INDEX for FEED Scope of Work

REVISION HISTORY **2**

EXECUTIVE SUMMARY **3**

DEFINITIONS AND ABBREVIATIONS **4**

1. INTRODUCTION **5**
1.1 Purpose 6
1.2 Project Description 7
1.3 Project Schedule 8
1.4 Objectives and Requirements of the Project 9

2. INTERFACES **10**
2.1 COMPANY Interfaces 11
2.1.1 Project Management Team (PMT) 12
2.1.2 Data Exchange 13

2.2 Facilities Interfaces 14
2.2.1 Existing Facilities in the Field 15
2.2.2 Export Pipelines 16
2.2.3 COMPANY Operations 17

2.3 Reservoir Exploitation Interfaces 18
2.4 Commercial Development Interfaces 19
2.5 Other Interfaces 20

3. SCOPE OVERVIEW **21**
3.1 Initial FEED Activities 22
3.1.1 Review of the Scope of Work and Deliverables 23
3.1.2 Data Gathering Activities 24
3.1.3 Review of Pre-FEED Deliverables 25
3.1.4 Assessment of Logistics/Infrastructures 26

3.2 Early Works EPC 27
3.2.1 General Requirements 28
3.2.2 Early Civil Works 29
3.2.3 Piping Tie-Ins 30
3.2.4 Electrical Early Works 31
3.2.5 Early Works on Telecoms/Public Address and Alarm 32

3.3 Location of the new Facilities 33
3.4 Description of the new Facilities 34
3.5 Maximum Throughput Capacities of the new Facilities 35

4. PROJECT MANAGEMENT ACTIVITIES **36**
4.1 General Project Deliverables 37

4.2 Project Management and Administration 38
4.2.1 Project Management Requirements 39
4.2.2 Project Administration Requirements 40

4.3 Information Management and Technology 41
4.4 Quality Assurance and Quality Control (QA/QC) 42

4.5 Value Assurance 43
4.5.1 Specific Value Assurance Requirements 44
4.5.1.1 General 45
4.5.1.2 Value Improving Practices and Indicators (VIPs/VIIs) & Reviews 46
4.5.2 Specific Risk Management Requirements 47
4.5.3 CRA Critical Actions Register 48

4.6 Permitting and Certification 49
4.6.1 Permitting 50
4.6.1.1 General Regulations Requirements 51
4.6.1.2 Deviations 52
4.6.1.3 PLAC Permits, Licences, Approvals and Consents 53
4.6.1.4 Contacts/Interfaces with the Authorities 54
4.6.2 National Certifications 55
4.6.2.1 Certifications Procedures 56
4.6.2.2 Equipment Imports 57

4.7 Contracts, Procurement and Materials Management 58
4.7.1 General Overview of the SERVICES 59
4.7.2 Purchasing 60
4.7.2.1 Development of Bid List 61
4.7.2.2 Requisitions and Requests for Quotation (RFQs) 62
4.7.2.3 Interfaces with Bidders 63
4.7.2.4 Evaluation Procedure 64
4.7.2.5 Award Recommendation 65
4.7.2.6 Finalising Purchase Orders 66
4.7.2.7 Post-Purchase Order Administration 67
4.7.3 Materials Movement Management 68
4.7.4 Contracts for SERVICES and Work 69
4.7.4.1 Sub-Contracting 70
4.7.4.2 Company Requested SERVICES 71
4.7.4.3 Local Content Requirements 72
4.7.4.4 Special Contracts & Procurement Requirements during FEED 73

5. ENGINEERING ACTIVITIES 74
5.1 Introduction 75

5.2 Requirements Common to all Disciplines 76
5.2.1 General Requirements 77
5.2.2 Basis of Design 78
5.2.2.1 Basic Engineering Design Data 79
5.2.2.2 Design Criteria 80
5.2.2.3 Design Deliverables 81
5.2.2.4 Document Translations 82
5.2.3 Applicable Codes, Standards & Specifications 83
5.2.4 National Regulatory Authorities & Procedures 84

5.3	Health, Safety and Environment (HSE) Requirements	85
5.3.1	General	86
5.3.2	HSE Management Plan	87
5.3.3	Quantitative Risk Assessment (QRA)	88
5.3.4	Simultaneous Operations (SIMOPS)	89
5.3.5	Flaring	90
5.3.6	Explosion Overpressure	91
5.3.7	Environmental and Social Impact Assessments (ESIA)	92
5.3.8	Construction Site Gas Detectors	93
5.3.9	Materials Safety Data Sheets	94
5.3.10	HAZID and HAZOP Reviews	95
5.3.11	Noise and Vibration	96
5.3.12	Safety Critical Systems	97
5.3.13	Fire Protection	98
5.3.14	Escape Evacuation & Rescue Assessment (EERA)	99
5.3.15	Safety Assessments	100
5.3.16	Construction & Design Management (CDM) Philosophy	101
5.3.17	Declaration of Safety for Industrial Units (DSIU)	102
5.3.18	Safety Cases	103
5.4	Process Design	104
5.4.1	General	105
5.4.2	Fluid Composition Study	106
5.4.3	Initial Process Screening	107
5.4.4	Optimisation of Product Streams	108
5.4.5	Battery Limits Register	109
5.4.6	Heat Integration and Optimisation	110
5.4.7	Process Models	111
5.4.8	Tie-Ins for Early Works	112
5.4.9	Finalisation of Process Design and Equipment Specifications	113
5.5	Mechanical Design	114
5.5.1	General	115
5.5.2	Long Lead Equipment	116
5.5.3	Special Engineering Requirements	117
5.5.4	Materials and Isolations	118
5.5.5	Mechanical Handling Equipment	119
5.5.6	Spare Parts / Special Tools	120
5.5.7	Vendor Support	121
5.5.8	Vendor IOMs / Data Books / Passports	122
5.5.9	Reliability, Availability and Maintainability (RAM) Modelling	123
5.6	Civil and Structural Design	124
5.6.1	General	125
5.6.2	Civil Design Scope	126
5.6.3	Earth Movements / Earth Works	127
5.6.4	Civil Design	128
5.6.5	Geotechnical Investigations / Soil Improvement	129
5.6.6	Piling	130
5.6.7	Underground Services and Utilities Piling	131
5.6.8	Roads and Paving	132
5.6.9	Fencing and Access Gates	133
5.6.10	Foundations	134
5.6.11	Seismic Conditions	135

5.6.12 Structural Design 136

5.7 Architectural, Buildings, and Heating, Ventilation and Air Conditioning (HVAC) Deign 137

5.8 Piping and Layout 138
5.8.1 General 139
5.8.2 3-D Model Requirements 140
5.8.3 Critical Plant Layout Requirements 141
5.8.4 Piping Best Practices 142
5.8.5 Piping Materials and Valve Selection 143
5.8.6 Piping Materials Take-Offs (MTOs) 144
5.8.7 Special Piping Items 145
5.8.8 Piping Stress Analysis 146
5.8.9 Pipe Supports 147
5.8.10 Special Piping Studies 148

5.9 Metallurgy 149
5.9.1 General 150
5.9.2 Corrosive Nature of the fluids 151
5.9.3 Materials and Welding Fabrication 152
5.9.4 Paint and Coating 153

5.10 Electrical Systems Design 154
5.10.1 General 155
5.10.2 Existing Power Systems / Sources 156
5.10.3 Design Requirements 157
5.10.4 Power Generation 158
5.10.5 Emergency Power Systems 159
5.10.6 Rationalisation of Power Supplies 160
5.10.7 MV/LV Systems incl. Lighting 161
5.10.8 Earthing and Lighting Protection 162
5.10.9 Cabling 163
5.10.10 Electrical Trace Heating 164
5.10.11 Temporary Facilities during Construction 165

5.11 Control & Instrumentation (C&I), Fire & Gas, Telecomm Systems 166
5.11.1 General 167
5.11.2 Integration & Commonality of Systems 168
5.11.3 Distributed Control Systems (DCS) 169
5.11.4 Instrumentation and Control Elements 170
5.11.4.1 Instrument Cabling and Routing 171
5.11.4.2 Instrumentation Supply and Installation 172
5.11.4.3 Instrument Database 173
5.11.4.4 Pneumatic Systems 174
5.11.4.5 Motor Operated Valves (MOVs) 175
5.11.5 Emergency Shutdown System (ESD) 176
5.11.6 Fire & Gas (F&G) System 177
5.11.7 Telecomms Systems 178

5.12 Pipelines 179
5.12.1 General 180
5.12.2 Oil Export Pipelines 181
5.12.3 Gas Export Pipelines 182
5.12.4 Infield Pipelines and Gathering Network 184

5.12.4.1 General 185
5.12.4.2 Gathering Network Philosophy 186

5.13 Other Export Systems Design 187
Rail Export Systems 188
Terminal Facilities 189

5.14 Well Site Design 190
5.15 Cost Estimation 191
5.15.1 General 192
5.15.2 Cost Estimation Methodology 193
5.15.3 Interim Total Installed Costs (TIC) Estimates 194
5.15.4 TIC Control Estimate 195
5.15.5 End of FEED Estimates Requirements 196

5.16 Construction Planning 197
5.16.1 General Philosophy 198
5.16.2 Constructability Requirements 199
5.16.3 Construction Planning & Manpower Estimates 200
5.16.17 Logistics Requirements 201

REFERENCES **202**