS Gigabit Ethernet interfaces with failover & load balancing and with support for TCP/IP Offload Engine for windows server
13	Built in IO	USB 2.0/3.0 Ports - min. 4 total SVGA/ XGA – 1 Network RJ-45 – 2 HDMI Port -1
14	Graphic sub system	Integrated Matrox or equivalent card
15	Keyboard & Mouse	USB Keyboard & Mouse
16	Power supply	220 +/-10% VAC, 50 Hz, pf (min 0.9) corrected & surge tolerant, CE Compliant Hot Plug AC Redundant Power Supply Wattage – Bidder to specify

17	System Fans	Fully redundant hot pluggable fans
18	Operating System	WINDOWS 2019 Server/ latest version with Service Pack (SP). MS Office 2019 Home Business/latest version
19	System Management	OEM's server management software should be provided. Systems Manager SW shall provide a secure environment to manage & diagnose server and shall also help in managing the server as an asset, shall provide pre-failure alerts & diagnostics and help in management of server faults and reporting.
20	Warranty	3 years from the date of supply (Warranty cost shall be considered under main server supply cost & no separate payment shall be done for the same.)
21	Regulatory	FCC, UL complied, ROHS
22	Security	All possible latest generation security features to be provided
23	Mounting	19" Rack-mountable chassis complete with rack mounting hardware and cable management arm etc, to be supplied along with main Servers. Servers shall be mounted in existing server cabinet in such a way so that can be taken out from front. Server cabinet is excluded.
25	Antivirus	Antivirus license as per sub clause 11 of clause G.3.4.
26	Monitors	1 each with server. 21" LED monitor. However, the server shall also have the facility of connecting the video output to a standard LED monitor.
27	KVM switch	As per requirement.

Note: The HDD total array shall be designed in such a way that it can retain/store the history data of APPS including events, trends, syslogs etc. for minimum 3 months with availability of 50% unutilized space.

G12.2. Specification for Workstation:

Sr. No.	**Functionality**	**Specifications**
		Windows based system loaded with Windows 10 Pro software
1	Make & Model	HP / DELL/ IBM
2	Processor	**Intel® Xeon® Silver 4215 Processor (11 M Cache, 2.5 GHz)**
3	Form Factor	Rackable minitower

PART II

SECTION G

4	Chipset	Intel® C622
5	Memory	Type: DDR4 RDIMM ECC Slots: 6 DIMM on board (6 DIMM additional with optional 2nd processor riser) Speed: 2.5 GHz Capacities: 16GB
6	HDD	1 TB
6	I/O Controller	Integrated SATA 6.0 Gb/s Factory integrated RAID available for SATA/SAS drives (RAID 0, 1, and 10)
7	Internal Storage	Up to 4x 3.5" (or 2.5") SATA Drives Up to 2x M.2 NVMePCIe SSDs M.2 on motherboard
8	External Storage	Integrated: DVD Writer Optional: Blu-Ray Writer
9	Available Graphics	NVIDIA GeForce NVIDIA Quadro NVIDIA NVS AMD Radeon Pro
10	Audio	Realtek HD ALC221
11	Networking	LAN Integrated: Intel i219 Gigabit Ethernet controller with Intel Remote Wake UP, PXE and Jumbo frames support. LAN Optional: Intel i210 1GbE single port PCIe (Gen 3 x1) network card Intel i350 1GbE dual port PCIe (Gen 3 x1) network card Intel i350 1GbE quad port PCIe (Gen 3 x1) network card Intel X550-T2 10GbE dual port PCIe (Gen 3 x4) RJ45 network card Intel X550-T2 10GbE dual port PCIe (Gen 3 x4) SFP+ network card WLAN Optional: Intel® Dual Band Wireless-AC 8265 802.11a/b/g/n/ac (2x2) Wi-Fi® and Bluetooth® 4.2 Combo, non-vPro™
12	Expansion Slots	Slot 1: CPU with open-ended connector. Slots 3 and 6: PCH with open-ended connector. Slot 4: CPU with open-ended connector (slot converts to x4 electrical when SSD is installed in 2nd M.2 slot). M.2 Slots 1 and 2: CPU up to 80 mm storage devices
13	Ports and Connectors	Standard Front Panel: 1 headset; 4 USB 3.1 (1 charging) Premium Front Panel (optional): 1 headset, 2 USB 3.1 Gen1 Type-A (1 charging), 2 USB 3.1 Gen 2 Type-C, SD Media Card Reader.

		Rear: 6 USB 3.1 Gen 1; 2 RJ-45 (1 GbE); 1 audio line out; 1 audio line in; 1 PS/2 mouse port; 1 PS/2 keyboard port; 1 serial port (optional)
14	Power	1000 W internal power supply, up to 90% efficiency, active PFC
15	Warranty	3 years from the date of supply (Warranty cost shall be considered under main server supply cost & no separate payment shall be done for the same.
16	Monitors	2x21" LED monitor with each Workstation.
17	Antivirus	Antivirus license as per sub clause 11 of clause G.3.4.

G12.3 MANDATORY SPARE

One APPS Server as per specification detailed below:

Sr. No.	**Functionality**	**Specifications**
		Windows server loaded with OS
1	Make & Model	HP / DELL (19" rack mountable)
2	Processor	INTEL® XEON® GOLD 5215 PROCESSOR (13.75M Cache, 2.50 GHz)
3	No. of Processors	2 (Minimum)
4	Memory	32 GB
5	Cache	13.75 MB Cache or higher.
6	HDD	Hot pluggable type (each HDD of 600 GB, 2.5" SAS 10000 rpm) or higher (in RAID-5 configuration) Refer Note 1
7	Hard Drive Bays	8 nos. 2.5" drive cage.
8	Optical drives	Slim line DVD ± R/RW 8X Slim or better
9	I/O Expansion slots	Minimum 02 Nos. PCI slots
10	BIOS	Flash ROM, Plug and Play, ACPI
11	Hard Disk controller	Min. dual port SAS Integrated controller with min. 256MB DDR battery backed write cache and RAID – 0, 1, 5, 6 with supporting RAID controller (PERC 6/I or H700 controller)
12	Network Interface	Integrated dual 10/100/1000 MBPS Gigabit Ethernet interfaces with failover & load balancing and with support for TCP/IP Offload Engine for windows server
13	Built in IO	USB 2.0/3.0 Ports - min. 4 total SVGA/ XGA – 1 Network RJ-45 – 2 HDMI Port -1
14	Graphic sub system	Integrated Matrox or equivalent card

15	Keyboard & Mouse	USB Keyboard & Mouse
16	Power supply	220 +/-10% VAC, 50 Hz, pf (min 0.9) corrected & surge tolerant, CE Compliant Hot Plug AC Redundant Power Supply Wattage – Bidder to specify
17	System Fans	Fully redundant hot pluggable fans
18	Operating System	WINDOWS 2019 Server/ latest version with Service Pack (SP). MS Office 2019 Home Business/latest version
19	System Management	OEM's server management software should be provided. Systems Manager SW shall provide a secure environment to manage & diagnose server and shall also help in managing the server as an asset, shall provide pre-failure alerts & diagnostics and help in management of server faults and reporting.
20	Warranty	3 years from the date of supply (Warranty cost shall be considered under main server supply cost & no separate payment shall be done for the same.)
21	Regulatory	FCC, UL complied, ROHS
22	Security	All possible latest generation security features to be provided
23	Mounting	19" Rack-mountable chassis complete with rack mounting hardware and cable management arm etc, to be supplied along with main Servers. Servers shall be mounted in existing server cabinet in such a way so that can be taken out from front. Server cabinet is excluded.
25	Antivirus	Antivirus license as per sub clause 11 of clause G.3.4.
26	Monitors	1 number LED monitor. However, the server shall also have the facility of connecting the video output to a standard LED monitor.

Note: HDD Array shall be similar to the Array supplied with the APPS server mentioned in clause G.12.1.

G.13 LIST OF ANNEXURES

ANNEXURE APPS-1

DETAILED LIST OF INSTRUMENTS REQUIRED APPS FOR NSPLPIPELINE LINE

SL NO	LOCATION	PRESSURE TRANSMITTER	TEMPERATURE TRANSMITTER	FLOWMETER	DENSITY METER	MOV
1	**NDT**	**Make:** ABB **Model:**2600T **Type:** Electronic Smart **Accuracy** = ±0.075% FSD **Repeatability** = ±0.1% FSD Number in use = As per P&ID	**Make: ABB** **Model: 600T** **Type:** Electronic Smart **Accuracy** = ±0.1% **Repeatability** = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Type: Ultrasonic 4 Beam** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	Make: Solartron Model: 7835 Type: Vibration Tube Accuracy: ± 0.1 kg/m3 Repeatability: ± 0.02 kg/m3 Number in use: 1	Number of MOVs as per P&ID
2	**SV1**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
3	**IP1**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Type: Ultrasonic 4 Beam** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	**Density Derived from Flowmeter**	Number of MOVs as per P&ID
4	**SV2**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
5	**SV3**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
6	**IP2**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Type: Ultrasonic 4 Beam** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	**Density Derived from Flowmeter**	Number of MOVs as per P&ID
7	**SV4**	Make: ABB Model:2600T Type: Electronic Smart Accuracy =	Make: ABB Model: 600T Type: Electronic Smart Accuracy =	NA	NA	1

		±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	±0.1% Repeatability = ±0.1% Number in use = 2			
8	**SV5**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
9	**IP3**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	**Density Derived from Flowmeter**	Number of MOVs as per P&ID
10	**SV6**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use =2	NA	NA	1
11	**SV7**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
12	**IP4**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Type: Ultrasonic 4 Beam** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	Density Derived from Flowmeter	Number of MOVs as per P&ID
13	**SV8**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = 2	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1

14	**SV9**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = 2	NA	NA	1
15	**RT**	Make: ABB Model:2600T Type: Electronic Smart Accuracy = ±0.075% FSD Repeatability = ±0.1% FSD Number in use = As per P&ID	Make: ABB Model: 600T Type: Electronic Smart Accuracy = ±0.1% Repeatability = ±0.1% Number in use = As per P&ID	**Make: Caldon** **Model: LEFM240C** **Type: Ultrasonic 4 Beam** **Linearity:** ±0.15% over nominal flow range **Repeatability:** In accordance with the requirements of API Manual of Petroleum Measurement Standards Chapter 5.8, Table B.1 or OIML R 117-1 Accuracy Class 0.3 Number in use: 1	**Make: Micromotion** Model: CDM100P Type: Vibration Tube Accuracy: ± 0.1 kg/m3 Repeatability: ± 0.02 kg/m3 Number in use: 2	Number of MOVs as per P&ID

Note: The above list is tentative only. To meet the functional requirement and technical specification bidder should refer to all the instruments including MOVs installed in this NSPL pipeline. These details are available in the P &IDs and I/O lists furnished in the List of Appendix appended at the end of this document.

ANNEXURE APPS-2

PIPELINE DATA

A. PIPELINE PARAMETERS

Sl. No.	Pipeline Parameters
1.	Pipeline Throughput: 1.721 MMTPA
2.	Operating Hours: 8000 Hrs/ Annum
3.	Pipeline operating life: 35 Years
4.	Pipeline Length: 653.4 Km (approximate)
5.	Basis for Hydraulic Calculation: All hydraulic calculations are based on HSD at 250C
6.	Pipeline Diameter: 406.4mm (16")
7.	Design pressure: 84.5 Kg/cm^2
8.	Max. Operating Pressure: 76 kg/cm^2
9.	Hydro testing pressure: 106 Kg/cm^2 (min.)
10.	Design consideration: ASME B31.4, OISD 141
11.	Pipe grade: 259Km (converted & existing) API5LX46/X52 Pipe thickness - 7.9/11.9 mm

PART II

SECTION G

	: 394 Km (new)-API5LX60/X46- Pipe thickness - 6.4/8.7/11.9 mm
12.	Pipe Thickness at crossings: Major River crossings: 11.9/8.7mm thickness. CTE Coated CWC pipe Micro tunnelling: 8.7mm thickness. 3LPE coated HDD: 11.9 mm thickness. 3LPE coated Road Crossings: 11.9mm (old) / 8.7mm (new) CTE coated
13.	Pipeline Roughness: 45 microns
14.	Material of Construction for Pipeline: Carbon Steel
15.	Pipeline Corrosion Allowance: 0.5 mm
16.	Pigging Facilities: Permanent Pigging facilities suitable for "Intelligent Pigs" provided at IP Stations
17.	Subsoil Temperature: 31°C(Max), 19°C(Min) throughout the entire length of the pipeline
18.	Design Temperature: Above ground 650 C
19.	Buried 600 C
20.	Pipeline laying: Buried
21.	Sectionalizing valves: Sectionalizing valves are provided as per ASME B 31.4
22.	Power supply: Power supply to SVs, CPs, Repeater station & Intermediate Pigging stations is drawn from Captive Generator. Battery backup is provided at all stations. For back-up, DG power is provided for full capacity.
23.	Pipeline corrosion protection system: For external corrosion protection, Coal Tar Enamel coating is provided. Impressed current cathodic protection system is provided for the entire pipeline. Internal corrosion protection is provided through injection of automated corrosion inhibitor dosage linked to online monitoring system at Numaligarh Despatch Terminal and IP2 Noonmati.
24.	Corrosion Monitoring System: Corrosion monitoring system is provided.

B. PIPELINE DETAILS

Sr. No.	Section	Length	Size
1.	NDT-IP1	80 KM	16”
2.	IP1-IP2	141.2 KM	16”
3.	IP2-IP3	156.3 KM	16”
4.	IP3-IP4	147.3 KM	16”
5.	IP4-RT	128.6 KM	16”
	TOTAL	653.4 KM	

C. FLOW RATES IN DIFFERENT SECTIONS:

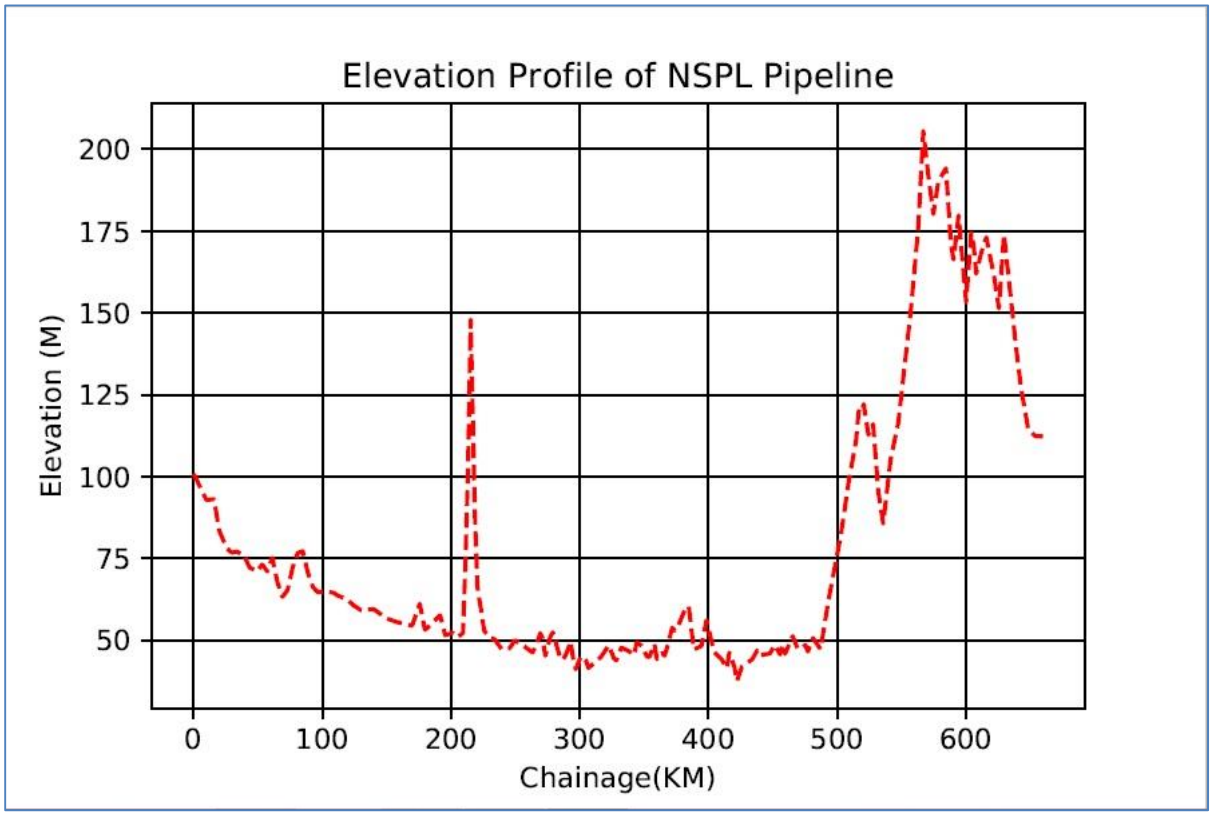
Sr. No.	Section	Minimum (Kls/hr)	Maximum (Kls/hr)	Normal (Kls/hr)
1.	NDT(Numaligarh)-IP1(Sekoni)	235	310	290
2.	IP1(Sekoni)-IP2(Narangi)	235	310	290

3.	IP2(Narangi)-IP3(Bongaigaon	235	310	290
4.	IP3((Bongaigaon)-IP4(Madarihat)	235	310	290
5.	IP4(Madarihat)-RT(Rangapani)	235	310	290

D. ELEVATION PROFILE OF NSPL PIPELINE (DETAILS SHALL BE SHARED DURING DETAILED ENGINEERING)

PART II

SECTION G



ANNEXURE APPS-3(A)

DETAILS TO BE PROVIDED BY THE BIDDER

OFFERED APPS

S. No	Description	Bidders reply
1	Make of APPS	
2	Software model with version.(Latest available version to be supplied):	
3	Methodology of Leak detection:	
4	Modules names (literature to be attached with offer)	

ANNEXURE APPS-3(B)

DECLARATION FOR SUPPORT (OEM) (To be signed by APPS OEM on letterhead)

Sl. No	Description	Confirmation
	Maintenance Support	
1	Maintenance support for APPS shall be available for minimum ten (10) years from the date of commissioning.	Yes/No
2	Operational Service support office in India of APPS package By the vendor / Channel partner	Yes/No
3	APPS patches/ performance updates time to time during warranty period and during PWMC.	Yes/No
	Project Execution and performance.	
4	System Engineering, Design, Integration shall be performed by us.	Yes/No
5	Performance of the system as per tender specification shall be certified by us.	Yes/No
6	Inspection, Testing and Factory Acceptance test shall be carried out by us.	Yes/No
7	All support shall be provided to bidder for completion of project to deliver the complete integrated solution as per tender specifications.	Yes/No

ANNEXURE APPS-3(C)

DECLARATION FOR SUPPORT (BIDDER) (To be signed by bidder on letterhead)

Sr. No	Description	Confirmation
1	Maintenance support for APPS shall be available for minimum ten (10) years from the date of commissioning.	Yes/No
2	APPS patches/ performance updates time to time during warranty period and during PWMC.	Yes/No
	Project Execution and performance.	
3	System Engineering, Design, Integration shall be performed by OEM.	Yes/No
4	Performance of the system as per tender specification shall be certified by OEM and us.	Yes/No
5	Inspection, Testing and Factory Acceptance test shall be carried out by OEM.	Yes/No

PART II

SECTION G

ANNEXURE APPS-3(D)

PROVEN TRACK RECORD FORM OF OFFERED SOFTWARE BASED ON RTSA/RTTM OPERATIONAL IN INDIA FOR MULTI PRODUCT PIPELINE

Sl. No	Description	Details
A	**Project Name & Description**	
1	Details of the application	
2	Pipeline description (Multi product pipeline)	
3	Project details (Length of pipeline/ network, No. of pump stations , compressor stations)	
B	**APPS Details**	
1	Make & model of APPS software implemented	
2	Leak detection criteria applied in the reference project.	
3	Type of LDS As per specification	
C	**Name of owner of project**	
1	Contact details of owner: Name, address, phone no, Email.	
2	Date of commissioning:	
3	Documentary evidence of project execution a) Work order/Contract b) Completion certificate c) Owners performance certificate	

G.14 TECHNICAL CHECKLIST

To be submitted along with bid document duly filled and signed.

Sl. No	Description	Bidder's Comments Remarks if any	
		Yes/No	Deviation
1	APPS Server OS: Windows Server 2019		
2	HMIs OS: Windows 10 Pro		
3	Redundant LAN for all Servers and HMIs		
4	System Hardware as per clause G.12 of Part II		
5	LDS Model based on RTSA/RTTM		
6	Additional modules		
	• Batch Tracking • Scrapper Tracking • Pipeline Efficiency • Instrument Drift Analysis		

	• Pipeline Integrity • DRA tracking		
7	Compliance of Leak Detection Criteria of the offered APPS package as per clause G.5.4 of section G PART II		
8	GUI functionality in APPS Servers, HMIs and SCADA HMIs as per clause G.5.5 of section G PART II		
9	Tonal alarm for leak warning and leak alarm functionality in APPS HMIs		
10	Scope for status monitoring of all Legs/sections in SCADA HMI simultaneously via GUI		
11	Manual tuning options in LDS GUI		
12	Submission of duly filled in ANNEXURES 3(A), 3(B),3(C) and 3(D) of Section G of part II		
13	Submission of BOM to meet the Technical Specifications mentioned in the tender		

REMARK (IF ANY):

DEVIATIONS IF ANY AGAINST THE CLAUSES AND ITS SUB ITEMS OF THE TECHNICAL SPECIFICATION AS MENTIONED IN THE TENDER SHOULD REFLECT CLEARLY IN THE REMARKS.

PART II

SECTION H

PROJECT PROGRAM AND DELIVERY REQUIREMENTS

H.1 PROJECT PROGRAM AND DELIVERY REQUIREMENTS

The time for completion of all the works under this project including the supply and delivery of the equipment, software and installation and commissioning shall be six calendar months from the issue of LOA. This will be read in conjunction with the provision of clause of general condition of the contract.

H.2 PROGRAM OF DELIVERY

The bidder shall submit a bar chart showing bidders program for delivery, installation and commissioning.

H.3 BARCHART

The contractor shall within 15 days after receipt of LOA provide the company with the detail bar chart diagram. In respect of the following:

1. Design & Engineering
2. FDS
3. Ordering of equipment
4. Drawing of the document approval
5. FAT
6. Packaging
7. Transportation
8. Installation

9. Pre-commissioning

10. SAT

11. Test Run

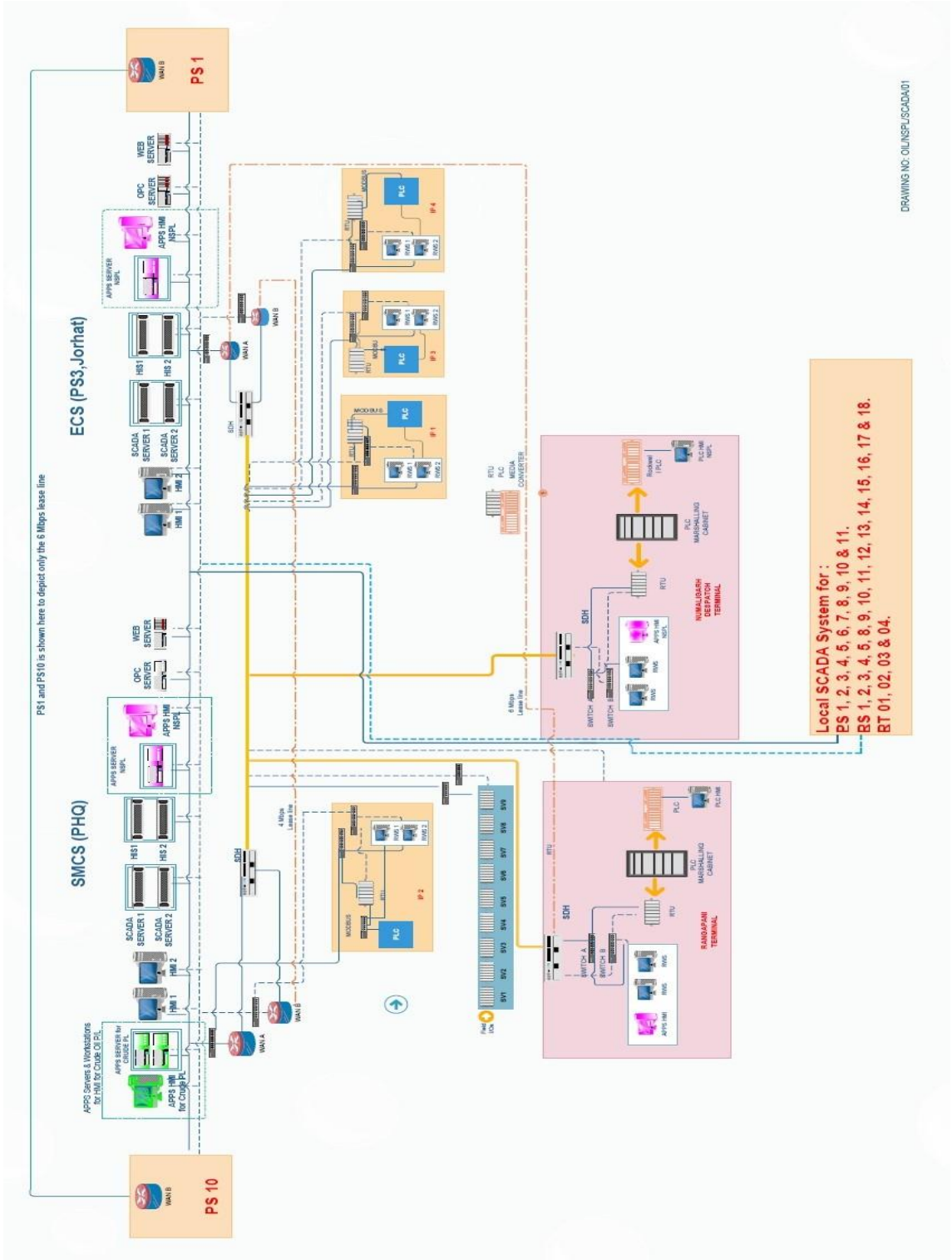
12. Training

13. Warranty

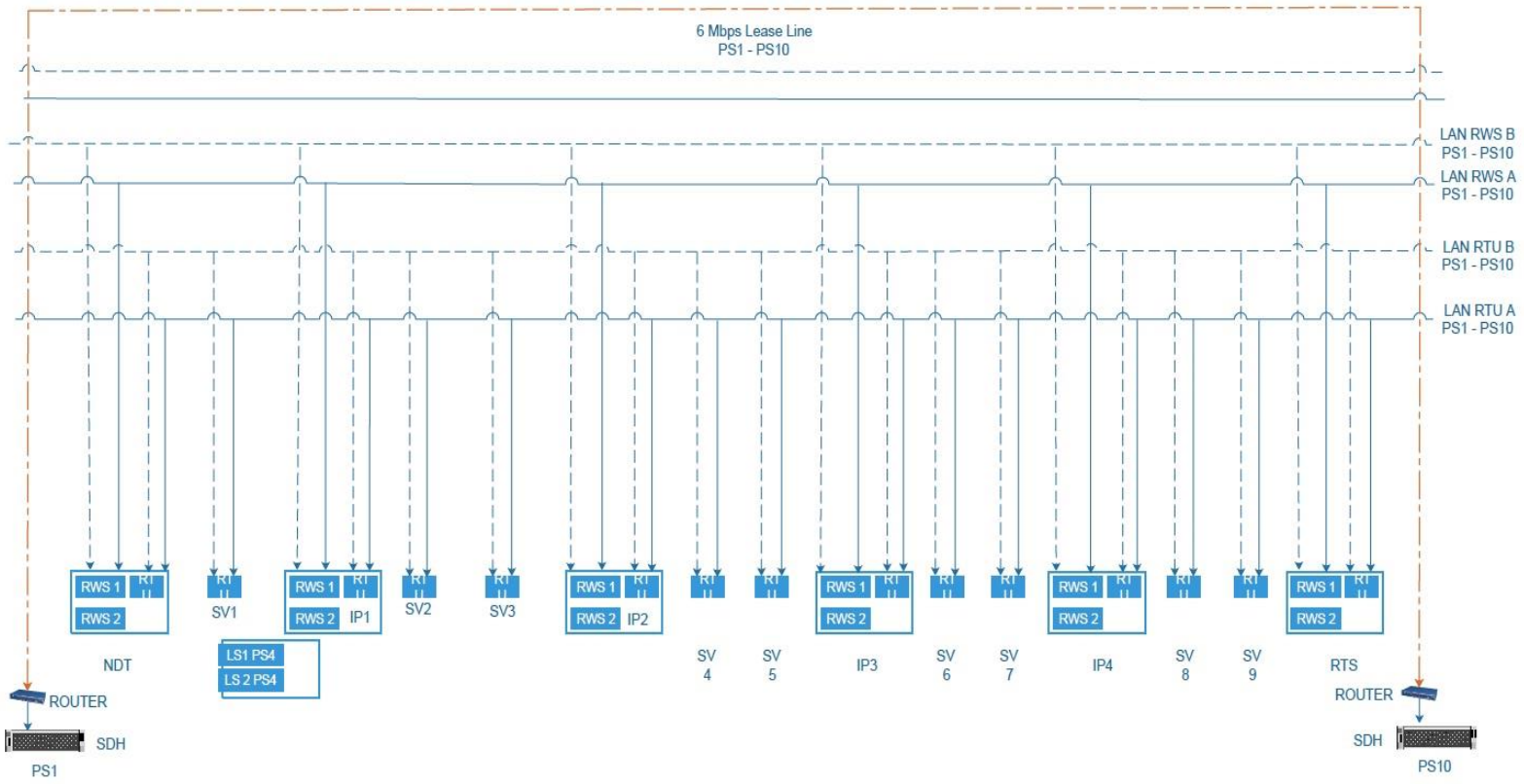
H.4 HOLD UP AND SLEEPAGE REPORT

The contractor also submits every month a hold up and sleepage report wherever necessary. It shall provide additional efforts whenever the bar chart diagram indicates a delay incompletion rate. All extra cost incurred by the contractor for such additional efforts in order to prevent a possible delay in the completion date shall be to his account.

APPENDIX I(A) -SCADA ARCHITECTURE

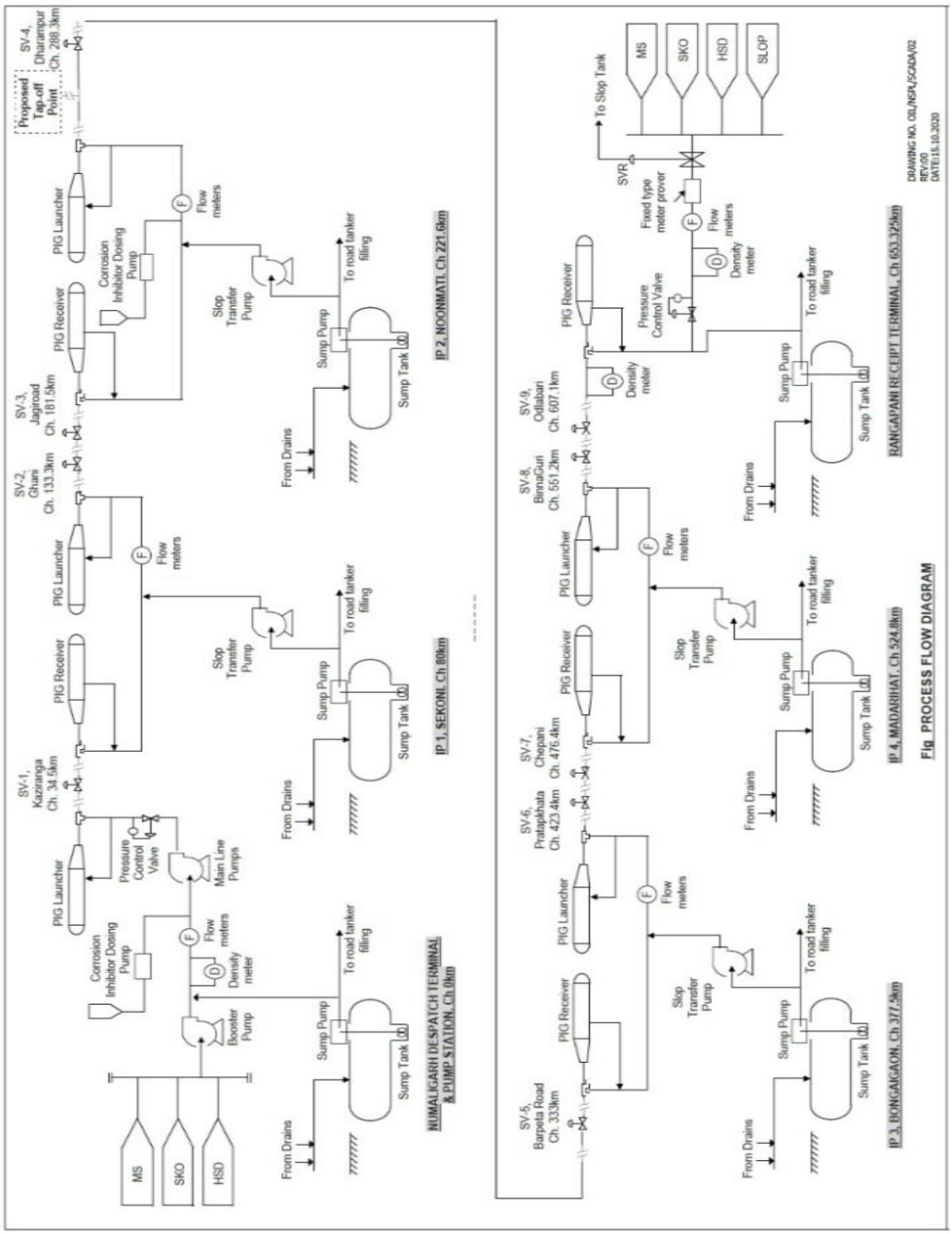


APPENDIX I(B) -CHANNELING PLAN



DRAWING NO: OIL/NSPL/SCADA 02
REV: 00
DATE 24/02/2020

ANNEXURE II (PROCESS FLOW DIAGRAM)



APPENDIX III(A)

IO Points of NDT

Analog Input

Instrument Description	Controller Tag	Description of Tag
MLP	_10_PI_1103	Pressure Indicator at MLP Inlet
	_10_PI_1205	MLP Discharge Pressure Indicator
	_10_DPI_1201	MLP-1 Differential Pressure Indicator
	_10_DPI_1202	MLP-2 Differential Pressure Indicator
	_10_TI_1103	Temperature Indicator at MLP Inlet
Booster Pump	_10_PI_1104	Pressure Indicator at Booster Inlet & just after Inlet Manifold
	_10_DPI_1101	BP-1 Differential Pressure Indicator
	_10_DPI_1102	BP-2 Differential Pressure Indicator
Scrapper Trap	_10_PI_1208	Scrapper Trap Pressure Indicator
	_10_TI_1202	Temperature indicator - Scrapper Trap
CI Dosing	_10_PI_1215	CI Dosing Tank Outlet Pressure Indicator
	_10_LI_1201	CI Dosing Tank Level Indication
Basket Filter	_10_DPI_1103	Basket Filter 1 Differential Pressure Indicator
	_10_DPI_1104	Basket Filter 2 Differential Pressure Indicator
Flowmeter	_10_TI_1101	Temperature - Flowmeter 1
	_10_TI_1102	Temperature - Flowmeter 2
	_10_FI_1101_R	Flow Rate Flowmeter 1
	_10_FI_1102_R	Flow Rate Flowmeter 2
	_10_PI_1105	Flowmeter 1 Pressure
	_10_PI_1106	Flowmeter 2 Pressure
Inlet Manifold	_10_TI_1104	Temperature Indicator at Inlet Manifold
Density Meter	_10_DI_1101C	NSPL Density Meter
PCV	_10_ZI_1201	PCV-1 Opening Indication
	_10_ZI_1202	PCV-2 Opening Indication
	_10_TI_1201	Temperature Indicator after PCV
Sump Tank	_10_LI_1101	Sump Tank Level Indication
CPTR	_10_CPTR_V	CPTR Voltage
	_10_CPTR_A	CPTR Current
	_10_PSP	Pipe to Soil Potential

Digital Input

Instrument Description	Controller Tag	Description of Tags
Booster Pump	BP[0].XLH	Booster Pump 101A ON FB
	BP[0].XLL	Booster Pump 101A OFF FB
	BP[0].XRL	Booster Pump 101A Remote Local Indication
	BP[0].XAF	Booster Pump 101A Fail to Trip
	BP[1].XLH	Booster Pump 101B ON FB
	BP[1].XLL	Booster Pump 101B OFF FB
	BP[1].XRL	Booster Pump 101B Remote Local Indication
	BP[1].XAF	Booster Pump 101B Fail to Trip
	10_PAH_1101	Booster Pump - 1 Discharge Pressure High Trip
	10_CF_101A_Trip	Booster Pump 1 Trip
	10_CF_101B_Trip	Booster Pump 2 Trip
	10_PAH_1102	Booster Pump - 2 Discharge Pressure High Trip
CI Dosing Pump	_10_104A.XLH	CI Dosing Pump 104A ON FB
	_10_104A.XLL	CI Dosing Pump 104A OFF FB
	_10_104A.XRL	CI Dosing Pump 104A Local/Remote Selection
	_10_104B.XLH	CI Dosing Pump 104AON FB
	_10_104B.XLL	CI Dosing Pump 104A OFF FB
	_10_104B.XRL	CI Dosing Pump 104A Local/Remote Selection
Main Line Pump	_10_102A 1.XRL	MLP-A Local/Remote Selection
	_10_102A 1.XLH	MLP-A ON FB
	_10_102A 1.XLL	MLP-A OFF FB
	MP(0).XFAL	MLP-A Common Fault Alarm
	_10_102A 1.XAF	MLP-A Fail to Trip Alarm
	_10_102B 1.XRL	MLP-B Local Remote Selection
	_10_102B 1.XLH	MLP-B ON FB
	_10_102B 1.XLL	MLP-B OFF FB
	MP(1).XFAL	MLP-B Common Fault Alarm
	_10_102B 1.XAF	MLP-B Fail to Trip Alarm
	10_PAL_1201	MLP Inlet Pressure Low Alarm
	10_PAH_1201	MLP Discharge Pressure High Trip
	10_PALL_1201	Main Line Pump Inlet Pressure Low Trip
	10_PAL_1202	Inlet Pressure Low Alarm
	10_PAH_1202	Discharge Pressure High Trip
Sump Pump & Tank	SP.XLL	Sump Pump 103 Trip FB
	SP.XLH	Sump Pump 103 ON FB
	SP.XRL	Sump Pump 103 Remote / Local Selection
	10_LAL_1101	Sump Tank Low Level Alarm
	10_LAH_1101	Sump Tank High Level Alarm
Station Discharge	10_PAHH_1201	Station Discharge Pressure High Trip (2 of 3 Logic)
	10_PAHH_1202	Station Discharge Pressure High Trip (2 of 3 Logic)

	10_PAHH_1203	Station Discharge Pressure High Trip (2 of 3 Logic)
	10_PAH_1204	Station Discharge Pressure High Alarm
Emergency Shutdown	10_ESD_1203	Emergency Shutdown
CPTR	10_REF_F	All Ref Cell Fail
	10_REF_AU	Unit in Auto mode
	10_PL_OV	Pipeline Over Protected (POP)
	10_PL_UV	Pipeline Under Protected (PUP)
Differential Pressure	10_DPAH-1102	Differential Pressure High Alarm
Pig Indicator	10_XXI_1201	Pig Indicator
Interface Indication	10_NIA_1101	Interface Indication Alarm
Pressure Switch	10_PSH_1251A	Pressure Switch
	10_PSH_1251B	Pressure Switch
Level Switch	10_LSH_1251A	Level Switch
	10_LSH_1251B	Level Switch
Emergency Shutdown	ESD_SCADA	ESD from SCADA
	ESD_Field	ESD from Field
MOV	MOV[0].ZLH	10-MOV-1101 Open Feedback Indication
	MOV[0].ZLL	10-MOV-1101 Close Feedback Indication
	MOV[0].XRL	10-MOV-1101 Remote-Local Feedback Indication
	MOV[1].ZLH	10-MOV-1102 Open Feedback Indication
	MOV[1].ZLL	10-MOV-1102 Close Feedback Indication
	MOV[1].XRL	10-MOV-1102 Remote-Local Feedback Indication
	MOV[2].ZLH	10-MOV-1103 Open Feedback Indication
	MOV[2].ZLL	10-MOV-1103 Close Feedback Indication
	MOV[2].XRL	10-MOV-1103 Remote-Local Feedback Indication
	MOV1[0].ZLH	10-MOV-1105 Open Feedback Indication
	MOV1[0].ZLL	10-MOV-1105 Close Feedback Indication
	MOV1[0].XRL	10-MOV-1105 Remote-Local Feedback Indication
	MOV1[1].ZLH	10-MOV-1106 Open Feedback Indication
	MOV1[1].ZLL	10-MOV-1106 Close Feedback Indication
	MOV1[1].XRL	10-MOV-1106 Remote-Local Feedback Indication
	MOV1[2].ZLH	10-MOV-1107 Open Feedback Indication
	MOV1[2].ZLL	10-MOV-1107 Close Feedback Indication
	MOV1[2].XRL	10-MOV-1107 Remote-Local Feedback Indication
	MOV1[3].ZLH	10-MOV-1108 Open Feedback Indication
	MOV1[3].ZLL	10-MOV-1108 Close Feedback Indication
	MOV1[3].XRL	10-MOV-1108 Remote-Local Feedback Indication
	MOV1[4].ZLH	10-MOV-1109 Open Feedback Indication
	MOV1[4].ZLL	10-MOV-1109 Close Feedback Indication
	MOV1[4].XRL	10-MOV-1109 Remote-Local Feedback Indication
	MOV1[5].ZLH	10-MOV-1110 Open Feedback Indication
	MOV1[5].ZLL	10-MOV-1110 Close Feedback Indication

	MOV1[5].XRL	10-MOV-1110 Remote-Local Feedback Indication
	MOV1[6].ZLH	10-MOV-1111 Open Feedback Indication
	MOV1[6].ZLL	10-MOV-1111 Close Feedback Indication
	MOV1[6].XRL	10-MOV-1111 Remote-Local Feedback Indication
	MOV1[7].ZLH	10-MOV-1112 Open Feedback Indication
	MOV1[7].ZLL	10-MOV-1112 Close Feedback Indication
	MOV1[7].XRL	10-MOV-1112 Remote-Local Feedback Indication
	MOV1[8].ZLH	10-MOV-1113 Open Feedback Indication
	MOV1[8].ZLL	10-MOV-1113 Close Feedback Indication
	MOV1[8].XRL	10-MOV-1113 Remote-Local Feedback Indication
	MOV1[9].ZLH	10-MOV-1114 Open Feedback Indication
	MOV1[9].ZLL	10-MOV-1114 Close Feedback Indication
	MOV1[9].XRL	10-MOV-1114 Remote-Local Feedback Indication
	MOV1[10].ZLH	10-MOV-1115 Open Feedback Indication
	MOV1[10].ZLL	10-MOV-1115 Close Feedback Indication
	MOV1[10].XRL	10-MOV-1115 Remote-Local Feedback Indication
	MOV1[11].ZLH	10-MOV-1116 Open Feedback Indication
	MOV1[11].ZLL	10-MOV-1116 Close Feedback Indication
	MOV1[11].XRL	10-MOV-1116 Remote-Local Feedback Indication
	MOV1[12].ZLH	10-MOV-1201 Open Feedback Indication
	MOV1[12].ZLL	10-MOV-1201 Close Feedback Indication
	MOV1[12].XRL	10-MOV-1201 Remote-Local Feedback Indication
	MOV1[13].ZLH	10-MOV-1202 Open Feedback Indication
	MOV1[13].ZLL	10-MOV-1202 Close Feedback Indication
	MOV1[13].XRL	10-MOV-1202 Remote-Local Feedback Indication
	MOV1[14].ZLH	10-MOV-1203 Open Feedback Indication
	MOV1[14].ZLL	10-MOV-1203 Close Feedback Indication
	MOV1[14].XRL	10-MOV-1203 Remote-Local Feedback Indication
	MOV1[15].ZLH	10-MOV-1204 Open Feedback Indication
	MOV1[15].ZLL	10-MOV-1204 Close Feedback Indication
	MOV1[15].XRL	10-MOV-1204 Remote-Local Feedback Indication
	MOV1[16].ZLH	10-MOV-1207 Open Feedback Indication
	MOV1[16].ZLL	10-MOV-1207 Close Feedback Indication
	MOV1[16].XRL	10-MOV-1207 Remote-Local Feedback Indication
	MOV1[17].ZLH	10-MOV-1208 Open Feedback Indication
	MOV1[17].ZLL	10-MOV-1208 Close Feedback Indication
	MOV1[17].XRL	10-MOV-1208 Remote-Local Feedback Indication
	MOV1[18].ZLH	10-MOV-1209 Open Feedback Indication
	MOV1[18].ZLL	10-MOV-1209 Close Feedback Indication

	MOV1[18].XRL	10-MOV-1209 Remote-Local Feedback Indication

Analog Output

Instrument Description	Controller Tag	Description of Tags
PCV	PCV1_CMD	PCV-1 Control Command
	PCV2_CMD	PCV-2 Control Command

Digital Output

Instrument Description	Controller Tag	Description of Tags
MOV	MOV[0].O_CMD	10-MOV-1101 Open Command
	MOV[0].C_CMD	10-MOV-1101 Close Command
	MOV[1].O_CMD	10-MOV-1102 Open Command
	MOV[1].C_CMD	10-MOV-1102 Close Command
	MOV[2].O_CMD	10-MOV-1103 Open Command
	MOV[2].C_CMD	10-MOV-1103 Close Command
	MOV1[0].O_CMD	10-MOV-1105 Open Command
	MOV1[0].C_CMD	10-MOV-1105 Close Command
	MOV1[1].O_CMD	10-MOV-1106 Open Command
	MOV1[1].C_CMD	10-MOV-1106 Close Command
	MOV1[2].O_CMD	10-MOV-1107 Open Command
	MOV1[2].C_CMD	10-MOV-1107 Close Command
	MOV1[3].O_CMD	10-MOV-1108 Open Command
	MOV1[3].C_CMD	10-MOV-1108 Close Command
	MOV1[4].O_CMD	10-MOV-1109 Open Command
	MOV1[4].C_CMD	10-MOV-1109 Close Command
	MOV1[5].O_CMD	10-MOV-1110 Open Command
	MOV1[5].C_CMD	10-MOV-1110 Close Command
	MOV1[6].O_CMD	10-MOV-1111 Open Command
	MOV1[6].C_CMD	10-MOV-1111 Close Command
	MOV1[7].O_CMD	10-MOV-1112 Open Command
	MOV1[7].C_CMD	10-MOV-1112 Close Command
	MOV1[8].O_CMD	10-MOV-1113 Open Command
	MOV1[8].C_CMD	10-MOV-1113 Close Command
	MOV1[9].O_CMD	10-MOV-1114 Open Command
	MOV1[9].C_CMD	10-MOV-1114 Close Command
	MOV1[10].O_CMD	10-MOV-1115 Open Command
	MOV1[10].C_CMD	10-MOV-1115 Close Command
	MOV1[11].O_CMD	10-MOV-1116 Open Command
	MOV1[11].C_CMD	10-MOV-1116 Close Command
	MOV1[12].O_CMD	10-MOV-1201 Open Command
	MOV1[12].C_CMD	10-MOV-1201 Close Command
	MOV1[13].O_CMD	10-MOV-1202 Open Command
	MOV1[13].C_CMD	10-MOV-1202 Close Command
	MOV1[14].O_CMD	10-MOV-1203 Open Command

	MOV1[14].C_CMD	10-MOV-1203 Close Command
	MOV1[15].O_CMD	10-MOV-1204 Open Command
	MOV1[15].C_CMD	10-MOV-1204 Close Command
	MOV1[16].O_CMD	10-MOV-1207 Open Command
	MOV1[16].C_CMD	10-MOV-1207 Close Command
	MOV1[17].O_CMD	10-MOV-1208 Open Command
	MOV1[17].C_CMD	10-MOV-1208 Close Command
	MOV1[18].O_CMD	10-MOV-1209 Open Command
	MOV1[18].C_CMD	10-MOV-1209 Close Command
Booster Pump	BP[0].STT_CMD	Booster Pump-101 A Start Command
	BP[0].STP_CMD	Booster Pump-101 A Stop Command
	BP[1].STT_CMD	Booster Pump-101 B Start Command
	BP[1].STP_CMD	Booster Pump-101 B Stop Command
CI Dosing	_10_104A.STT_CMD	CI Dosing Pump 104A Start Command
	_10_104A.STP_CMD	CI Dosing Pump 104A Stop Command
	_10_104B.STT_CMD	CI Dosing Pump 104B Start Command
	_10_104B.STP_CMD	CI Dosing Pump 104B Stop Command
Main Line Pump	_10_102A1.STT_CMD	MainLine Pump A Start Command
	_10_102A1.STP_CMD	MainLine Pump A Stop Command
	_10_102A1.PRMCV	MainLine Pump A Start Permissive
	_10_102B1.STT_CMD	MainLine Pump B Start Command
	_10_102B1.STP_CMD	MainLine Pump B Stop Command
	_10_102B1.PRMCV	MainLine Pump B Start Permissive
Sump Pump	SP.STT_CMD	Sump Pump 103 Start Command
	SP.STP_CMD	Sump Pump 103 Stop Command
Emergency Shutdown (ESD)	ESD_PUMP102A	Emergency Shutdown of MLP-A
	ESD_PUMP102B	Emergency Shutdown of MLP-B

APPENDIX III(B)

IO Points of IP-1

Analog Input

Instrument Description	Controller Tag	Description of Tag
Inlet	20-PI-1301	Line Inlet Pressure
	20-PI-1302	Inlet Pressure
	20-TI-1301	Line Inlet Temperature
	20-TI-1302	Station Inlet Temperature
Outlet	20-PI-1303	Line Outlet Pressure
	20-PI-1305	Outlet Pressure
	20-TI-1303	Line Outlet Temperature
	20-TI-1305	Station Outlet Temperature
Slop	20-PI-1307	Slop Discharge Pressure
Sump Tank	20-LI-1301	Sump Tank Level Transmitter
Flowmeter	20-FI-1305	Flowrate
CPTR	20-CPTR-A	Cathodic Current

	20-CPTR-V	Cathodic Voltage
	20-PSP	Pipe-Soil Protection

Digital Input

Instrument Description	Controller Tag	Description of Tags
Sump Pump & Tank	20-XRL-101	SUMP PUMP REMOTE/LOCAL
	20-SMP-101	SUMP PUMP STATUS
Slop Transfer Pump	20-XRL-102A	SLOP PUMP -1 REMOTE/LOCAL
	20-SP1-102A	SLOP PUMP-1 STATUS
	20-XRL-102B	SLOP PUMP -2 REMOTE/LOCAL
	20-SP1-102B	SLOP PUMP-2 STATUS
Flowmeter	Flowmeter Totalizer Reset	
CPTR	20-CPTR-AU	CPTR AUTO MODE
	20-PL-OV	PL OVER VOLTAGE
	20-PL-UV	PL UNDER VOLTAGE
	20-REF-F	ALL REF CELL FAIL
Pig Indicator	20-XXI-1301	SCRAPER RECEIVE
	20-XXI-1302	SCRAPER IN TRAP
	20-XXI- 1303	SCRAPER LAUNCH
Level Switch	20-LAH-1301	SUMP TANK LEVEL HIGH
	20-LAL-1301	SUMP TANK LEVEL LOW
Pressure Switch	20-PSH-1301	SUMP TANK PRESSURE HIGH
MOV	20-XRL-1301	Line Inlet Valve OPEN and CLOSE F/B
	20-MOV-1301 (OPEN)	
	20-MOV-1301 (CLOSE)	
	20-XRL-1315	Line Outlet Valve OPEN and CLOSE F/B
	20-MOV-1315 (OPEN)	
	20-MOV-1315 (CLOSE)	
	20-XRL-1303	Line Inlet Valve OPEN and CLOSE F/B
	20-MOV-1303 (OPEN)	
	20-MOV-1303 (CLOSE)	
	20-XRL-1313	Line Outlet Valve OPEN and CLOSE F/B
	20-MOV-1313 (OPEN)	
	20-MOV-1313 (CLOSE)	

Digital Output

Instrument Description	Controller Tag	Description of Tags
MOV	20-MOV-1301 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	20-MOV-1301 (CLOSE)	
	20-MOV-1315 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	20-MOV-1315 (CLOSE)	
	20-MOV-1303 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	20-MOV-1303 (CLOSE)	

	20-MOV-1313 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	20-MOV-1313 (CLOSE)	
Slop Transfer Pump	20-HSH-102A	SLOP PUMP-1 START COMMAND
	20-HSL-102A	SLOP PUMP-1 STOP COMMAND
	20-HSH-102B	SLOP PUMP-2 START COMMAND
	20-HSL-102B	SLOP PUMP-2 STOP COMMAND
Sump Pump	20-HSH-101	SUMP PUMP START COMMAND
	20-HSL-101	SUMP PUMP STOP COMMAND

APPENDIX III(C)

IO Points of IP-2

Analog Input

Instrument Description	Controller Tag	Description of Tag
Inlet	30-PI-1401	Line Inlet Pressure
	30-PI-1402	Inlet Pressure
	30-TI-1401	Line Inlet Temperature
	30-TI-1402	Station Inlet Temperature
Outlet	30-PI-1403	Line Outlet Pressure
	30-PI-1405	Outlet Pressure
	30-TI-1403	Line Outlet Temperature
	30-TI-1405	Station Outlet Temperature
Slop	30-PI-1407	Slop Discharge Pressure
Sump Tank	30-LI-1401	Sump Tank Level Transmitter
Flowmeter	30-FI-1405	Flowrate
CPTR	30-CPTR-A	Cathodic Current
	30-CPTR-V	Cathodic Voltage
	30-PSP	Pipe-Soil Protection
CI Dosing	30_PI_1415	CI Dosing Pressure Transmitter
	30_LI_1403	CI Dosing Level Transmitter

Digital Input

Instrument Description	Controller Tag	Description of Tags
Sump Pump & Tank	30-XRL-101	SUMP PUMP REMOTE/LOCAL
	30-SMP-101	SUMP PUMP STATUS
Slop Transfer Pump	30-XRL-102A	SLOP PUMP -1 REMOTE/LOCAL
	30-SP1-102A	SLOP PUMP-1 STATUS
	30-XRL-102B	SLOP PUMP -2 REMOTE/LOCAL
	30-SP1-102B	SLOP PUMP-2 STATUS
Flowmeter	Flowmeter Totalizer Reset	

CPTR	30-CPTR-AU	CPTR AUTO MODE
	30-PL-OV	PL OVER VOLTAGE
	30-PL-UV	PL UNDER VOLTAGE
	30-REF-F	ALL REF CELL FAIL
Pig Indicator	30-XXI-1401	SCRAPER RECEIVE
	30-XXI-1402	SCRAPER IN TRAP
	30-XXI- 1403	SCRAPER LAUNCH
Level Switch	30-LAH-1401	SUMP TANK LEVEL HIGH
	30-LAL-1401	SUMP TANK LEVEL LOW
Pressure Switch	30-PSH-1401	SUMP TANK PRESSURE HIGH
MOV	30-XRL-1401	Line Inlet Valve OPEN and CLOSE F/B
	30-MOV-1401 (OPEN)	
	30-MOV-1401 (CLOSE)	
	30-XRL-1415	Line Outlet Valve OPEN and CLOSE F/B
	30-MOV-1415 (OPEN)	
	30-MOV-1415 (CLOSE)	
	30-XRL-1403	Line Inlet Valve OPEN and CLOSE F/B
	30-MOV-1403 (OPEN)	
	30-MOV-1403 (CLOSE)	
	30-XRL-1413	Line Outlet Valve OPEN and CLOSE F/B
	30-MOV-1413 (OPEN)	
	30-MOV-1413 (CLOSE)	

Digital Output

Instrument Description	Controller Tag	Description of Tags
MOV	30-MOV-1401 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	30-MOV-1401 (CLOSE)	
	30-MOV-1415 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	30-MOV-1415 (CLOSE)	
	30-MOV-1403 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	30-MOV-1403 (CLOSE)	
	30-MOV-1413 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	30-MOV-1413 (CLOSE)	
Slop Transfer Pump	30-HSH-102A	SLOP PUMP-1 START COMMAND
	30-HSL-102A	SLOP PUMP-1 STOP COMMAND
	30-HSH-102B	SLOP PUMP-2 START COMMAND
	30-HSL-102B	SLOP PUMP-2 STOP COMMAND
Sump Pump	30-HSH-101	SUMP PUMP START COMMAND
	30-HSL-101	SUMP PUMP STOP COMMAND

APPENDIX III(D)

IO points of IP-3

Analog Input

Instrument Description	Controller Tag	Description of Tag
Inlet	40-PI-1501	Line Inlet Pressure
	40-PI-1502	Inlet Pressure
	40-TI-1501	Line Inlet Temperature
	40-TI-1502	Station Inlet Temperature
Outlet	40-PI-1503	Line Outlet Pressure
	40-PI-1505	Outlet Pressure
	40-TI-1503	Line Outlet Temperature
	40-TI-1505	Station Outlet Temperature
Slop	40-PI-1507	Slop Discharge Pressure
Sump Tank	40-LI-1501	Sump Tank Level Transmitter
Flowmeter	40-FI-1505	Flowrate
CPTR	40-CPTR-A	Cathodic Current
	40-CPTR-V	Cathodic Voltage
	40-PSP	Pipe-Soil Protection

Digital Input

Instrument Description	Controller Tag	Description of Tags
Sump Pump & Tank	40-XRL-101	SUMP PUMP REMOTE/LOCAL
	40-SMP-101	SUMP PUMP STATUS
Slop Transfer Pump	40-XRL-102A	SLOP PUMP -1 REMOTE/LOCAL
	40-SP1-102A	SLOP PUMP-1 STATUS
	40-XRL-102B	SLOP PUMP -2 REMOTE/LOCAL
	40-SP1-102B	SLOP PUMP-2 STATUS
Flowmeter	Flowmeter Totalizer Reset	
CPTR	40-CPTR-AU	CPTR AUTO MODE
	40-PL-OV	PL OVER VOLTAGE
	40-PL-UV	PL UNDER VOLTAGE
	40-REF-F	ALL REF CELL FAIL
Pig Indicator	40-XXI-1501	SCRAPER RECEIVE
	40-XXI-1502	SCRAPER IN TRAP
	40-XXI- 1503	SCRAPER LAUNCH
Level Switch	40-LAH-1501	SUMP TANK LEVEL HIGH
	40-LAL-1501	SUMP TANK LEVEL LOW
Pressure Switch	40-PSH-1501	SUMP TANK PRESSURE HIGH
MOV	40-XRL-1501	Line Inlet Valve OPEN and CLOSE F/B
	40-MOV-1501 (OPEN)	
	40-MOV-1501 (CLOSE)	
	40-XRL-1515	Line Outlet Valve OPEN and CLOSE F/B
	40-MOV-1515 (OPEN)	
	40-MOV-1515 (CLOSE)	
	40-XRL-1503	Line Inlet Valve OPEN and CLOSE F/B

	40-MOV-1503 (OPEN)	
	40-MOV-1503 (CLOSE)	
	40-XRL-1513	Line Outlet Valve OPEN and CLOSE F/B
	40-MOV-1513 (OPEN)	
	40-MOV-1513 (CLOSE)	

Digital Output

Instrument Description	Controller Tag	Description of Tags
MOV	40-MOV-1501 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	40-MOV-1501 (CLOSE)	
	40-MOV-1515 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	40-MOV-1515 (CLOSE)	
	40-MOV-1503 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	40-MOV-1503 (CLOSE)	
	40-MOV-1513 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	40-MOV-1513 (CLOSE)	
Slop Transfer Pump	40-HSH-102A	SLOP PUMP-1 START COMMAND
	40-HSL-102A	SLOP PUMP-1 STOP COMMAND
	40-HSH-102B	SLOP PUMP-2 START COMMAND
	40-HSL-102B	SLOP PUMP-2 STOP COMMAND
Sump Pump	40-HSH-101	SUMP PUMP START COMMAND
	40-HSL-101	SUMP PUMP STOP COMMAND

APPENDIX III(E)

IO Points of IP4

Analog Input

Instrument Description	Controller Tag	Description of Tag
Inlet	50-PI-1601	Line Inlet Pressure
	50-PI-1602	Inlet Pressure
	50-TI-1601	Line Inlet Temperature
	50-TI-1602	Station Inlet Temperature
Outlet	50-PI-1603	Line Outlet Pressure
	50-PI-1605	Outlet Pressure
	50-TI-1603	Line Outlet Temperature
	50-TI-1605	Station Outlet Temperature
Slop	50-PI-1607	Slop Discharge Pressure
Sump Tank	50-LI-1601	Sump Tank Level Transmitter
Flowmeter	50-FI-1605	Flowrate

CPTR	50-CPTR-A	Cathodic Current
	50-CPTR-V	Cathodic Voltage
	50-PSP	Pipe-Soil Protection

Digital Input

Instrument Description	Controller Tag	Description of Tags
Sump Pump & Tank	50-XRL-101	SUMP PUMP REMOTE/LOCAL
	50-SMP-101	SUMP PUMP STATUS
Slop Transfer Pump	50-XRL-102A	SLOP PUMP -1 REMOTE/LOCAL
	50-SP1-102A	SLOP PUMP-1 STATUS
	50-XRL-102B	SLOP PUMP -2 REMOTE/LOCAL
	50-SP1-102B	SLOP PUMP-2 STATUS
Flowmeter	Flowmeter Totalizer Reset	
CPTR	50-CPTR-AU	CPTR AUTO MODE
	50-PL-OV	PL OVER VOLTAGE
	50-PL-UV	PL UNDER VOLTAGE
	50-REF-F	ALL REF CELL FAIL
Differential Pressure		
Pig Indicator	50-XXI-1601	SCRAPER RECEIVE
	50-XXI-1602	SCRAPER IN TRAP
	50-XXI- 1603	SCRAPER LAUNCH
Level Switch	50-LAH-1601	SUMP TANK LEVEL HIGH
	50-LAL-1601	SUMP TANK LEVEL LOW
Pressure Switch	50-PSH-1601	SUMP TANK PRESSURE HIGH
MOV	50-XRL-1601	Line Inlet Valve OPEN and CLOSE F/B
	50-MOV-1601 (OPEN)	
	50-MOV-1601 (CLOSE)	
	50-XRL-1615	Line Outlet Valve OPEN and CLOSE F/B
	50-MOV-1615 (OPEN)	
	50-MOV-1615 (CLOSE)	
	50-XRL-1603	Line Inlet Valve OPEN and CLOSE F/B
	50-MOV-1603 (OPEN)	
	50-MOV-1603 (CLOSE)	
	50-XRL-1613	Line Outlet Valve OPEN and CLOSE F/B
	50-MOV-1613 (OPEN)	
	50-MOV-1613 (CLOSE)	

Digital Output

Instrument Description	Controller Tag	Description of Tags

MOV	50-MOV-1601 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	50-MOV-1601 (CLOSE)	
	50-MOV-1615 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	50-MOV-1615 (CLOSE)	
	50-MOV-1603 (OPEN)	Line Inlet Valve OPEN and CLOSE COMMAND
	50-MOV-1603 (CLOSE)	
	50-MOV-1613 (OPEN)	Line Outlet Valve OPEN and CLOSE COMMAND
	50-MOV-1613 (CLOSE)	
Slop Transfer Pump	50-HSH-102A	SLOP PUMP-1 START COMMAND
	50-HSL-102A	SLOP PUMP-1 STOP COMMAND
	50-HSH-102B	SLOP PUMP-2 START COMMAND
	50-HSL-102B	SLOP PUMP-2 STOP COMMAND
Sump Pump	50-HSH-101	SUMP PUMP START COMMAND
	50-HSL-101	SUMP PUMP STOP COMMAND

APPENDIX III(F)

IO Points of RT

Analog Input

Instrument Description	Controller Tag	Description of Tag
Basket Filter		Basket Filter 1 Differential Pressure Indicator
	_60_DPI_1702	Basket Filter 2 Differential Pressure Indicator
Flowmeter	_60_TI_1702	Temperature - Flowmeter 1
	_60_TI_1703	Temperature - Flowmeter 2
	_60_FmI_1701	Flow Rate Flowmeter 1
	_60_FmI_1702	Flow Rate Flowmeter 2
	_60_PI_1710	Flowmeter 1 Pressure
	_60_PI_1711	Flowmeter 2 Pressure
Station Inlet	_60_PI_1701	Station Inlet Pressure Indicator
	_60_TI_1701	Station Inlet Temperature Indicator
Station Outlet	_60_PI_1704	Station Outlet Pressure Indicator
	_60_TI_1705	Station Outlet Temperature Indicator
Density Meter	_60_DI_1701C	Density Meter 1701
	_60_PI_1705	Outlet Pressure after DI 1701
	_60_DI_1702C	Density Meter 1702
Sump Tank	_60_LI_1701	Sump Tank Level Indication
CPTR	_60_CPTR_V	CPTR Voltage
	_60_CPTR_A	CPTR Current
	_60_PSP	Pipe to Soil Potential
PCV	_60_ZI_1701	PCV Opening Indication
	_60_PI_1202	Pressure Indication

Instrument Description	_60_DPI_1701	Description of Tags
Sump Pump & Tank	60-XRL-101	SUMP PUMP REMOTE/LOCAL
	60-SMP-101	SUMP PUMP STATUS
Flowmeter	Flowmeter Totalizer Reset 1701	
	Flowmeter Totalizer Reset 1702	
CPTR	60-CPTR-AU	CPTR AUTO MODE
	60-PL-OV	PL OVER VOLTAGE
	60-PL-UV	PL UNDER VOLTAGE
	60-REF-F	ALL REF CELL FAIL
Pig Indicator	60-XXI-1701	SCRAPER RECEIVE
	60-XXI-1702	SCRAPER IN TRAP
Level Switch	60-LAH-1701	SUMP TANK LEVEL HIGH
	60-LAL-1701	SUMP TANK LEVEL LOW
Pressure Switch	60-PSHH-1701	SUMP TANK PRESSURE HIGH
MOV	60-XRL-1701	
	60-MOV-1701 (OPEN)	
	60-MOV-1701 (CLOSE)	Line Inlet Valve OPEN and CLOSE F/B
	60-XRL-1702	
	60-MOV-1702 (OPEN)	
	60-MOV-1702 (CLOSE)	Pig Receiver MOV
	60-XRL-1703	
	60-MOV-1703 (OPEN)	
	60-MOV-1703 (CLOSE)	Line Inlet Valve OPEN and CLOSE F/B
	60-XRL-1709	Basket Filter Inlet Valve OPEN and CLOSE F/B
	60-MOV-1709 (OPEN)	
	60-MOV-1709 (CLOSE)	
	60-XRL-1710	
	60-MOV-1710 (OPEN)	
	60-MOV-1710 (CLOSE)	
	60-XRL-1711	Basket Filter Outlet Valve OPEN and CLOSE F/B
	60-MOV-1711 (OPEN)	
	60-MOV-1711 (CLOSE)	
	60-XRL-1712	
	60-MOV-1712 (OPEN)	
	60-MOV-1712 (CLOSE)	
	60-XRL-1713	Flowmeter1 and Flowmeter2 Inlet Valve OPEN and CLOSE F/B
	60-MOV-1713(OPEN)	
	60-MOV-1713 (CLOSE)	
	60-XRL-1714	
	60-MOV-1714 (OPEN)	
	60-MOV-1714 (CLOSE)	

	60-XRL-1704	Manifold inlet valve
	60-MOV-1704(OPEN)	
	60-MOV-1704 (CLOSE)	
	60-XRL-1705	
	60-MOV-1705 (OPEN)	
	60-MOV-1705 (CLOSE)	
	60-XRL-1706	
	60-MOV-1706 (OPEN)	
	60-MOV-1706 (CLOSE)	
	60-XRL-1707	
	60-MOV-1707 (OPEN)	
	60-MOV-17097(CLOSE)	
	60-XRL-1708	
	60-MOV-1708 (OPEN)	
	60-MOV-1708 (CLOSE)	
PCV	60-ZT-1701	Remote/Local Indication

Analog Output

Instrument Description	Controller Tag	Description of Tags
PCV	PCV_CMD	PCV Control Command

Digital Output

Instrument Description	Controller Tag	Description of Tags
Sump Pump & Tank	60-STT-101	SUMP PUMP START COMMAND
	60-STP-101	SUMP PUMP STOP COMMAND
	60-MOV-1701 (OPEN)	Line Inlet Valve OPEN and CLOSE command
	60-MOV-1701 (CLOSE)	
	60-MOV-1702 (OPEN)	Pig Receiver MOV
	60-MOV-1702 (CLOSE)	
	60-MOV-1703 (OPEN)	Line Inlet Valve OPEN and CLOSE F/B
	60-MOV-1703 (CLOSE)	
	60-MOV-1709 (OPEN)	Basket Filter Inlet Valve OPEN and CLOSE F/B
	60-MOV-1709 (CLOSE)	
	60-MOV-1710 (OPEN)	
	60-MOV-1710 (CLOSE)	
	60-MOV-1711 (OPEN)	Basket Filter Outlet Valve OPEN and CLOSE F/B
	60-MOV-1711 (CLOSE)	
	60-MOV-1712 (OPEN)	
	60-MOV-1712 (CLOSE)	

	60-MOV-1713(OPEN)	Flowmeter1 and Flowmeter2 Inlet Valve OPEN and CLOSE F/B
	60-MOV-1713 (CLOSE)	
	60-MOV-1714 (OPEN)	
	60-MOV-1714 (CLOSE)	
	60-MOV-1704(OPEN)	Manifold inlet valve
	60-MOV-1704 (CLOSE)	
	60-MOV-1705 (OPEN)	
	60-MOV-1705 (CLOSE)	
	60-MOV-1706 (OPEN)	
	60-MOV-1706 (CLOSE)	
	60-MOV-1707 (OPEN)	
	60-MOV-17097(CLOSE)	
	60-XRL-1708	
	60-MOV-1708 (OPEN)	
	60-MOV-1708 (CLOSE)	

APPENDIX III(G)

IO POINTS OF SV STATIONS

Analog Inputs

Instrument Description	Controller Tag	Description Tag
Pressure Transmitter	300NSPL_SV*_PI01_PV	Pressure Transmitters
	300NSPL_SV*_PI02_PV	
Temperature Transmitter	300NSPL_SV*_TI01_PV	Temperature Transmitters
	300NSPL_SV*_TI02_PV	
Cathodic Protection	300NSPL_SV*_CATH_PSP_PV	Cathodic Protection Parameters
	300NSPL_SV*_CPTR_CUR_PV	
	300NSPL_SV*_CPTR_VOL_PV	

Digital Input

Instrument Description	Controller Tag	Description Tag
RCM VALVE	300NSPL_SV*_MOV_XRL	MOV LOCAL REMOTE
	300NSPL_SV*_MOV_PV	MOV OPEN/CLOSE FEEDBACK
Pipeline Protection	300NSPL_SV*_PL_POP	Pipeline Overprotected
	300NSPL_SV*_PL_PUP	Pipeline Under protected
Cathodic Protection	300NSPL_SV*_ARC_FAI	Cathodic Protection Parameters
	300NSPL_SV*_CPTR_MOD	
Radio Room Temperature	300NSPL_SV*_TEMP_HIGH	Radio Room Temperature High Alarm
Entry Alarm	300NSPL_SV*_ENRTY	ENTRY ALARM
Battery on discharge alarm	300NSPL_SV*_BATON	Charger Mains Fail

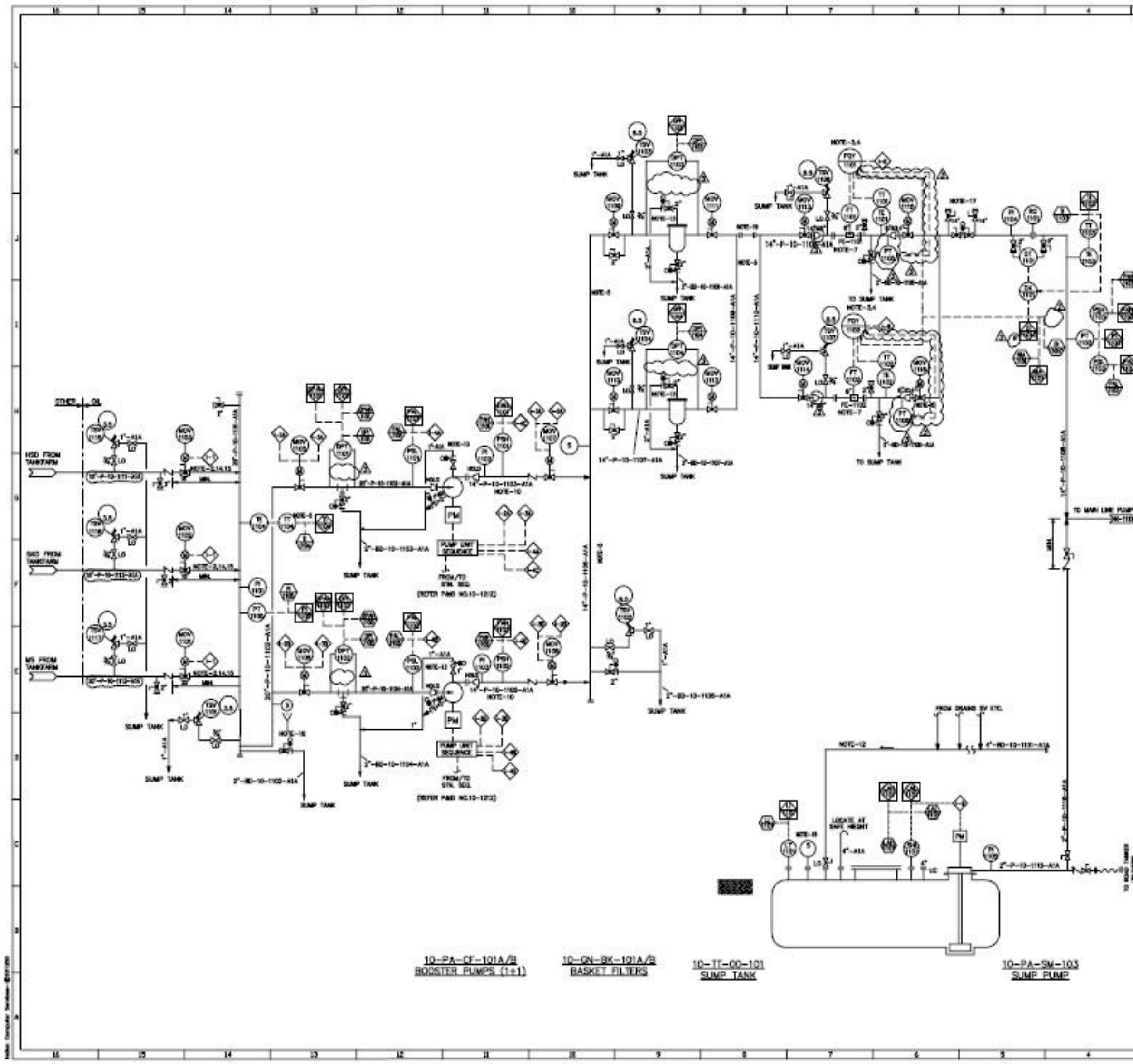
Digital Output

Instrument Description	Controller Tag	Description Tag
RCM VALVE	300NSPL_SV*_MOV_MV	MOV OPEN/CLOSE COMMAND

Note : Where * represents from 1 to 9 for all relevant SV Stations.

APPENDIX IV(A)

NDT P&ID



NOTES:

1. UNIT No. '10' TO BE ADDED AS PREFIX TO ALL INSTRUMENTS APPEARING IN THIS P&ID.
2. ALL THE MOV SHALL BE OPERABLE FROM FIELD,CONTROL ROOM & SMCS. FOR MOV LEGEND REFER P&ID NO. 6047-02-41-00-1200 [DETAIL-1(1)].
3. FOR FLOW COMPUTER DETAIL REFER P&ID NO.6487-02-41-00-1201.
4. THE FOLLOWING MINIMUM INDICATION SHALL BE AVAILABLE IN THE FLOW COMPUTER LCD: FI, FQ, TI & CORRECTED FI/FmI,FQ AND FmQ.
5. THE PIPING PORTION IN BETWEEN THE FOLLOWING ISOLATION VALVES SHALL BE KEPT MINIMUM.
   A. MOV 1105 & 1106.
   B. MOV 1107 & 1108.
   C. MOV 1109 & 1110.
   D. MOV 1111 & 1112.
   E. MOV 1113 & 1114.
   F. MOV 1115 & 1116.
6. DELETED.
7. DELETED.
8. PROVIDE SIGHT GLASS ON BOOSTER PUMP CASING VENT LINE. DOWN STREAM OF ISOLATION VALVE.
9. DELETED.
10. ALARM FOR "PUMP FAIL TO TRIP" SHALL BE PROVIDED IN CONTROL ROOM .
11. COMPANION FLANGE FOR PUMPS SHALL BE PROVIDED BY PUMP VENDOR.
12. ADEQUATE SLOPE SHALL BE PROVIDED IN DRAIN HEADER FOR SMOOTH GRAVITY FLOW.
13. DELETED.
14. DELETED.
15. AN ADDITIONAL 25% OPEN POSITION SWITCH SHALL BE PROVIDED FOR MOVS-1101, 1102 & 1103.
16. SAMPLING HATCH.
17. PROVISION FOR METER PROVER.
18. DRAIN FROM SAMPLE CONNECTION TO BE ROUTED TO SUMP TANK FOR SAMPLE POINT LEGEND REFER P&ID NO. 6487-02-41-00-1200 (DETAIL-3)
19. PROVISION FOR TURBINE FLOW METER (FUTURE).

INTERLOCK LOGIC

INTERLOCK	ACTUATED BY	ACTION
I-1	OPENING COMMAND FOR MOV-1100/1102/1103 (ANY OF THE ABOVE)	OPEN DESIRED PRODUCT HEADER VALVE & CLOSE OTHER OPENED PRODUCT HEADER VALVE.

THIS INTERLOCK WILL NOT ALLOW OPENING UP OF TWO PRODUCT HEADER VALVE AT THE SAME TIME.

INTERLOCK	ACTUATED BY	ACTION
I-2A	PUMP UNIT START UP PUSH BUTTON 10-PB-101 A1 OR HSH-101A1	BRING MOV-1105 * TO OPEN AND MOV-1107 TO CLOSE POSITION
I-2B	PUMP UNIT START UP PUSH BUTTON 10-PB-101 B1 OR HSH-101B1	BRING MOV-1108 * TO OPEN AND MOV-1106 TO CLOSE POSITION
I-3A	TRIPPING OF PA-CF-101A	ESD : CLOSE MOV-1105,1107 OTHER TRIP-CLOSE MOV-1107 WITH A TIME DELAY SUFFICIENT FOR PUMP COASTDOWN
I-3B	TRIPPING OF PA-CF-101B	ESD : CLOSE MOV-1106,1108 OTHER TRIP-CLOSE MOV-1108 WITH A TIME DELAY SUFFICIENT FOR PUMP COASTDOWN
I-4A	PSL-1101	TRIP PA-CF-101A
I-4B	PSL-1102	TRIP PA-CF-101B
I-4C	PSH-1101	TRIP PA-CF-101A
I-4D	PSH-1102	TRIP PA-CF-101B
I-9	LSL-1101	TRIP SUMP PUMP PA-SM-101

FOR INTERLOCK I-8 REFER P&ID NO. 1212.

- INTERLOCK BYPASS SHALL BE PROVIDED FOR I-4C & I-4D WITH INDICATION.

* DISCHARGE MOV'S OF THE RESPECTIVE PUMPS WILL OPEN AFTER A TIME LAG WITH RESPECT TO THE INDIVIDUAL PUMP UNIT STARTUP.

No.	DATE	REVISIONS	DRN	BY	CHKD	APPD
3	[illegible]	REVISED AS PER ENGG. COMMENTS	[illegible]			
2	[illegible]	[illegible]	[illegible]	DR	DS	DS
1	[illegible]	COMMENTS INCORPORATED	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	ISSUED FOR COMMENTS/ENGG	[illegible]	[illegible]	AC	AC

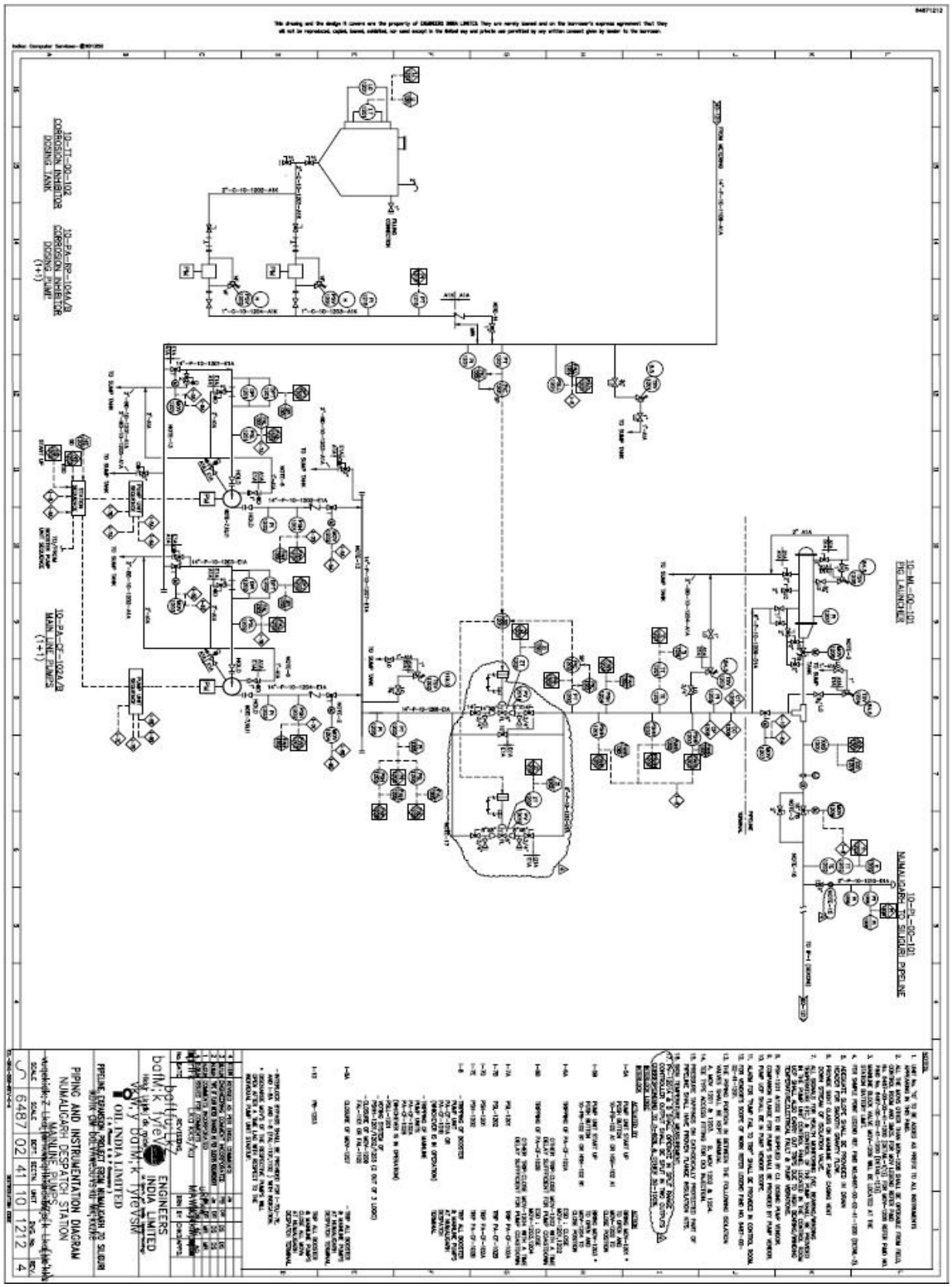
baftfu;Lkz bafM;k fyfeVsM
ENGINEERS INDIA LIMITED

vkW;y bafM;k fyfeVsM
OIL INDIA LIMITED
(A Navratna E & P Company)

PIPELINE EXPANSION PROJECT FROM NUMALIGARH TO SILIGURI

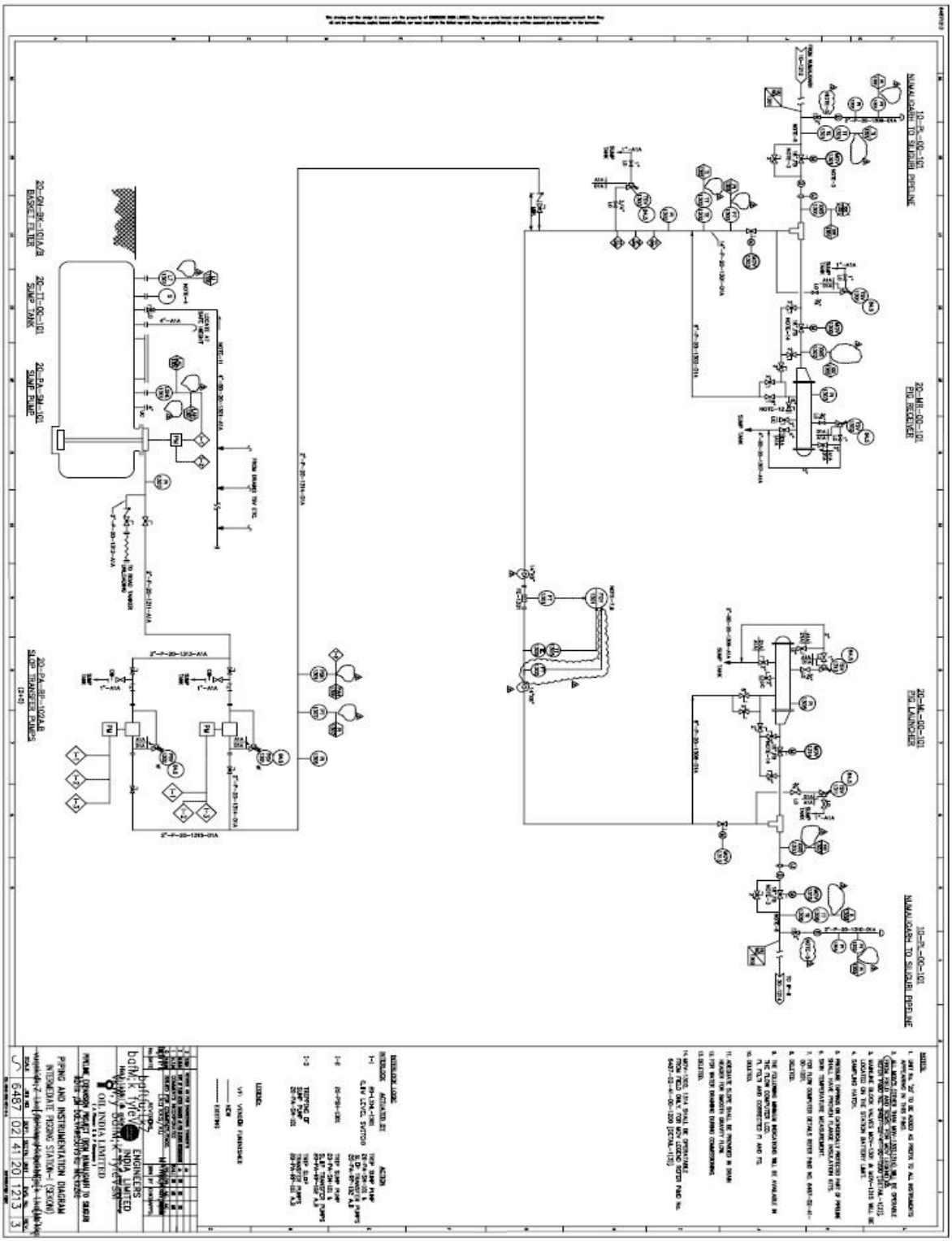
PIPING AND INSTRUMENTATION DIAGRAM
NUMALIGARH DESPATCH STATION
BOOSTER PUMPS AND METERING

SCALE	JOB NO.	DEPT.	SECTN.	UNIT	DWG. No.	REV.
∽	6487	02	41	10	1211	3



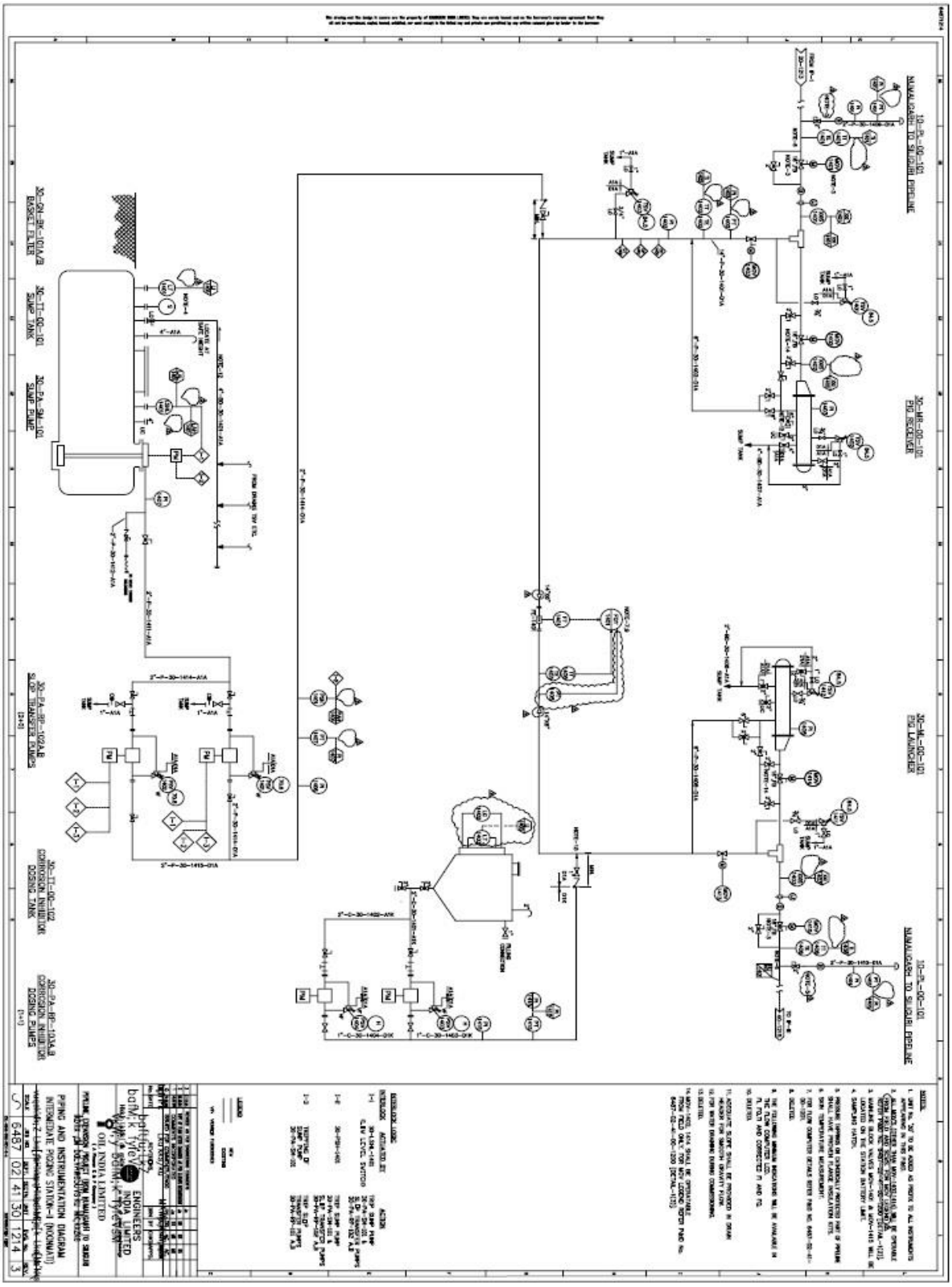
APPENDIX IV(B)

P& ID -IP Station 1



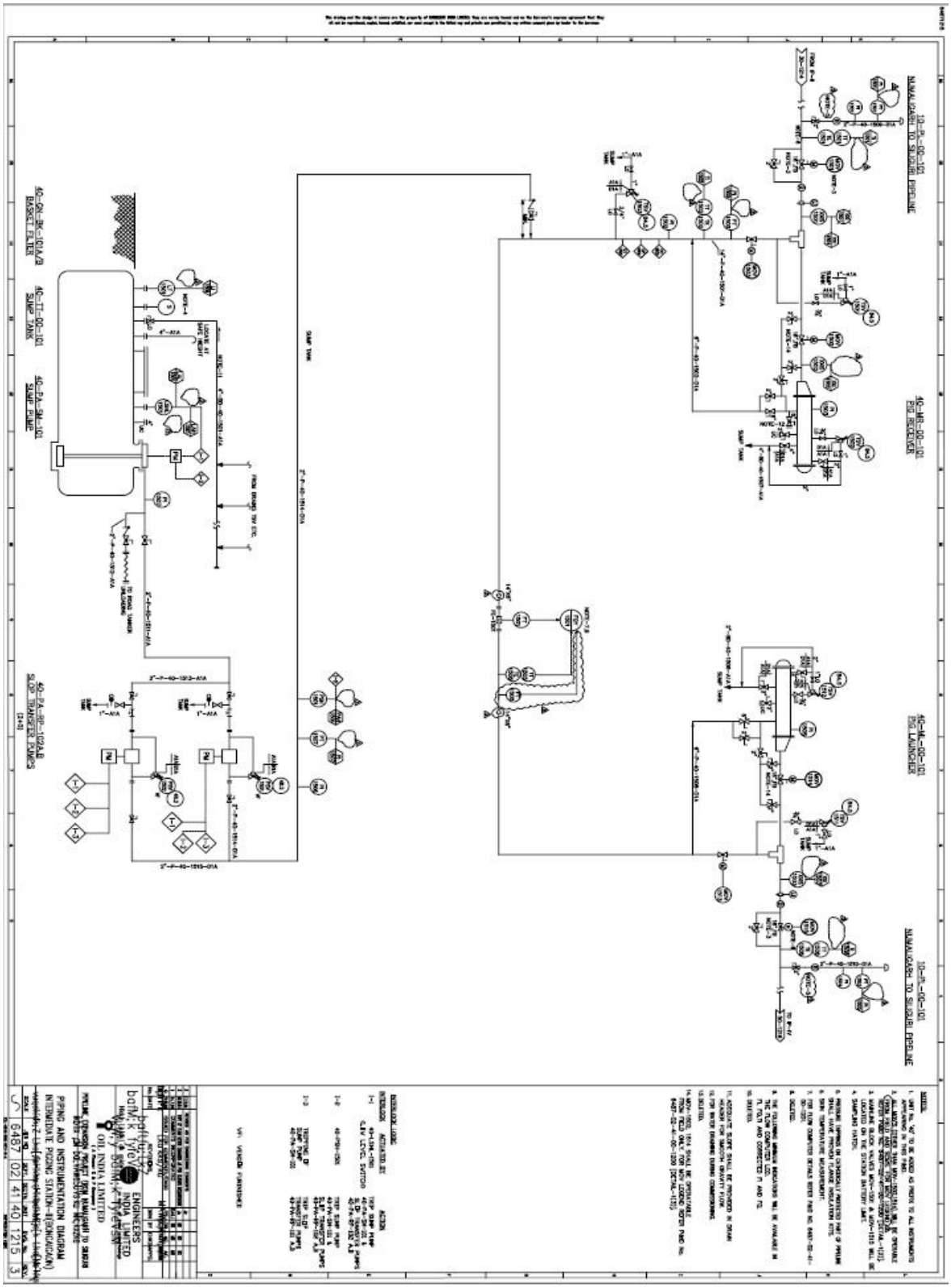
APPENDIX IV(C)

IP Station 2



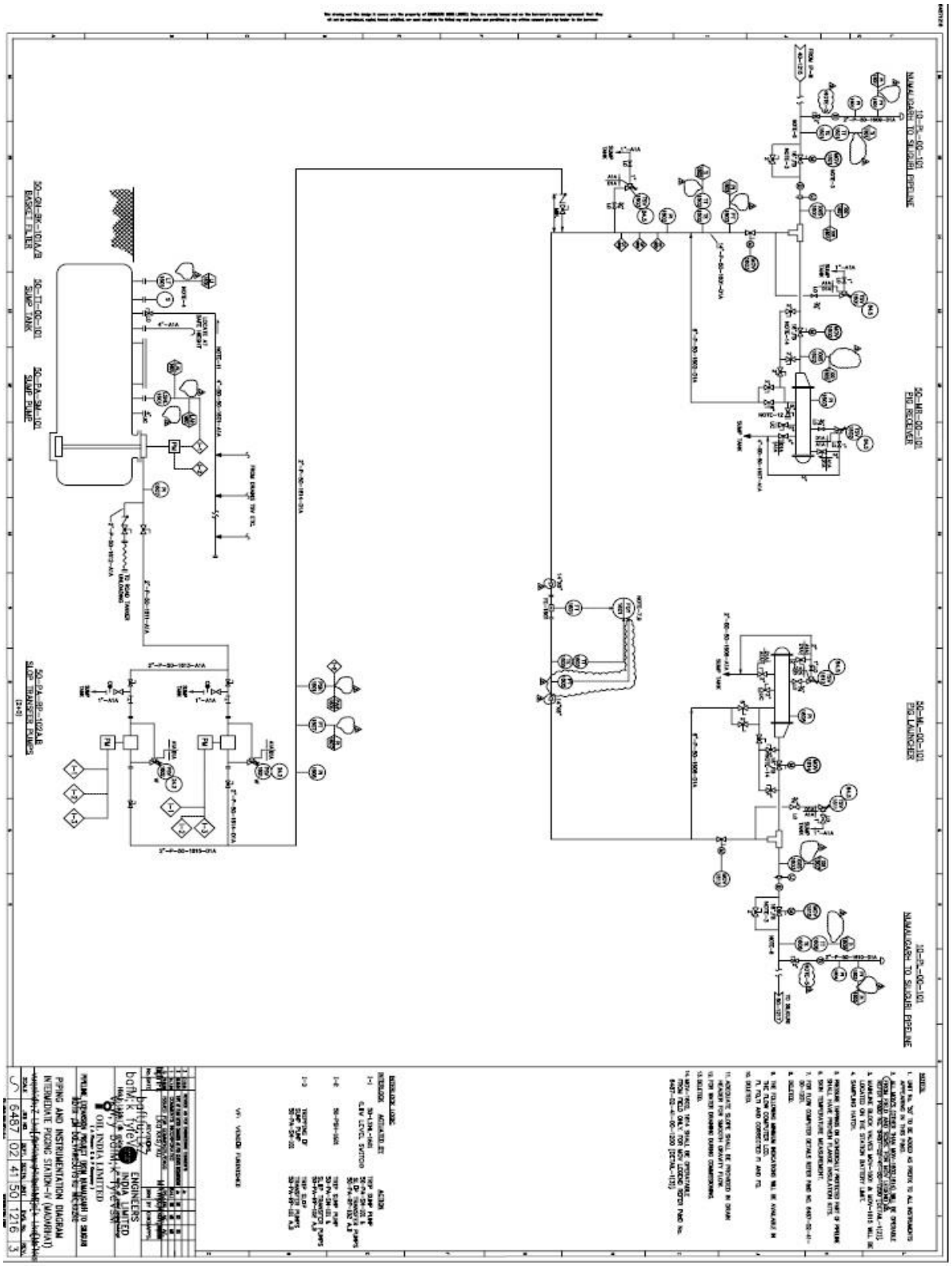
APPENDIX IV(D)

P &ID- IP Station 3



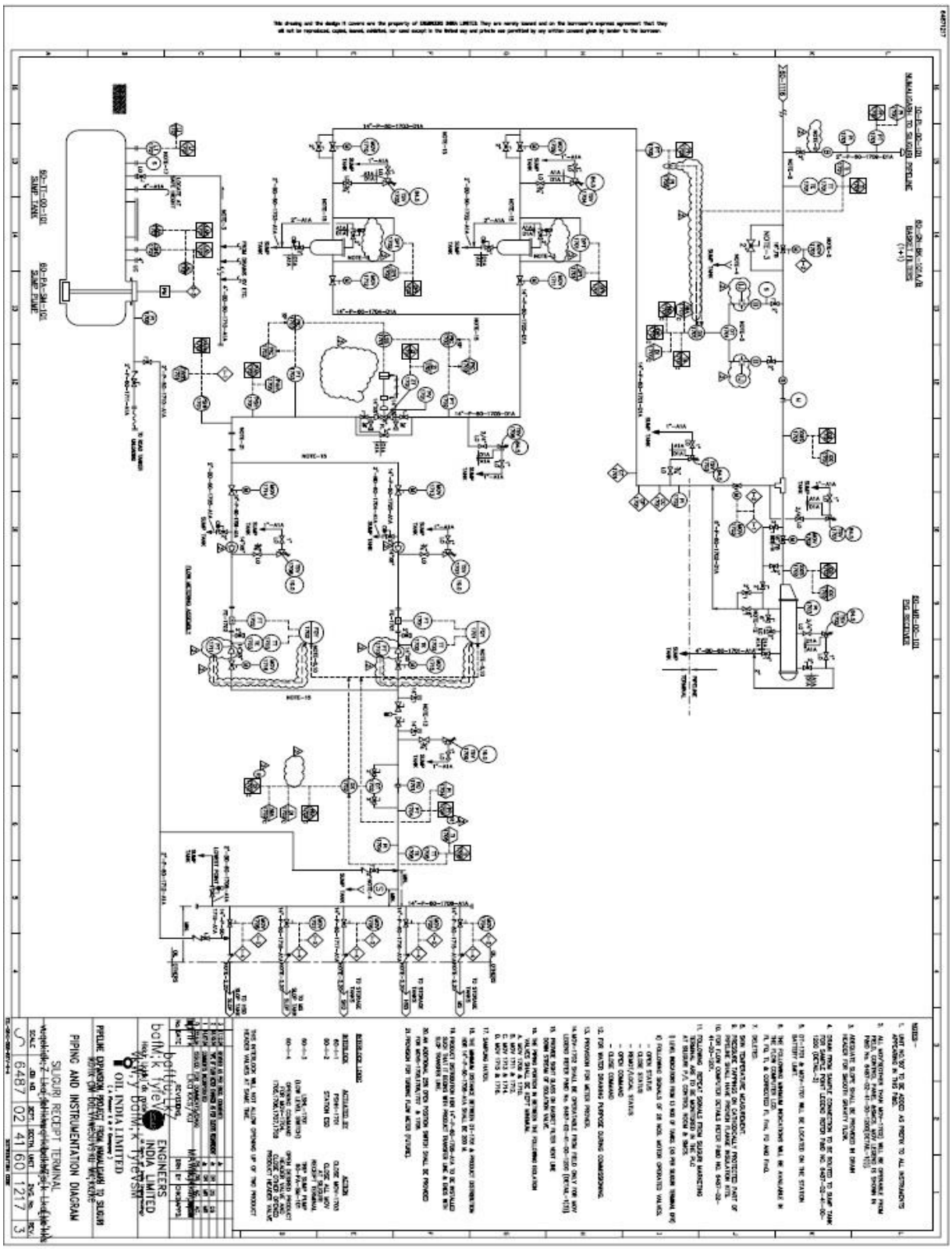
APPENDIX IV(E)

P &ID -IP Station 4



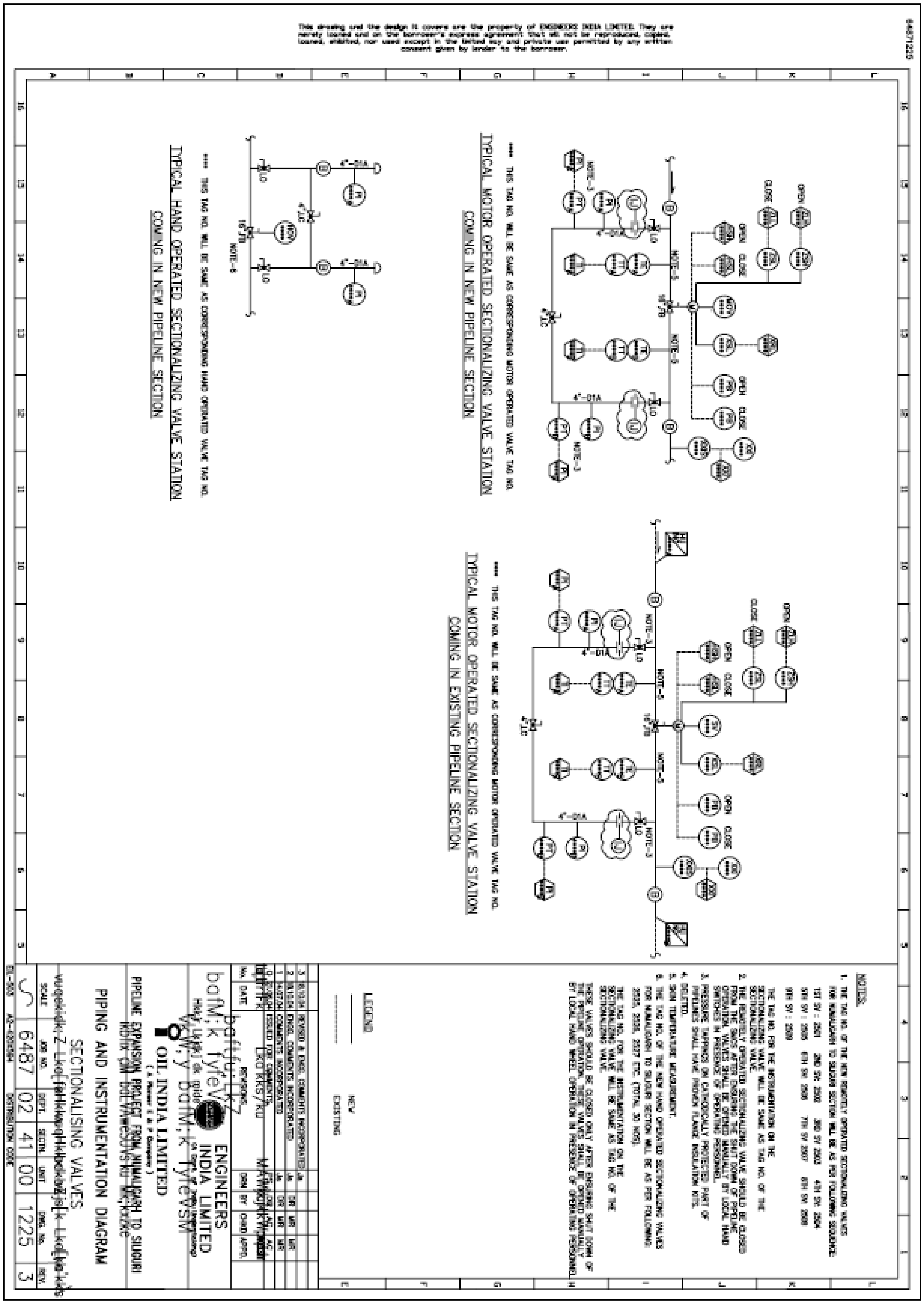
APPENDIX IV(F)

P ID - RT



APPENDIX IV(G)

P & ID - SV Station (APPLICABLE FOR ALL 9 SV stations of NSPL)



TYPICAL MOTOR OPERATED SECTIONALIZING VALVE STATION
COMING IN NEW PIPELINE SECTION
TYPICAL MOTOR OPERATED SECTIONALIZING VALVE STATION
COMING IN EXISTING PIPELINE SECTION
TYPICAL HAND OPERATED SECTIONALIZING VALVE STATION
COMING IN NEW PIPELINE SECTION
NOTES
LEGEND
NEW
EXISTING
ENGINEERS INDIA LIMITED
OIL INDIA LIMITED
PIPING AND INSTRUMENTATION DIAGRAM
SECTIONALISING VALVES
6487
02
41
00
1225
3

TECHNICAL CHECK LIST OF APPS Package:

Sl. No	Description	Bidder's Comments Remarks if any
1	APPS Server OS: Windows Server 2019	
2	HMIs OS: Windows 10 Pro	
3	Redundant LAN for all Servers and HMIs	
4	System Hardware as per clause G.12 of Part II	
5	LDS Model based on RTSA/RTTM	
6	Additional modules	
	• Batch Tracking • Scrapper Tracking • Pipeline Efficiency • Instrument Drift Analysis • Pipeline Integrity • DRA tracking	
7	ACCURACY of the package as per clause G.5 of section G PART II	
8	GUI functionality in APPS Servers, HMIs and SCADA HMIs as per clause G.5.5 of section G PART II	
9	Tonal alarm for leak warning and leak alarm functionality in APPS HMIs	
10	Scope for status monitoring of all Legs/sections in SCADA HMI simultaneously via GUI	
11	Manual tuning options in LDS GUI	
12	Duly filled ANNEXURES of Section G part II, submitted (Yes/No)	
13	As Per BOM	

REMARK (IF ANY):

DEVIATIONS IF ANY AGAINST THE CLAUSES AND ITS SUB ITEMS OF THE TECHNICAL SPECIFICATION AS MENTIONED IN THE TENDER SHOULD REFLECT CLEARLY IN THE REMARKS.

ANNEXURE – CC

COMMERCIAL COMPLIANCE SHEET

COMMERCIAL COMPLIANCE SHEET

The check list must be completed and submitted with the offer. Please ensure that all these points are covered in the offer. These will ensure that the offer is properly evaluated. Please mark 'Yes', 'No' or 'Not Applicable' or specify against the following questions, in the right hand column.

OFFER REF:			
NAME OF THE BIDDER:			
Srl. No.	**Particulars**	**Yes/No/Not Applicable**	**Remarks**
1	Whether bid submitted under Single Stage Two Bid System? i.e. Whether Price are uploaded in "Notes & Attachment" and technical unpriced bid submitted under "Technical Attachment"?		
2	Whether **BID SECURING DECLARATION** been submitted as per format **Annexure AA1 as a part of technical bid.**		
3	In case MSE, whether MSE certificate submitted along with **BID SECURING DECLARATION** as per format **Annexure AA1 as a part of technical bid.**		
4	Whether offered firm prices?		
5	Whether quoted offer validity of 120 days from the date of final bid closing of the tender?		
6	Whether quoted firm delivery period?		
7	Whether quoted delivery as per BRC Criteria?		
8	Whether quoted as per tender (without any deviations)?		
9	Whether quoted any deviation?		
10	Whether deviation separately highlighted?		
11	Whether agreed to the Warranty clause?		
12	Whether Price Bid submitted as per Price Schedule		
13	Whether quoted all the items/qty. of tender?		
14	Whether indicated the country of origin for the items quoted?		
15	Whether technical literature / catalogue enclosed?		
16	Whether confirmed acceptance of tender Payment Terms?		
17	Whether indicated the place from where the goods will be dispatched. To specify:		
18	Whether road transportation charges up to Destination quoted?		
19	Whether offered Ex-works price including packing/forwarding charges?		
20	Whether weight & volume of items offered indicated?		
21	If Pre-despatch/shipment inspection charges applicable, whether quoted separately?		
22	Whether confirmed to submit PBG as asked for in tender?		
23	Whether agreed to submit PBG within 30 days of placement of order?		
24	Whether indicated import content in the offer?		
25	Whether all applicable Taxes & Duties have been quoted?		

26	Whether all BRC/BEC clauses accepted?		
27	Whether MSME? If yes, whether documents enclosed as per tender.		
28	Whether Annexure EE - Annual turnover & Net worth Certificate submitted?		
29	Whether affidavit/undertaking submitted certifying that the balance sheet/Financial Statements for the financial year 2019-20 has actually not been audited so far, if applicable?		
30	Whether Annexure – FF - Undertaking towards submission of authentic information/documents submitted.		
31	Whether the Digital signature used is Class III digital certificate (e-commerce application) with 'Certificate Type: **Organization Certificate'**		
32	Whether Submit Annexure XII of Integrity Pact		
33	Whether comply all terms & condition of GTC (General Terms & Contion)		

ANNEXURE – EE

CERTIFICATE OF ANNUAL TURNOVER & NETWORTH

CERTIFICATE OF ANNUAL TURNOVER & NETWORTH

TO BE ISSUED BY PRACTISING CHARTERED ACCOUNTANTS' FIRM ON THEIR LETTER HEAD

TO WHOM IT MAY CONCERN

This is to certify that the following financial positions extracted from audited financial statements of M/s…… (Name of the bidder) for the last 3 (three) completed accounting years upto……(as the case may be) are correct.

YEAR	TURNOVER In INR (Rs.) Crores/ USD Million*	NET WORTH In INR (Rs.) Crores / USD Million*

*Rate of conversion (if used any): USD 1.00 = INR ……

Place:
Date:

Seal:

Membership No.:
Registration Code:
UDIN No.:

Signature:

****Applicable for Global Tenders.***

ANNEXURE – FF

FORMAT OF UNDERTAKING BY BIDDERS TOWARDS SUBMISSION OF AUTHENTIC INFORMATION/ DOCUMENTS

FORMAT OF UNDERTAKING BY BIDDERS TOWARDS SUBMISSION OF AUTHENTIC INFORMATION/DOCUMENTS

(To be typed on the letter head of the bidder)

Ref. No_____ Date _____

To,

The Dy. General Manager (Materials)PL
Oil India Limited, Pipeline Headquarters
Narangi, Guwahati

Sub: Undertaking of authenticity of information/documents submitted
Ref: Your tender No._____ Dated _____

Sir,

With reference to our quotation no. ..... dated..... against your above-referred tender, we hereby undertake that no fraudulent information/documents have been submitted by us.

We take full responsibility for the submission of authentic information/documents against the above cited bid.

We also agree that, during any stage of the tender/contract agreement, in case any of the information/documents submitted by us are found to be false/forged/fraudulent, OIL has right to reject our bid at any stage including forfeiture of PBG and/or cancel the award of contract and/or carry out any other penal action on us, as deemed fit.

Yours faithfully,
For (type name of the firm here)

Signature of Authorised Signatory

Name :
Designation :
Phone No.
Place :
Date :

(Affix Seal of the Organization here, if applicable)

ANNEXURE - GG

STARTUP AND MSE VENDORS

In case a Startup *[defined as per Ministry of Commerce and Industry (Department of Industrial Policy and Promotion, DIPP) latest notification]/* MSE is interested in supplying the tendered item but does not meet the Pre-Qualifying Criteria (PQC)/ Proven Track Record (PTR) indicated in the tender document, the Startup/MSE is requested to write a detailed proposal separately, and not against the present tender requirement, to the tender issuing authority about its product. Such proposals shall be accompanied by relevant documents in support of MSE (where applicable) or in case of Startup, following documents shall be given:

1. Certificate of Recognition issued by the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India.

2. Certificate of incorporation.

3. Audited Profit & Loss (P&L) Statement of all the Financial Years since incorporation. In case where the Balance sheet has not been prepared, bidder shall submit a certificate in original from its CEO/CFO stating the turnover of the bidding entity separately for each Financial Years since incorporation along with a declaration stating the reason for not furnishing the audited P&L Statement. This certificate shall be endorsed by a Chartered Accountant/Statutory Auditor.

The Proposal shall be examined by OIL and OIL may consider inviting a detailed offer from the Startup/MSE with the intent to place a TRIAL or TEST Order, provided the Startup/MSE meets the Quality and Technical Specifications.

In case the Startup/MSE is successful in the Trial Order, the vendor shall be considered for PQC exemption/relaxation (as the case may be) for the next tender for such item till the time it remains a Startup/MSE.

Annexure-XX

Format for Undertaking by Bidders towards compliance of office memorandum F. No. 6/18/2019-PPD dated 23rd July, 2020 (Public Procurement no. 1) issued by Department of Expenditure, Ministry of Finance, Govt. of India

(To be typed on the letter head of the bidder)

Ref. No_____ **Date** _____

Tender No._____ **Dated** _____

OIL INDIA LIMITED

……

……

Dear Sirs,

"We have read the clause regarding restrictions on procurement from a bidder or a country which shares a land border with India; We certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. We hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. [Where evidence of valid registration by the Competent Authority shall be attached.]"

We also agree that, during any stage of the tender/contract agreement, in case the above information/documents submitted by us are found to be false, Oil India Limited has the right to immediately reject our bid/terminate contract at any stage and carry out further legal action on us in accordance with law.

Yours faithfully,

For (type name of the firm here)

Signature of Authorised Signatory

Name :

Designation :

Phone No.

Place :

Date :

(Affix Seal of the Organization here, if applicable)

Note : This form should be returned along with offer duly signed.

ANNEXURE-N

RESTRICTIONS ON PROCUREMENT FROM A BIDDER OF A COUNTRY WHICH SHARES A LAND BORDER WITH INDIA

1.0 Ministry of Finance of Govt. of India, Department of Expenditure, Public procurement Division vide office memorandum F. No. 6/18/2019-PPD dated 23rd July, 2020(order-Public Procurement no.1) has proclaimed the insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017 w.e.f. 23rd July, 2020 regarding restrictions on procurement from a bidder of a country which shares a land border with India on the grounds of defence of India on matters directly or indirectly related thereto including national security. Bidders are requested to take note of the following clauses and submit their offers accordingly wherever applicable.

Bidders must submit duly sealed & signed undertaking as per format provided vide, "**Annexure-XX**" along with the technical bid.

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

Validity of Registration:

In respect of tenders, registration should be valid at the time of submission of bids and at the time of acceptance of bids. In respect of supply otherwise than by tender, registration should be valid at the time of placement of order. If the bidder was validly registered at the time of acceptance/placement of order, registration shall not be a relevant consideration during contract execution.

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a county which shares a land border with India "for the purpose of this Order means: -

a. An entity incorporated, established or registered in such a country; or
b. A subsidiary of an entity incorporated, established or registered in such a country; or
c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
d. An entity whose beneficial owner is situated in such a country; or
e. An Indian (or other) agent of such an entity; or
f. A natural person who is a citizen of such a country; or
g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.
   Explanation –

   a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company;

   b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person (s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or

together, or through one or more juridical person, has ownership or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract any job related to the procurement (e.g. installation and commissioning, Annual Maintenance Contract etc.) to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

ANNEXURE-M

UNDERTAKING BY VENDOR ON SUBMISSION OF PERFORMANCE BANK GUARANTEE

To,
The Oil India Limited
Materials/Contracts Department
Guwahati, Assam

We M/s ..... are submitting the performance security in favour of Oil India Limited, Guwahati in the form of bank guarantee bearing reference no. ..... for an amount of INR/USD/EUR ..... valid up to ..... as per terms and conditions of our Purchase Order/Contract No. .....

PBG issuing bank details:-
Bank
Branch
IFS Code
Contact Details
E-mail Addresses Mobile
Telephone
Fax
Correspondence Address
H No/Street/City State
Country
Pin Code
Declaration:-
We have arranged to send the confirmation of issuance of the performance bank guarantee via SFMS portal through our bank using the details mentioned in the contract/purchase order and hereby confirming the correctness of the details mentioned.
Authorised Signature_____
Name_____
Vendor Code_____
Email ID_____
Mobile No _____
Encl: Original performance bank guarantee

Annexure AA1

BID SECURING DECLARATION

To,

OIL INDIA LIMITED

PIPELINE HEADQUARTER, Guwahati,ASSAM, INDIA

Whereas ..... (herein after called 'the Bidder') has submitted their Bid No. ..... dated..... against OIL INDIA LIMITED, GUWAHATI, ASSAM, INDIA (hereinafter called the Purchaser)'s tender No..... for the supply of .....
(hereinafter called 'the Bid') KNOW ALL MEN by these presents that if I/We withdraw or modify our Bid during the period of validity, or if I/We are awarded the contract and I/We fail to sign the contract, or to submit a performance security before the deadline defined in the NIT / Purchase Order, then I/We shall be suspended for the period of two (2) years. This suspension of two years shall be automatic without conducting any enquiry.

Signature & Seal of the Bidder

Annexure NN

GeM Registration ID Declaration

To,

OIL INDIA LIMITED

PIPELINE HEADQUARTER, Guwahati,ASSAM, INDIA

CONFIRMATION OF GOVERNMENT E-MARKET PLACE REGISTRATION NUMBER(GeM)

We hare by confirmed the following:

Name of the Bidder:	
Address:	
GeM Registration ID:	

Signature & Seal of the Bidder

(Annexure-X)

PP-LC POLICY

(Purchase preference linked with local content)

1. For this tender, only Class-I Local Suppliers and Class-II Local Suppliers as defined under clause 2.5 of PPLC Policy (Amended) issued by Ministry of Petroleum and Natural Gas ref. FP-20013/2/2017-FP-PNG dated 17.11.2020, are eligible to bid.

2. The minimum local content in terms of items/services for this tender shall be 20%.

3. Any Class-I local supplier can opt for benefit under either of MSE 2012 policy or PPLC policy. Their preference with respect to this shall be submitted in the relevant bidding form.

4. The Amended PPLC policy document is attached in the e-tender. Bidders have to read the document and upload the declaration/certificate for percentage of local content in prescribed format given below along with duly signed calculations in the relevant appendix format given below for necessary qualification/purchase preference as applicable.

PROFORMA FOR SELF DECLARATION FOR LOCAL CONTENT

(On Bidder's Letter Head)

TENDER ENQUIRY NO. .....

ISSUED BY: Procurement Leader (Group 3), CPO (M), Bharat Petroleum Corporation Limited (Procurement Authority)

I/We, the undersigned, ……(full names), do hereby declare, in my / our capacity as …… ……..of .... (name of bidder entity), the following:

a) I / We have satisfied myself / ourselves that the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid document (refer Annexure no X)

b) The local content has been calculated using the formula given in the "**Appendix**" contained in the Annexure-X referred above and the provisions as detailed in the PPLC amended policy attached therein.

c) The Stipulated minimum threshold for Local content for the tendered items as **20%** is hereby met and we qualify as **Class I Local Supplier/ Class-II Local Supplier** as defined under clause no. 2.5 of the PPLC amended Policy document

d) Local content for _____ (product name) is certified as _____%, as calculated in terms of the PPLC amended policy.

Note: If the bid is for more than one product, a schedule of the local content product-wise shall be attached.

d) I/ We also declare that Local Content certificate shall be submitted along with each invoice raised by us after the contract has been awarded and we will ensure that the percentage of minimum local content as per the Class of supplier shall be maintained during all stages of execution of contract.

f) I/ We accept that the Procurement Authority / Institution have the right that the local content be verified in terms of the requirements of the said Policy.

g) I/ We understand that submission of incorrect data, or data that are not verifiable as described in the said Policy (PPLC amended policy), may result in the Procurement Authority imposing any or all of the remedies as provided under the Policy.

SIGNATURE OF AUTHORIZED SIGNATORY:

STAMP : DATE:

CALCULATION OF LOCAL CONTENT – GOODS

Name of manufacturer	Calculation of manufacturer cost per no unit of product			
Cost component in Rs./US$	Cost (Domestic component)	Cost (Imported component)	Cost Total	% Domestic Component
	A	B	C = A+B	D = A/ C
I. Direct material cost				
II. Direct Labour cost				
III. Factory Overhead				
IV. Total Production cost				

Note:

$$\% \text{ LC Goods} = \frac{\text{Total cost (IV C)-Total imported component cost (IV B)}}{\text{Total Cost (IV.C)}} \times 100$$

$$\% \text{ LC Goods} = \frac{\text{Total Domestic component cost (IV A)}}{\text{Total Cost (IV C)}} \times 100$$

CALCULATION OF LOCAL CONTENT – SERVICE

NAME OF SUPPLIER OF GOODS/PROVIDER OF SERVICE					
	COST SUMMARY				
Cost component in Rs./US$	Cost (Domestic component)	Cost (Imported component)	Cost Total	Local Content	
				%	Rs./US$
	B	C	D = B+D	E = B/ D	F=DxE
I. Material used cost					
II. Personnel & Consultant cost					
III. Other services cost					
IV. Total cost (I to III)					
TAXES AND DUTIES					
TOTAL QUOTED PRICE					

Note:

$$\% \text{ LC Service} = \frac{\text{Total cost (A.IV D)-Total imported component cost (A.IV.C)}}{\text{Total Cost (A.IV.D)}} \times 100$$

$$\% \text{ LC Service} = \frac{\text{Total Domestic component cost (A.IV.B)}}{\text{Total Cost (A.IV.D)}} \times 100$$

CALCULATION OF LOCAL CONTENT – EPC (GOODS AND SERVICE)

A	NAME OF SUPPLIER OF GOODS/PROVIDER OF SERVICE					
		COST SUMMARY				
	Cost component in Rs./US$	Cost (Domestic component)	Cost (Imported component)	Cost Total	Local Content	
					%	Rs./US$
		B	C	D = B+D	E = B/ D	F=DxE
I.	GOODS					
1.	Material used cost					
2.	Equipment cost					
3.	Sub Total I					
II.	SERVICES					
1.	Personnel & Consultant cost					
2.	Equipment & Work facility cost					
3.	Construction/Fabrication cost					
4.	Sub Total II					
5.	TOTAL COST OF GOODS + SERVICES					
B.	Non Cost Component					
C.	TOTAL QUOTED PRICE					

Note:

$$\%\ \text{LC Combination} = \frac{\text{Total domestic component cost of goods (A.I.3.B)} + \text{Total domestic component cost of service (A.II.5.B)}}{\text{Total Cost (A.III.D)}} \times 100$$

$$\%\ \text{LC Service} = \frac{\text{Total Domestic component cost (A.IV.B)}}{\text{Total Cost (A.IV.D)}} \times 100$$

UNDERTAKING FOR APPLICABILITY OF POLICY

To,

OIL INDIA LTD

SUB:
TENDER NO:

Dear Sir

We, M/s_____ ***(Name of Bidder)*** hereby confirm that following purchase preference to be considered:-

Description	Preference
Purchase Preference (linked with local content) or	
Purchase Preference under Public Procurement Policy for MSE	

Note:

(i) Please indicate your preference against only one policy.

(ii) The above preference shall be extended only after submission of requisite documents (as mentioned in the tender documents).

(iii) In case a bidder is eligible to seek benefit under PP-LC policy as well as under MSE 2012, then the bidder should categorically seek benefits against only one of the two policies i.e. either PP-LC or MSE policy.

(iv) In case a MSEs bidder opts for purchase preference based on PP-LC, he shall not be entitled to claim purchase preference benefit available to MSE Bidders under PPP for MSE 2012. However, the exemptions from furnishing Bidding Document fee and Bid security/EMD shall continue to be available to such MSE Bidders.

(v) The option once exercised cannot be modified subsequently.

[Signature of Authorized Signatory of Bidder having power of Attorney]

Place:
Date:
Name:
Designation:
Seal: