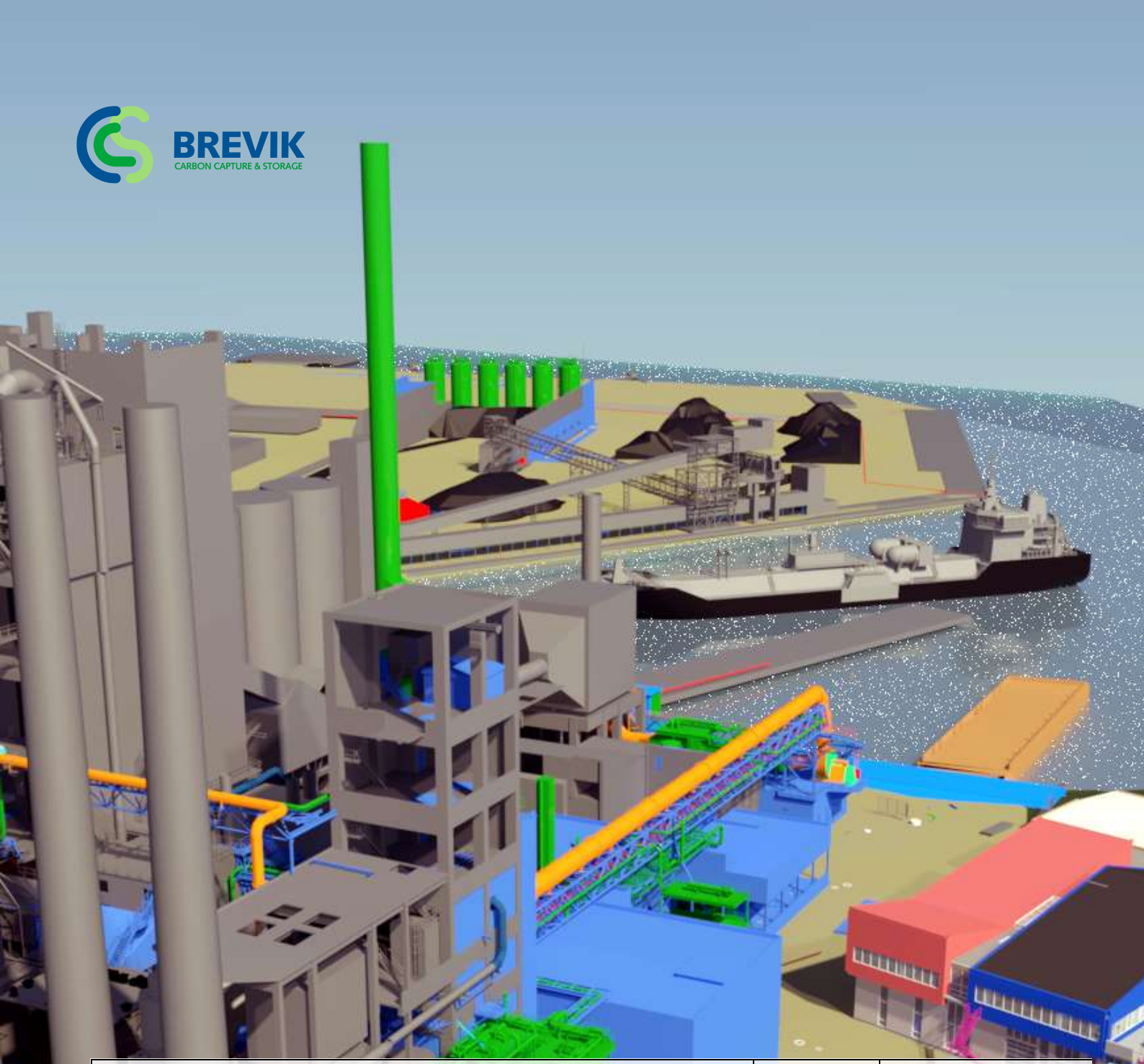

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Brevik CCS

Schedule Management

Contents

1 Purpose of this document 4
2 Validity 4
3 Definitions and abbreviations 4
4 Project Schedule Hierarchy 5
5 Scheduling software 5
5.1 Group view vs. Outline view 5

6 Unique Activity ID 6
7 Activity Descriptions 6
8 Activity Reference Codes 7
8.1 General 7
8.2 Work Breakdown Structure – WBS 8
8.3 AREA 9
8.4 SUB AREA 10
8.5 Procurement Package – PROC.PACK 11
8.6 Procurement Milestone – PROC. MILESTONE 12
8.7 Project Phase - PHASE 12
8.8 Discipline - DISC 13
8.9 Sub Phase 15
8.10 System 15
8.11 Commissioning Package - COP 16

9 Logical Linking 18
10 Interface Milestones 18
11 Calendars 18
12 Resource loading 19
13 Progress Measurement 19
13.1 Management 19
13.2 Engineering 19
13.2.1 Design Engineering 19
13.2.2 Design Document and Drawings 20
13.3 Document Progress 20
13.4 Procurement 20
13.4.1 Purchasing and contracting 20
13.4.2 Supplier activities 21
13.5 Construction 21
13.6 Progress from contractors 21

14 Voiding of activities 22
15 Status Reporting 22
16 References 23

Revisions to this document

Rev. no.	Revisions in chapter	Description
01	N/A	Initial issue
02	Multiple	• Section 6.3: Set of EWBS codes updated according to new WBS for Execution phase • Section 6.5: Spaces behind Subarea values in table removed. Thereby avoiding an error when pasting value list to MS Project. Values otherwise unchanged. • Section 6.8: Added DISC code value "KW" for Detailed Engineering & Follow-on, Technology. • Minor corrections/ text changes in various chapters.
03	Multiple	All sections - Restructuring of document outline, updated all paragraphs with additional information. Added section for Project Schedule Hierarchy, Reference code short list. Updated WBS for execution phase
04	Multiple	Split of Sub Area B040 into separate areas for HV1,HV2, GCT1,GCT2,ESP3 and ESP4. New Sub Areas for crane positionings. New WBS elements added for New Maintenance Center - Ground Works and Foundation and Upgrade of Sekkekaia Jetty. Subarea code added to unique activity instructions in section 6 Activity reference code Sub-Discipline added in section 8.9 Instructions for voiding of activities added in section 14
05	Multiple	• Document Title renamed from Schedule Instructions to **"Schedule Management".** • General page break settings for readability, and subsequent content index renumbering. • Chapter 1: Document mandate declaration moved to Chapter 2. • Chapter 7: Added Activity Description samples. • Section 8.1: Mechanical Completion Packages removed from table and Reference Code list. • Section 8.2: Added new WBS elements in graphics and table. • Section 8.4: Added new Sub Areas. • Section 8.9: Added Sub Phases. • Section 8.10: Added System numbers. • Section 8.11: Mechanical Complete Package – Removed N/A • Section 8.11: (Was 8.12) Added currently known Commissioning packages. • Chapter 13: moved to new Chapter 15 as Status Reporting • Chapter 13: Recreated as Progress Measurement • Chapter 15: Some text changes for clarifications.

1 Purpose of this document

The purpose of this document is to standardize the scheduling framework for the Project and secure effective exchange of schedule data between Beneficiary, Contractors and Entrepreneurs. This is achieved by defining a common and mandatory set of scheduling requirements and reference codes to be implemented on activity level into respective schedules.

The objective of this standardisation is to lay the foundation for collaboration, communication and integration of Beneficiary and Contractors schedules into one common, networked schedule comprising the entire scope of the Project. This common schedule is referred to as the *Integrated Detailed Schedule (IDS).*

2 Validity

The requirements put forth in this document are mandatory for the preparation of the Contractor Detailed Schedules (CDS), i.e., all schedules that are to be integrated into the Integrated Detailed Schedule.

This document is an addition to and not a replacement of contractual scheduling and administration requirements.

For lower-level schedules, e.g. Contractors subcontractor schedules, this document shall be considered as a guideline/ best practice. It is up to the Contractors to decide if certain elements shall be made mandatory also for lower-level schedules.

3 Definitions and abbreviations

Table 1: Definitions and abbreviations

Definition	Description
Activity code	See Reference code
Beneficiary	Norcem AS, Brevik CCS Project
Constraint	"Pinning" of a schedule activity to a certain date and by this overriding the date calculation mechanism of the CPM
Contractor	Entity responsible for the execution of a scope of work
CDS	Contractor Detailed Schedule, Schedule prepared by the Contractors
CMS	Contract Master Schedule
CPM	Critical Path Method
CDWS	Contractor Detail Work Schedules
ERP	Enterprise Resource Planning
IDS	Integrated Detailed Schedule - Networked schedule comprising the entire scope of the Project and build based upon the Contractor Detailed Schedules. The full-detail version of this schedule is called Contract Detail Schedule (CDS) in the GSA.
MSP	Microsoft Project, a CPM-scheduling software
Project	Brevik CCS - part of Norwegian CCS Demonstration Project (NCD)
Reference code	An attribute assigned to an activity in a schedule from a fix range of agreed values
Schedule integration process	Integration of the Contractor Detailed Schedules to the Integrated Detailed Schedule

4 Project Schedule Hierarchy

The Project has the following schedule hierarchy and definitions. There are mainly 4 schedule levels where the top two levels reside with Company and the lower two levels reside with Contractor. The purpose of this document is to control schedule data exchange to form the Integrated Detail Schedule (IDS).

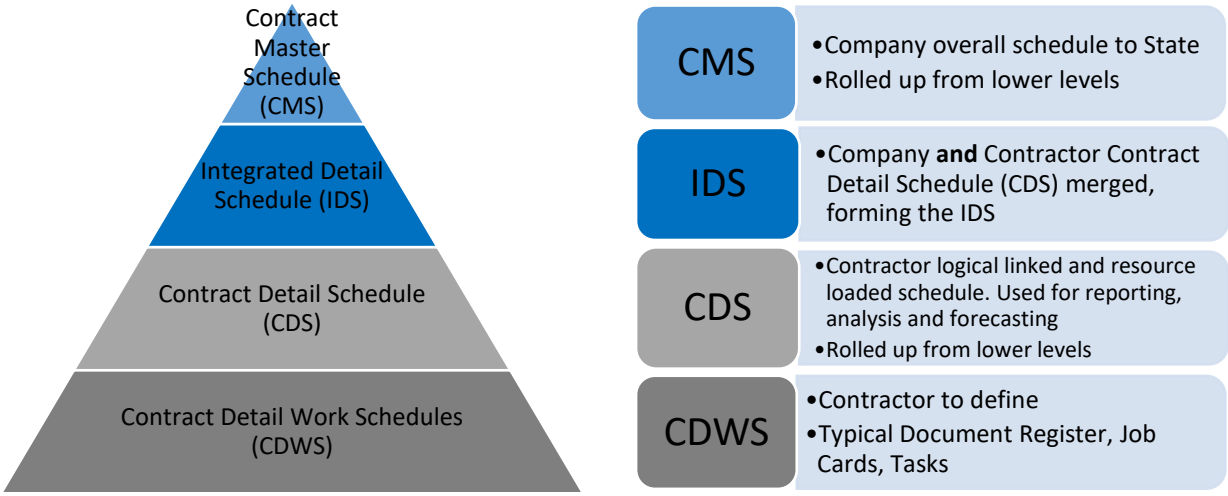

Figure 1: Project Schedule Hierarchy

5 Scheduling software

There is no mandatory requirement for the use of a certain scheduling software. Contractors shall utilize the scheduling software they are familiar with and for which they have developed system-integrating solutions. Such as integrations towards organizational applications as ERP system, Documents Management, Engineering databases and Construction follow-up systems.

However, the produced schedules shall be based on the Critical Path Management (CPM) approach, i.e., shall consist of a network of logically linked activities and be able to implement the scheduling requirements defined in this document.

5.1 Group view vs. Outline view

There are two basic approaches for breaking down a schedule. “Outline View” and “Group View”. Both approaches are briefly described below.

The Outline View of a schedule are summary activities created by indenting schedule activities in several levels. This is typically seen in Microsoft Project schedules.

The Group View of a schedule requires that one or more Reference codes are assigned to each activity in the schedule in order to create summary levels based on matching values. The Reference codes can be used to generate multiple alternative views of the project, depending on the chosen combination of Reference code for summary levels, filters and sort orders.

By applying Reference field values to activities and milestones in the schedule both viewing methods can be used for simplifying schedule data presentation.

6 Unique Activity ID

All activity IDs *shall be unique* and have the format WBS-DISC-SUBAREA-NNNN. WBS can be four digits (e.g. “20-10”) or shortened to two digits (e.g. "21") ref. section 0, DISC = discipline (two chars, aligned with reference code DISC; ref. section 0), SUBAREA = Sub Area code (e.g. “B040”) ref. section 8.4 and NNNN = Contractor defined multicharacter numbering containing a sequence number and possibly further coding.

Example: 21-KL-B040-NNNN-0010 or 20-10- KL-B040-NNNN-0010
where NNNN is from Contractors’ schedule numbering system

Main advantages with following the above format are:

- Activity ID is not only chosen as an arbitrary number but provides the reader of the schedule with a certain insight and orientation of activity type and content.
- Avoidance of duplicate Activity IDs when integrating schedules

7 Activity Descriptions

The content of a particular schedule activity or task shall be fully understandable by the entitled description. Activity description shall also be interpreted together with required Reference codes, i.e. without any possibly used outline structure/ summary tasks (ref. section 5.1). The rational for this requirement is that any possibly used outline structure/ summary tasks will <u>not</u> be imported during the Schedule integration process. Instead, after integration, the schedule activities will be presented in Group View by Reference codes.

Naming, numbering and tagging of buildings, equipment, areas etc. shall <u>precisely</u> follow the respective, valid defining technical documents, e.g. equipment names and tags following the P&IDs. This is done to avoid misunderstandings and provide searchability within the schedules.

Activity descriptions shall preferably be expressed in simple present or present progressive tense, e.g. "Cast foundation 1" or “Casting foundation 1”. Finish milestone descriptions shall preferably be expressed in simple past tense, e.g. "Commissioning of System 4 completed".

Examples of frequently used types of activities

Prefabrication of…
Assembly of…
Installation of…
Lifting of…
Testing of…

8 Activity Reference Codes

8.1 General

This section lists required schedule Reference codes to be implemented into Contractor Detail Schedule (CDS).

The Reference codes field names/ labels as well as values and descriptions shall be written precisely (also with capitalisation) as defined below. Strict adherence to this rule is required to satisfy the Schedule integration process.

Deviations are to be discussed with and approved by Company Lead Planner. This document shall then be updated accordingly.

The Reference codes described in the following paragraphs are required and standardized by the Project. Contractors are free to establish additional Reference codes to suit their own additional needs. Company strongly recommends establishing an "Owner" code to be assigned to each schedule activity, where owner is meant as responsible party for reporting the status on the respective activity within the respective project team.

Table 2: Short list of required activity reference codes

Activity Reference Code Short	Activity Reference Code Long	Description
WBS	WBS	Execution Phase Work Breakdown Structure
AREA	Area	A coarse geographical breakdown of Norcem Brevik Plant
SUBAREA	Sub Area	A detailed geographical breakdown of Norcem Brevik Plant
PROC.PACK	Procurement Package	Contractor's procurement package coding
PROC.MILESTONE	Procurement Milestone	Main milestones in the procurement value chain
PHASE	Phase	Project phase that the respective activity belongs to
DISC	Discipline	Used for identifying the discipline of physical and non-physical activities.
Sub-Discipline	Sub-Discipline	Used to distinguish activities in the construction phase that are performed on or off site.
System	System	System code as of NORSOK
COP	Commissioning Package	Used for activities in commissioning phase

A complete list of reference codes can be found in Appendix A to this document.

8.2 Work Breakdown Structure – WBS

The Execution Phase WBS is the central work breakdown structure during the Execution Phase and shall be set for all activities.

Contractor shall code his activities with their EWBS codes only. This is also valid for their "to" and "from" Interface Milestones, ref. section. 10.

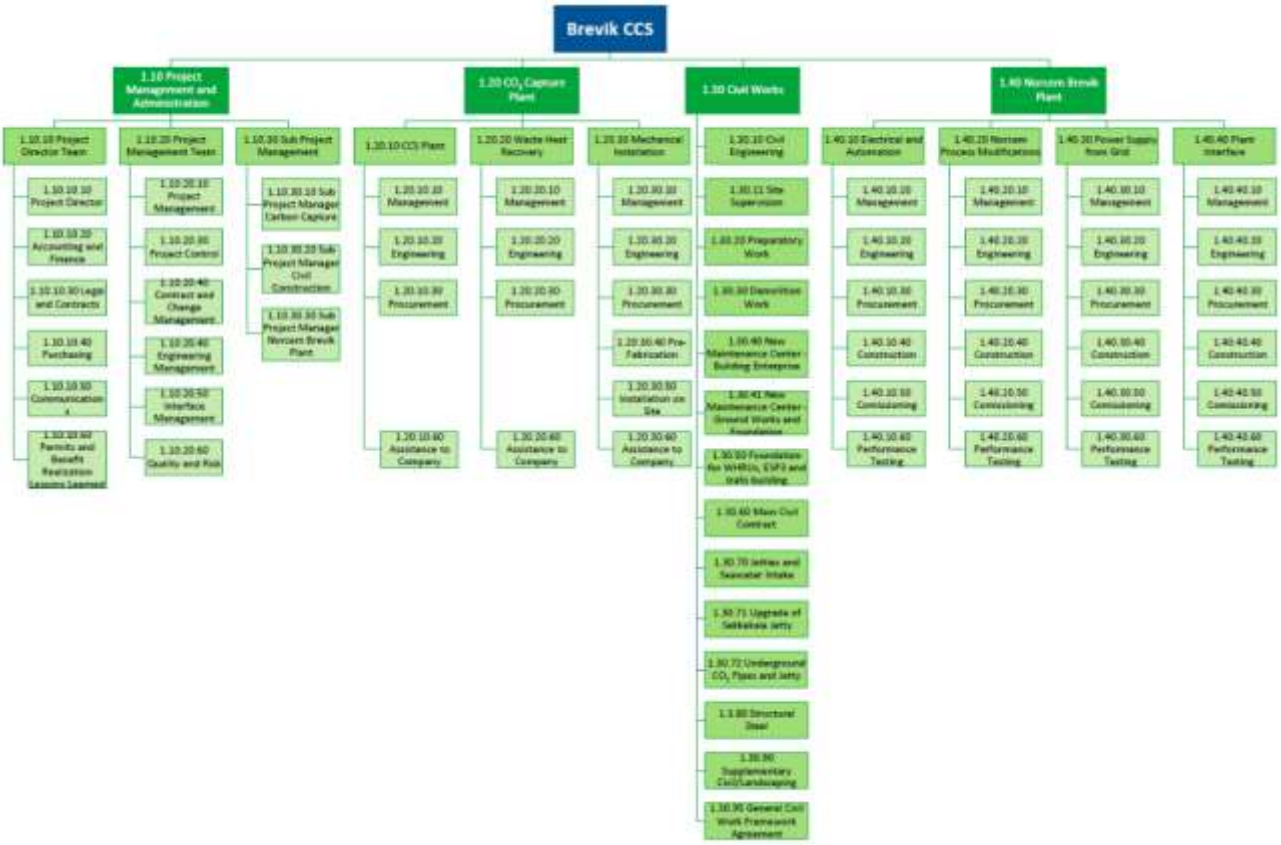

Figure 2: Brevik CCS WBS – Visual presentation. Ref document NC04-NOCE-A-TB-0001

Table 3: Reference code – WBS Level 0-2

WBS Level 0	WBS Level 1	WBS Level 2	Description
1	**Brevik CCS Project**		
	1.10	**Project Management and Administration**	
		1.10.10	Project Director Team
		1.20.20	Project Management Team
		1.10.30	Sub Project Management
	1.20	**$C0_2$ Capture Plant**	
		1.20.10	CCS plant
		1.20.20	Waste Heat Recovery
		1.20.30	Mechanical Installation
	1.30	**Civil Works**	
		1.30.10	Civil Engineering

WBS Level 0	WBS Level 1	WBS Level 2	Description
		1.30.20	Preparatory Work
		1.30.30	Demolition Work
		1.30.40	New Maintenance Centre
		1.30.41	New Maintenance Centre - Ground Works and Foundation
		1.30.50	Foundation for WHRUs, ESP3 and trafo building
		1.30.60	Main Civil Contract
		1.30.70	Jetties and Seawater Intake
		1.30.71[1]	Upgrade of Sekkekaia Jetty
		1.30.72	Underground CO2 Pipes and Jetty
		1.30.80	Structural Steel
		1.30.90	Supplementary Civil/Landscaping
		1.30.95	General Civil Work
	1.40	**Norcem Brevik Plant**	
		1.40.10	Electrical and Automation
		1.40.20	Norcem Process Modifications
		1.40.30	Power Supply from Grid
		1.40.40	Plant Interface

Source: NC04-NOCE-A-TB-0001 WBS.

8.3 AREA

The code Area provides a coarse geographical breakdown. Shall be set for all activities. For geographical localization, i.e. mark-up of values on a map. Please see the map source document referred to below the table.

Table 4: Reference code - Area

Value/ short	Description/ long	Remarks
A1	Area 1 (mid)	
A2	Area 2 (west)	
A3	Area 3 (east)	
0000	Other Area	Physical areas not covered by this list. E.g. offsite prefab.

Source: NC04-NOCON-C-XF-0005 Layout Area1-3

[1] 1.30.71 is kept in the IDS for historical reasons, but is deprecated due to new strategy for the loading area

8.4 SUB AREA

The code Sub Area provides geographical breakdown to a finer degree than provided by the Area code. Shall be set for all activities. For geographical localization, i.e. mark-up of values on a map. Please see the map source document referred to below the table.

Table 5: Reference code - Subarea

Subarea short	Subarea Description - long	Remarks
B010	WHRU2	
B020	Raw mill	
B030	Main grid station	
B040	HV1/HV2/ESP3/ESP4	
B041	HV1	
B042	HV2	
B043	GCT1 - Gas Conditioning Tower 1	
B044	GCT2 - Gas Conditioning Tower 2	
B045	ESP3 - Electro Static Precipitator 3	
B046	ESP4 - Electro Static Precipitator 4	
B047	“Båthus” above Kiln 6	Rev 5: New subarea previously under B040
B050	EL-, compressor and CO2-rooms	
B060	Main Process Area incl. drying unit	
B070	Cyclone tower 5 (CT5). CCS main substation	
B080	WHRU1 and transformers for main substation	
B090	HVAC for compressor building and CCS main substation	
B100	Compressor building	
B110	Steam compressor/Feeding water/Control room	
B120	Amine tankfarm	
B130	WHRU3/Waste water treatment/Refractory bricks storage/substation	
B140	New Maintenance Center	
B141	Gas Storage	Rev 5: new Sub Area
B150	Site office ("Gulbygget")	
B151	Office building	
B160	«Cementinekaia» jetty	
B170	Sea water intake and discharge	
B180	CO2 tankfarm	
B190	CO2 jetty	
B200	Old nitrogen tank (old reception facilities for hazardous waste)	
B210	Temporary storage and workshop	
B220	Rig area raw mill SE	
B230	Rig area raw mill NE	
B240	Existing workshops and storage. Rig area close to process area	
B250	In front of reception area (old pavilion)	
B260	«Kullkaia» jetty	
B261	«Sekkekaia» jetty (CO2 jetty)	
B270	Bagging corner and bagging plant storage	
B280	«Stavkaia» jetty	
B290	Rig area in harbor area (previous location of "Premohallen")	

Subarea short	Subarea Description - long	Remarks
B300	Limestone storage	
B310	Temporary mechanical workshop	
B320	Piping and carpenter workshop (old packing facilities)	
B330	Temporary fire station in old workshop	
C010	Crane Area WHRU 2	
C020	Crane Area ESP3	
C030	Crane Area WHRU 1	
C040	Crane Area Compressor Building	
C050	Crane Area Drying Unit	
C060	Crane Area Bridge Process Area and Amine	
C070	Crane Area WHRU 3	
C080	Crane Area CO2 Tank Farm	
C090	Crane Area HV1	
R010	Inside raw mill	
R020	Raw mill to «Elevator building”	
R021	From “Elevator building” to process	
R030	Main grid station to process	
R040	Chimney to process	
R050	OPI kiosk 30 to existing culvert	
R060	Above process area	
R070	OPI new maintenance centre to compressor room	
R080	Trench for sea water pipes to process area	
R090	OPI site office to control room	
R100	OPI WHRU 3 to culvert for sea water pipes (R080)	
R110	Sea water pipes (intake and discharge)	
R120	From process area to CO2 tank farm	
R130	Along “Sekkekaia” to the loading arm	
R140	From "Sekkekaia" + to bagging corner («Pakkerihjørnet»)	
R150	Bypass route	
0000	Other Subarea	To be used for prefabrication or other preparation work, or activities spanning across Sub Areas
9999	No Subarea	Chose for non-physical activities like engineering and procurement

Source: NC04-NOCON-C-XE-0007 Identification of Buildings and Structures and NC04-NOCON-C-XE-0008 Identification of pipe and cable routes.

8.5 Procurement Package – PROC.PACK

Contractor’s procurement package coding. Procurement package codes is a requirement and is maintained by the Contractors. All procurement packages shall be clearly identified by a Project-wide unique code, so Contractors should avoid too simple values like “a, b, c” or “01, 02, 03”.

Table 6: Reference Code – PROC.PACK

Value/ short	Description/ long	Remarks
(to be defined by Contractors)	Description of procurement package	Procurement package coding as chosen by Contractor
9999	No procurement package (PROC)	Chose if no procurement package can be assigned

8.6 Procurement Milestone – PROC. MILESTONE

Procurement package activities shall be referenced to main activities in the process.
(Issue RFQ, Evaluation period, Issue PO or CA, FAT, SAT, Delivery at Site, Site Need Date etc)

Table 7: Reference Code – PROC.MILESTONE

Short	Description	Remarks
P10	Tender Preparation	
P20	Pre-qualification of suppliers	
P25	ITT - Invitation for tender	
P30	Tender Period	
P40	Evaluation	
P50	Contract Award	
P51	Stand Still Period	
P52	Contract Signing	
P60	FAT	
P70	SAT	
P80	Delivery at Site	
P120	Site Need Date	

8.7 Project Phase - PHASE

This code is used for identifying the Project phase that the respective activity belongs to. Shall be set for all activities.

Table 8: Reference code - PHASE

Value/ short	Description/ long	Remarks
MGT	Management	
ENG	Detailed Engineering	
PRO	Procurement	
CON	Construction	
COM	Commissioning	
PER	Performance Testing	
CLO	Project Close-out	
RUN	Run-in period (Plant Operations Phase)	
OPE	Operation (Plant Operations Phase)	

8.8 Discipline - DISC

The code DISC is used for identifying the discipline of physical and non-physical activities. Basis for this code is Aker's existing, comprehensive discipline-codes based on the common NORSOK standard. The list of codes is extensive, and only the code values flagged with "yes" in the "In use" column shall be assigned to activities. Discipline code values which are greyed out shall not be used unless otherwise agreed with Company. The most common disciplines are listed below.

Table 9: Reference Code - DISC

Value/ short	Group (Main cat.; info only)	Description/ long	In use	Remarks
AC	Milestones	Contract Milestones	yes	
AG	Milestones	Interface Milestones (from)	yes	for "from milestones", i.e. Contractor requires something from another Contractor or Company. See section 9.
AF	Milestones	Interface Milestones (to)	yes	for "to milestones", i.e. Contractor delivers something to another Contractor or Company. See section 9.
AZ	Milestones	PEM Milestones	yes	refers to Aker execution model
DA	Management	Project Management General	yes	
DB	Management	Procurement Management		
DC	Management	Contract Management	yes	
DD	Management	Subcontracting Management		
DE	Management	Business Management		
DF	Management	Schedule Management	yes	
DG	Management	Cost Management	yes	
DH	Management	HSE Management	yes	
DI	Management	Information Management	yes	
DJ	Management	Change Management	yes	
DL	Management	Warranty Management		
DM	Management	Engineering Supervision	yes	
DP	Management	Personnel Administration	yes	
DQ	Management	Quality Management	yes	
DT	Management	Risk Management	yes	
DU	Management	Construction/ ModulFab/ Integr.Mgmt.	yes	
DW	Management	Weight & Quantity Measurement	yes	
DY	Management	Civil Management	yes	
DZ	Management	Completion Management		
JB	Procurement	Procurement	yes	
KA	Detailed Engineering & Follow-on	Management	yes	
KB	Detailed Engineering & Follow-on	E,I&T		
KC	Detailed Engineering & Follow-on	Architectural		
KD	Detailed Engineering & Follow-on	Drilling		
KE	Detailed Engineering & Follow-on	Electrical	yes	
KF	Detailed Engineering & Follow-on	Reservoir		
KG	Detailed Engineering & Follow-on	Geoscience		
KH	Detailed Engineering & Follow-on	HVAC		
KI	Detailed Engineering & Follow-on	Instrumentation	yes	
KJ	Detailed Engineering & Follow-on	Marine		
KL	Detailed Engineering & Follow-on	Piping & layout	yes	
KM	Detailed Engineering & Follow-on	Materials Technology	yes	
KN	Detailed Engineering & Follow-on	Structural	yes	
KO	Detailed Engineering & Follow-on	Operation	yes	
KP	Detailed Engineering & Follow-on	Process	yes	
KQ	Detailed Engineering & Follow-on	Civil	yes	
KR	Detailed Engineering & Follow-on	Mechanical	yes	
KS	Detailed Engineering & Follow-on	Safety & Environment	yes	
KT	Detailed Engineering & Follow-on	Telecommunication		
KU	Detailed Engineering & Follow-on	PLC programming	yes	
KV	Detailed Engineering & Follow-on	Methods engineering		
KW	Detailed Engineering & Follow-on	Technology	yes	New in rev. 02; requested by Aker

Value/ short	Group (Main cat.; info only)	Description/ long	In use	Remarks
KY	Detailed Engineering & Follow-on	Pipelines		
KZ	Detailed Engineering & Follow-on	Multidiscipline / General / MC eng.		
LC	Construction	Architect		
LE	Construction	Electrical	yes	
LH	Construction	HVAC	yes	
LI	Construction	Instrumentation incl. instr. tubing	yes	
LJ	Construction	Marine		
LL	Construction	Piping incl. VVS piping	yes	
LM	Construction	Surface treatment	yes	
LN	Construction	Structural incl. Steel outfitting	yes	
LQ	Construction	Civil	yes	
LR	Construction	Mechanical / safety	yes	
LS	Construction	Fire protection		
LT	Construction	Telecommunication		
LW	Construction	Weight		
LX	Construction	Insulation	yes	
LY	Construction	Pipeline		
LZ	Construction	Multidiscipline / general		
MA	Commissioning	Completion Administration		
MC	Commissioning	Quality Surveillance - Preparation		
MD	Commissioning	Mechanical Completion - Preparation		
ME	Commissioning	Preservation - Preparation		
MF	Commissioning	Expediting - Preparation		
MG	Commissioning	Pre-Commissioning - Preparation		
MH	Commissioning	Commissioning - Preparation		
MJ	Commissioning	Quality Surveillance - Follow-On		
MK	Commissioning	Mechanical Completion - Execution		
ML	Commissioning	Preservation - Execution		
MM	Commissioning	Expediting - Follow-On		
MN	Commissioning	Pre-Commissioning - Execution		
MO	Commissioning	Commissioning - Execution	yes	
MQ	Commissioning	Completion Administration - Offshore		
MS	Commissioning	Mechanical Completion / Hook-Up - Offshore		
MT	Commissioning	Pre-Commissioning - Offshore		
MW	Commissioning	Start-Up		
MX	Commissioning	Hand-Over		
YE	Removal/demolition	Electrical	yes	
YH	Removal/demolition	HVAC		
YI	Removal/demolition	Instrumentation incl. instr. tubing	yes	
YJ	Removal/demolition	Marine		
YL	Removal/demolition	Piping incl. VVS-piping		
YM	Removal/demolition	Surface treatment		
YN	Removal/demolition	Structural incl. Steel outfitting		
YQ	Removal/demolition	Civil	yes	
YR	Removal/demolition	Mechanical / safety		
YS	Removal/demolition	Fire protection		
YT	Removal/demolition	Telecommunication		
YW	Removal/demolition	Weight		
YX	Removal/demolition	Insulation		
YY	Removal/demolition	Pipeline		
YZ	Removal/demolition	Multidiscipline / general		
00	Other discipline (DISC)	Other discipline (DISC)	yes	Should not be necessary since all possible disciplines should be covered by this list. However, to be chosen if none of the above fits
99	No discipline (DISC)	No discipline (DISC)		Do not use; code shall be assigned for all activities. If you consider using this, rather use code 00.

Source: originally based on Aker standard but might be modified (i.e. appended) in future. This table here is the master.

8.9 Sub Phase

The construction activity type Reference field is used to distinguish activities in the construction phase between detail steps in this process. Current values are listed below, but more can be added in the future.

Table 10: Reference Code – PROC.PACK

Short	Description	Remarks
PG	Programming	
PF	Prefabrication	
PA	Preassembly	
IN	Installation	
TE	Test	
HC	Handover to Commissioning	
AB	As-Built	

8.10 System

System Reference codes are used during the project completion phase, and comprise one or several Commission Package Reference codes.

Table 11: Reference Code – SYSTEM

Short	Description	Remarks
00	FLUE GAS CONDITIONING / PRE-TREATMENT	
01	CO2 ABSORPTION	
02	SOLVENT REGENERATION	
03	CO2 COMPRESSION / LIQUEFACTION AND CONDITIONING	
04	ONSHORE TRANSPORT TO INTERIM STORAGE	
05	INTERIM STORAGE	
06	QUAY AND LOADING STATION	
31	HOT AIR FROM WHRU	
40	COOLING WATER	
42	CHEMICAL SYSTEMS	
43	FLUE GAS FROM STRING 1 & 2	
46	AS CONDITIONING (EXISTING NORCEM PLANT)	
50	SEAWATER SYSTEMS	
53	FRESH WATER, DEMIN WATER AND POTABLE WATER	
55	STEAM AND CONDENSATE	
56	OPEN DRAIN	
57	CLOSED DRAIN	
63	AIR SYSTEMS	
64	NITROGEN SYSTEM (NA)	
71	FIRE WATER	

Short	Description	Remarks
73	MATERIAL HANDLING	
77	HVAC (NA)	
78	EFFLUENT WATER TREATMENT SYSTEM	
82	MAIN POWER	
87	PROCESS CONTROL SYSTEM, PCS	

8.11 Commissioning Package - COP

Commissioning Package Reference codes are used during the project completion phase. The below list includes currently defined codes, but can be revised before final implementation.

Table 12: Reference Code – COMMISSIONING PACKAGE

Short	Description	Remarks
0000-C01	Flue Gas from Flue Gas Fan to DCC	
0000-C02	Direct Contact Cooler (DCC)	
0000-C03	Flue Gas From Interface "GS118" to Flue Gas Stack	
0000-C04	Flue gas thru WHRU 1	
0000-C05	Flue gas thru WHRU 2	
0000-C06	Flue gas thru WHRU 3	
0010-C01	DCC vessel, Excess Water Pump, Heat Exchanger	
0010-C10	DCC bleed to Upstream Water Tank GSA	
0010-C11	DCC Bleed to UF Process Tank	
0110-C01	Absorber	
0110-C02	Water Wash from Absorber	
0210-C01	Amin Holding Tank and feed to Absorber	
0210-C02	Rich Amine from Absorber to Desorber	
0210-C03	Lean Amine from Desorber to Absorber	
0210-C04	ER265 Reclaimer Package (02XX001)	
0210-C04A	Lean Amine to Reclaimer Package	
0210-C04B	Reclaimer Package	
0210-C05	Amine Make-Up System (string 1)	
0210-C06	Amine Make-Up System (string 2)	
0210-C10	Desorber & Reboiler	
0310-C01	CO2 Compression Package (03KZ001)	
0310-C02	CO2 Drying package (03XX001)	
0310-C03A	CO2 Conditioning, Inert stripping	
0310-C03B	C02 ConditioningFlash Separator #2	
0310-C03C	C02 ConditioningFlash Separator #3	
0310-C04	Vent and Relief Compressor	
0410-C01	C02 to CO2 Storage tanks	
0410-C02	CO2 from Storage Tanks to Compressor package, Desorber System and Reclainer Package	
0510-C01	Co2 Storage tanks	

Short	Description	Remarks
0610-C01	CO2 Export and Vapour Return	
4010-C01	Cooling Water Supply	
4210-C01	Caustic Soda Storage reception and storage tank	
4210-C02	Caustic Soda to DCC	
4210-C03	Caustic Soda to Reclaimer	
4210-C04	Chemical dosing (Ammonia and MEA) to Feed Water Tank	
4210-C05	Chemical dosing (Sodium Sulphite) to Feed Water Tank	
4310-C01	Hot air to/from WHRU 1	
4310-C02	Hot air to/from WHRU 2	
4310-C03	Hot air to/from WHRU 3	
4310-C04	Flue Gas from String 1&2 to CCS Plant	
4310-C05	Installations Gas from GCT 2 (GS120) to ESP3 and from ESP3 to interface at HNA21BV001/HNA21BV003)	
4610-C01	Gas Conditioning Tower 2 Modifications (Winter 2022)	
5010-C01	Seawater Distribution	
5330-C01	Demineralized water (DEMIN)	
5340-C01	MakeUp Water treatment package	
5340-C02	MakeUp Water tanks and distribution	
5360-C01	Potable Water Distribution	
5360-C02	Potable Water to MakeUp Water	
5360-C03	Cooling Water Supply to WHRU3	
5360-C04	Blocking Water to Steam Fans	
5510-C01	MP Steam from WHRU 1	
5510-C02	LP Steam from WHRU 1	
5510-C03	MP Steam from WHRU 2	
5510-C04	LP Steam from WHRU 3	
5510-C05	LP Steam thru Steam Fans/Compressor (0,2 -->3 bara)	
5510-C06	MP steam to Reboiler 02HI001	
5510-C07	LP steam from Feed Water to Muffler	
5510-C08	HP Steam downstream El-Boiler	
5510-C09	Reboiler (55FB951)	
5510-C10	Feed Water Tank (& lines upstream El-boiler)	
5510-C11	Feed Water to WHRU 1	
5510-C12	Feed Water to WHRU 2	
5510-C13	Feed Water to WHRU 3	
5610-C01	Open Drain System	
5620-C01	Drain from Feed Water Tank	
5620-C02	Drain and blow down WHRU 1 (Blow Down Tank 1 56VX945)	
5620-C03	Drain and blow down WHRU 2 (Blow Down Tank 2 56VX946)	
5620-C04	Drain and blow down WHRU 3 (Blow Down Tank 3 56VX947)	
5620-C05	Drain from Boiler System (55FB951)	
5620-C06	Drain and blow down Steam Fans (Blow Down Tank 5 56VX949)	
5620-C07	Drain (Blow Down Tank 4 56VX948)	
5710-C01	Amine from closed drain	

Short	Description	Remarks
6310-C01	Compressed Air Distribution	
6310-C02	Compressed Air to Ultrasound Horn 00CX933 and 00CX934	
6310-C03	Compressed Air to Ultrasound Horn 00CX933 and 00CX934	
7810-C01	Effluent Water Treatment string 1	
7810-C02	Effluent Water Treatment string 2	
7810-C03	Effluent Water Treatment string 3	
7810-C04	UF Process Tank, Reject Pump and Reject Buffer Tank	
7810-C05	Chemical tanks and Pump Skid	
7810-C06	AC Filter and treated water to Sea Water return	

9 Logical Linking

In general, all activities in the Contractor Detailed Schedules (CDS) shall be logically linked with predecessor and successor so that the schedule properly functions as a CPM network. The use of date constraints shall be avoided, at least minimized (exception: "from" interface milestones, see below).

In Microsoft Project schedules the Task Mode "Manually Scheduled" *shall not* be used. All activities shall be Task Mode "Auto Scheduled" (i.e. part of the schedule's CPM network). When necessary, date constraints shall be used.

10 Interface Milestones

There are two types of interface milestones which are used to manage schedule interfaces between Company and Contractors in the Integrated Detail Schedule (IDS) and Contractor Detailed Schedules (CDS):

- "From" interface milestone: Contractor requiring something from another Contractor
- "To" interface milestone: Contractor delivering something to another Contractor

Constraints shall be used on "from" interface milestones. Contractor can then link his own activities against the "from" interface milestone. "To" interface milestones shall not bear a constraint but instead move freely with the forecast dates of the respective activities in Contractor Detailed Schedule.

Interface milestones shall be coded according to the agreed format in attachment C and as implemented under Interface Management.

11 Calendars

Contractors shall define calendars in Contractor Detailed Schedules as suitable for their work.

Work/ no-work of activities during winter repair periods shall be controlled by respective calendars. For the avoidance of doubt: The activity duration shall not be used to compensate for holidays, but this shall be controlled by calendars.

Contractor calendars will be imported during the Schedule integration process. All calendars' names in Contractor Detailed Schedules shall therefore be named in a way that clearly identifies the respective Contractor and states the purpose of the respective calendar (e.g. "AkerEngineeringIndia", "NorcemElektroInstallationWRWorks" or "AkerHeavyLiftcampaign").

12 Resource loading

The activities in the Contractor Detailed Schedules shall be resource-loaded with man-hours or appropriate weighted value.

Procurements under respective contractor shall have the weighted value of price in NOK / 1000 to be comparable to a working hour.

Resources loading shall follow the established good scheduling practice of not assigning more than one resource type per activity. In case several resource types are needed, the activity shall be split or duplicated. Budget updates from one baseline revision to another will however require new instances of the same resource type, in order to keep track of the budget changes though membership of a Change Order.

13 Progress Measurement

Progress measurement for the Brevik CCS follows traditional Earned Value Measurement methodology (EVM). Completion is measured as percentage values of direct work against a Performance Measurement Baseline (PMB). Progress shall be measurable and verifiable. The PMB is conceived by integrating scope, schedule and cost into a time phased budget and referred to as the Contract Baseline Schedule (CBS).

The scope of work *shall be estimated in man-hours*. Projects progress measurement and assessment for different types of activities is described in the following sections.

13.1 Management

Management activities shall be estimated in man-hours and measured by level of effort and will in general not generate deviations against the planned values. Specific management activities will be reported by assessed physical percent completion or through document chains where applicable. Other activities will be subject to the responsible parties perception of completion. Management tasks and issues will be followed up through various already established issue registers.

13.2 Engineering

13.2.1 Design Engineering

Engineering activities shall be estimated by man-hours. Progress for design engineering is subjective towards achievement goals and delivery deadlines. Design engineering is also inflecting the 3D model, Building Information Model (BIM), the Bill of Materials (BoM) and the Equipment Lists. Where status for design engineering work cannot be derived by document status or the design object status in the 3D-modell, the progress is subjectively reported by the design responsible or Discipline Lead.

The 3D model includes visual status indicators of objects maturity status through a color scheme per main contractor as adopted from Main Contractor for the WBS1.20 CCS Plant, Aker Carbon Capture.

Object maturity status are shown in the following object maturity category:

- S1 - Preliminary
- S3 - Frozen Interface
- S4 - Detail Design Completed/ IFC

Reference is made to document NC04-NOCE-A-FD-0001 – BIM Strategy for more detail information.

13.2.2 Design Document and Drawings

Design documents and drawing production follows document chains and the progress steps defined by each Contractor.

13.3 Document Progress

Administrative documents are subject to a workflow setup in Interaxo for draft, review and approval as shown in Figure 3 below.

Figure 3 Document workflow – Administrative Documents

Document entries are updated according to planned and actual dates for each document profile. The CCS DMS application Interaxo does not support % complete registration by document profiles through document process flow/chains as given in 13. Nor does it register actual dates when moving the document profile to the next step in the flow. The registration of the actual dates is therefore subject to the document responsible person's knowledge and use of Interaxo and subsequent manual updates.

Table 13 Document process

Doc release	Progress % Cumulative	Chain code
Draft-IFR-IFA-Approved (Admin docs)	5-60-80-100	-

13.4 Procurement

Procurement activities are split into purchasing/contracting activities and supplier deliveries.

13.4.1 Purchasing and contracting

Purchasing and contracting activities leading up to the point of Contract Award or Purchase Order will follow a procurement milestone chain of activities. The activities will be assessed against completion towards these steps. Not all procurements need the full chain. A typical procurement milestone for the project is listed in table 14.

Table 14 Procurement Milestone chain - Typical

Procurement Milestone Chain
Detail engineering for tender (technical specification)
Commercial tender preparation
Publication of tender (where applicable)
Pre-Qualification Period
Invitation To Tender Documents
Tender Period
Tender Due Date (milestone)
Tender Evaluation & Negotiation (min 30 days)
Contract Award / Purchase Order

Stand Still Period (karensperiode)(10 days)
Contract Signing / PO Signing

13.4.2 Supplier activities

Supplier delivering materials and equipment will be assessed against a weighted milestone. Weighting will be based on the procurements monetary value in NOK and according to the payment milestone schedule. The supplier activities start after Contract Signing/PO date and runs through Delivery at Site. The production period is followed up according to supplier delivery schedules and ITPs.

13.5 Construction

Construction activities shall be estimated by man-hours and be split by disciplines and type of work for Prefabrication, Assembly, and Installation to allow differentiation of how the activities are granulated. Progress for construction activities shall be assessed based on physical measurement of performed quantities in relation to planned quantities. Progress shall be measurable and verifiable.

13.6 Progress from contractors

The Brevik CCS project has several main contractors. They must all adhere to the progress measurement principles described herein, implemented through their own project management systems.

Any further requirements in each contract with appendixes also apply.

14 Voiding of activities

If voiding of activities is necessary, it is important that activities with a baseline budget in current or previous baseline revisions are not deleted, as this will affect the total baseline budget and total progress.

In cases where the activities to be voided are planned in current or past reporting periods or have a relative low weight (will make an insignificant effect to the overall progress reporting when completed), the voiding should be handled the following way:

1. Insert ***CANCELLED*** in the beginning of the description/activity name
2. Make a comment in a text field describing why the activity is voided and make a reference to relevant variation order if applicable
3. Remove the resource loading from the activity by issuing a negative Change Order which outweighs the budget to be taken out.
4. Set actual % complete to 100%
5. If the duration of the activity exceeds the current cut-off date, set the actual finish date to the last day before cut-off.
6. Remove links that may disrupt remaining activities

In cases where the activities to be voided has a relative high resource allocation (will make significant effect to the overall progress reporting when completed) and are planned in the future, setting the actual % complete will result in misleading progress reporting, the voiding should be handled the following way:

1. Insert ***TO BE CANCELLED*** in the beginning of the description/activity name
2. Make a comment in a text field describing why the activity is voided and make a reference to relevant variation order if applicable
3. Remove the resource loading from the activity by issuing a negative Change Order which outweighs the budget to be taken out.
4. Remove links that may disrupt remaining activities
5. Report actual progress for the activity equal to baseline planned progress each cut-off
6. If the activities to be cancelled are not set to 100% complete by a baseline revision, set the activities to 100% complete in the new baseline revision.

15 Status Reporting

Periodic updating of Contractor Detailed Schedules in terms of status, progress and forecast dates *shall be at least monthly* and follows the requirements in respective contract.

Updated schedules shall, as a part of Contractor's reporting, be submitted to Company in native format (as opposed to PDF). Acceptable formats are e.g. Safran .SPX file and Microsoft Project .MPP file or .XML files. If no planning application is used the schedule shall be presented and delivered in as Excel spreadsheets. This to enable for efficient, periodic updates of the IDS.

16 References

Appendix A – Brevik CCS Schedule Reference Codes

Contract Documents – Any contract specific requirements defined for each relevant party.