MEDUPI FGD WATER MASS BALANCE

Company Name: Eskom Page 1 of 14

Project Name: Medupi FGD Project Project No: 178771

Document Title: Overall Water Mass Balance

Document Is: (check all that apply) ☐ Preliminary ☐ Final

Objective The objective of the following diagram is to estimate the overall water mass balance.

Unverified Assumptions Requiring Subsequent Verification

No.	Assumption	Verified By	Date
1			
2			
3			
4			

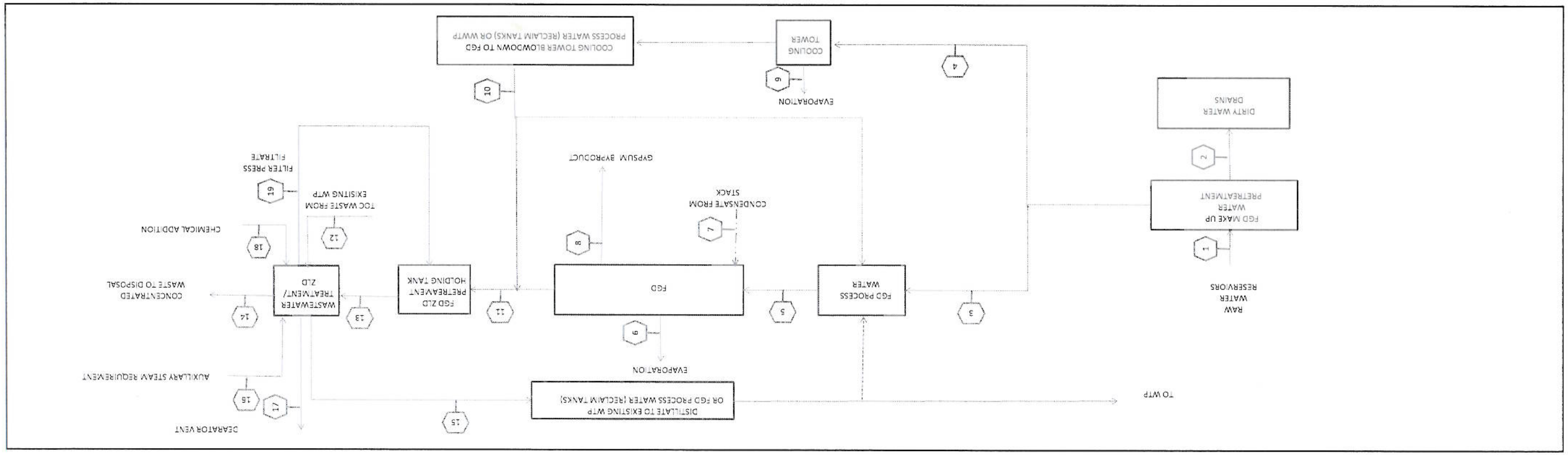
See Page ____ of this document for additional assumptions

Conclusion

Worst Coal+ ATT, 96% $CaCO_3$ will be taken as the worst case scenario for the FGD project see page 13

Review and Approval

Rev	Prepared By	Date	Verified By	Date	Approved By	Date
0	Abigail Melanie	2014/06/09	[signature]	2014/06/09	[signature]	2014/06/23

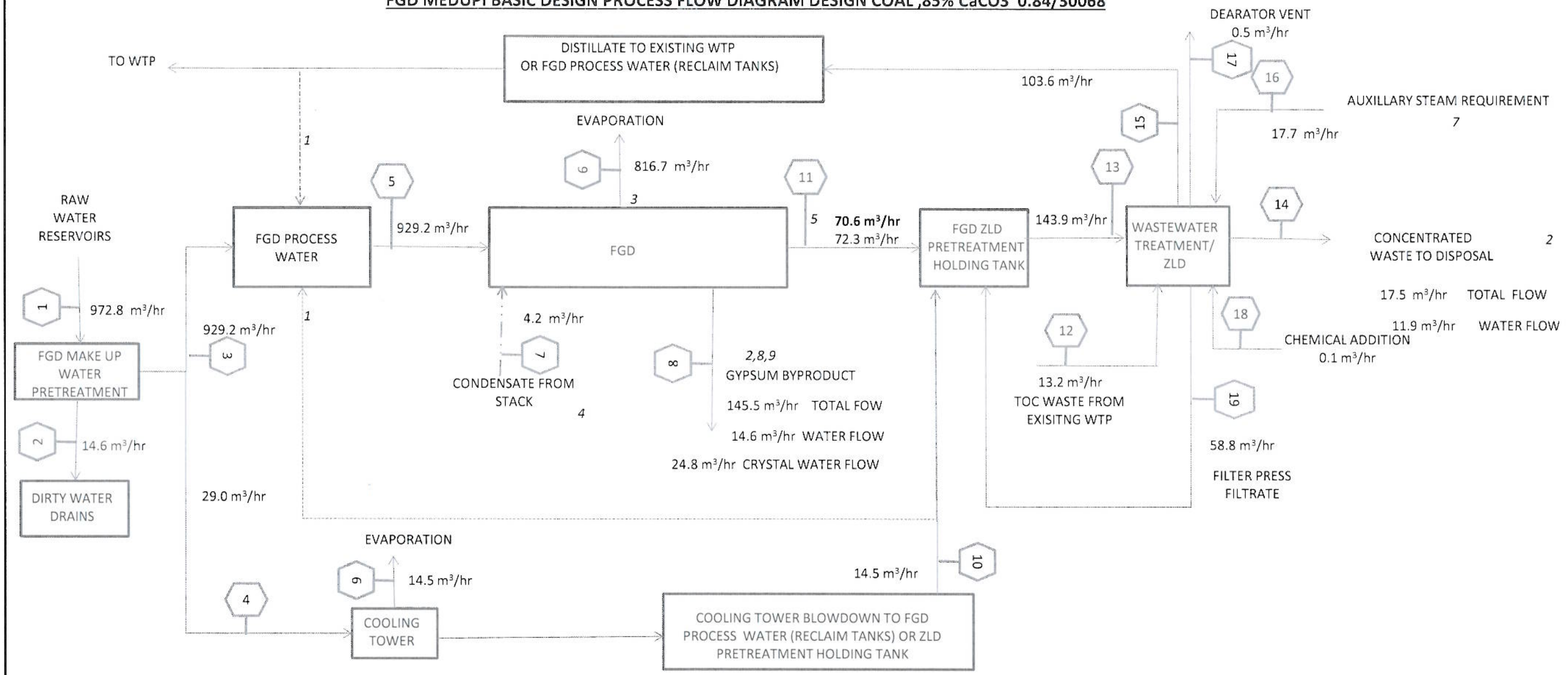


Stream Nr	Stream Name	Reference	Comment
1	Total raw water make up	10	Modification applied for each specific case (ref 2-6)
2	Backwash water from pre treatment to Dirty Drains	10	Modification applied for each specific case (ref 2-6)
3	Filtered water from pre treatment to the FGD plant	10	Modification applied for each specific case (ref 2-6)
4	Filtered water from pre treatment to the Cooling Tower	9	
5	FGD make up water	2-7	This is dependded on the specific case
6	FGD Evaporation	8	
7	Condensate from the stack	12	
8	Gypsum Byproduct	2-7 & 13	This is dependded on the specific case
9	Cooling Tower Evaporation	9	
10	Cooling Tower Blowdown To FGD Make up water (reclaim tanks) or WWTP	9	
11	FGD waste water to ZLD holding tank	2-7	This is dependded on the specific case
12	TOC waste from existing WTP	11	
13	Total waste water into WWTP	1	Dependant if 85% or 96% Coal
14	Concentrated waste for disposal	1	Dependant if 85% or 96% Coal
15	Distillate to existing WTP or FGD make up water (reclaim tanks)	1	Dependant if 85% or 96% Coal
16	Auxiliary steam requirement	1	Dependant if 85% or 96% Coal
17	Dearator vent	1	Dependant if 85% or 96% Coal
18	Chemical Addition	1	Dependant if 85% or 96% Coal
19	Filter Press Filtrate	1	Dependant if 85% or 96% Coal

References

1. Medupi FGD,56.6405.1201,FGD ZLD Water Mass Balance, 20 November 2013
2. FGD Medupi Basic Design Process Flow Diagram, Design Coal ,85% CaCO3 0.84/30068
3. FGD Medupi Basic Design Process Flow Diagram, Worst Coal,85% CaCO3 0.84/30067
4. FGD Medupi Basic Design Process Flow Diagram, Worst Coal + Attemperature Air,85% CaCO3 0.84/30066
5. FGD Medupi Basic Design Process Flow Diagram, Design Coal ,96% CaCO3 0.84/30065
6. FGD Medupi Basic Design Process Flow Diagram, Worst Coal,96% CaCO3 0.84/30064
7. FGD Medupi Basic Design Process Flow Diagram, Worst Coal + Attemperature air,96% CaCO3 0.84/30063
8. email:"RE: basic Design Evaporation Rates" , Candice Stephens,, 03/02/2014
9. Medupi FGD, 56.3202.1201, Cooling Tower Cycles of Concentration and Acid Feed Estimate, 25 October 2013
10. Medupi FGD, 56.6607.1202, FGD Makeup Water Pretreatment Backwashable Strainer, 15/07/2013
11. email:"131105 56.6405 Medupi FGD - TOC analysis" , Craig, Robert (Bob) M. Jr., 05/11/2013
12. Medupi Power Station, Drain Flow Rate Design for North and South Chimney, Exponent Technical Memorandum Sept 2001: Condensate Analysis, Alden Final Report GFS- 411002-1: Condensation Calculation, Sarrena-Concor Joint Venture, 10 September 2001
13. email:"RE: 140303 56.6405 Medupi FGD - Plant FGD Water Mass Balance", Keketsi Ramahali , 2014/04/07

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,85% CaCO3 0.84/30068



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,85% CaCO3 0.84/30068, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

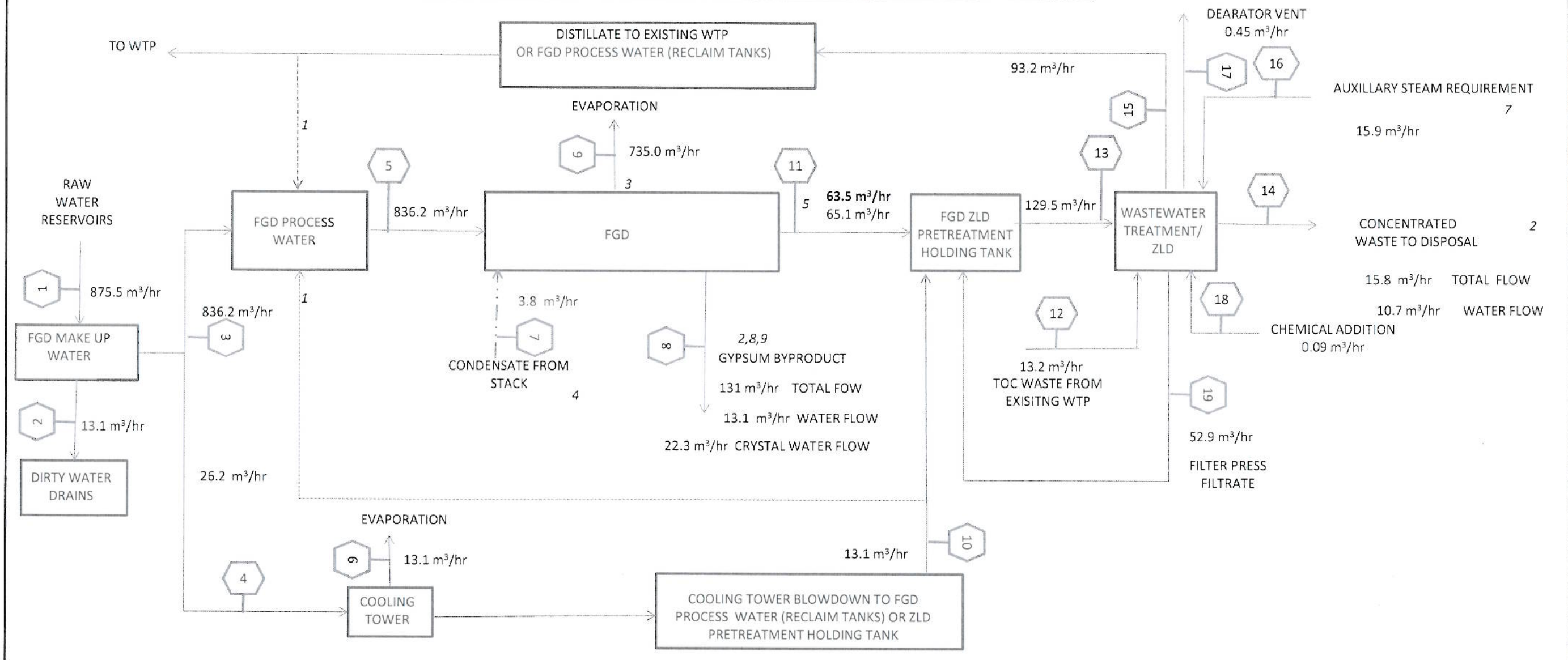
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, CaCO3 AND WORST COAL 96%,CaCO3.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,85% CaCO3 0.84/30068



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,85% CaCO3 0.84/30068, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST (

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

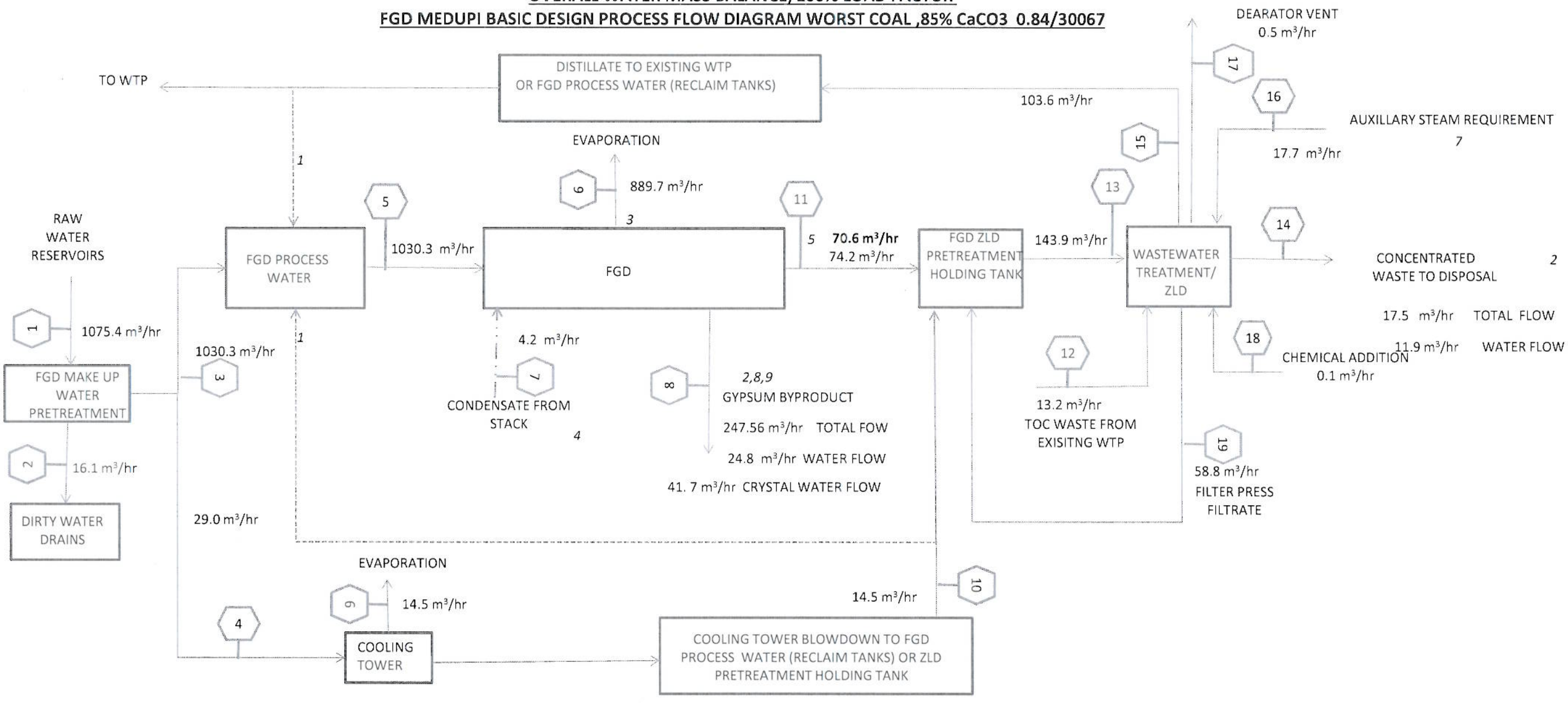
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, CaCO3 AND WORST COAL 96%,CaCO3.

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL ,85% CaCO3 0.84/30067



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL ,85% CaCO3 0.84/30067, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

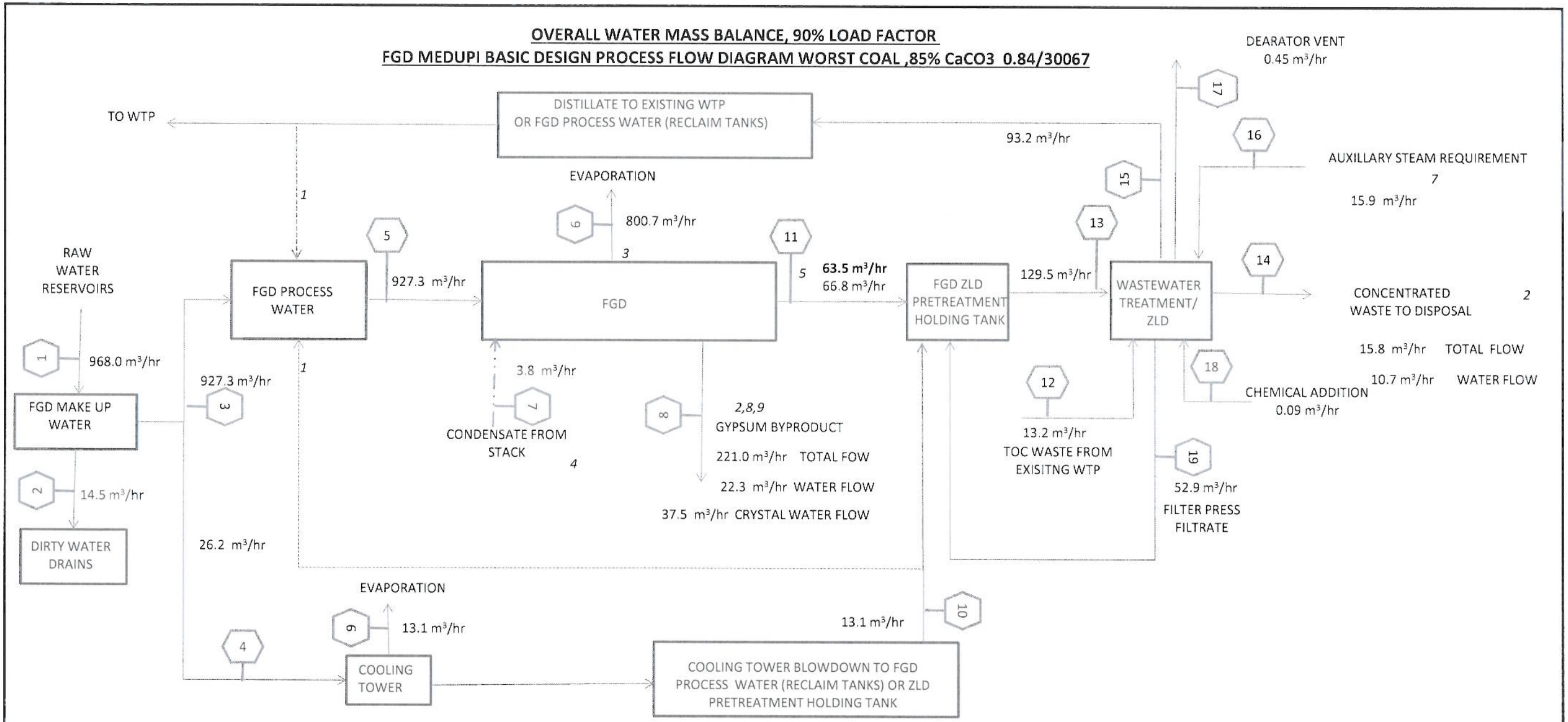
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, CaCO3 AND WORST COAL 96%,CaCO3.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL ,85% CaCO3 0.84/30067



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL ,85% CaCO3 0.84/30067, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

7 VOLUME IF STREAM WAS LIQUID WATER

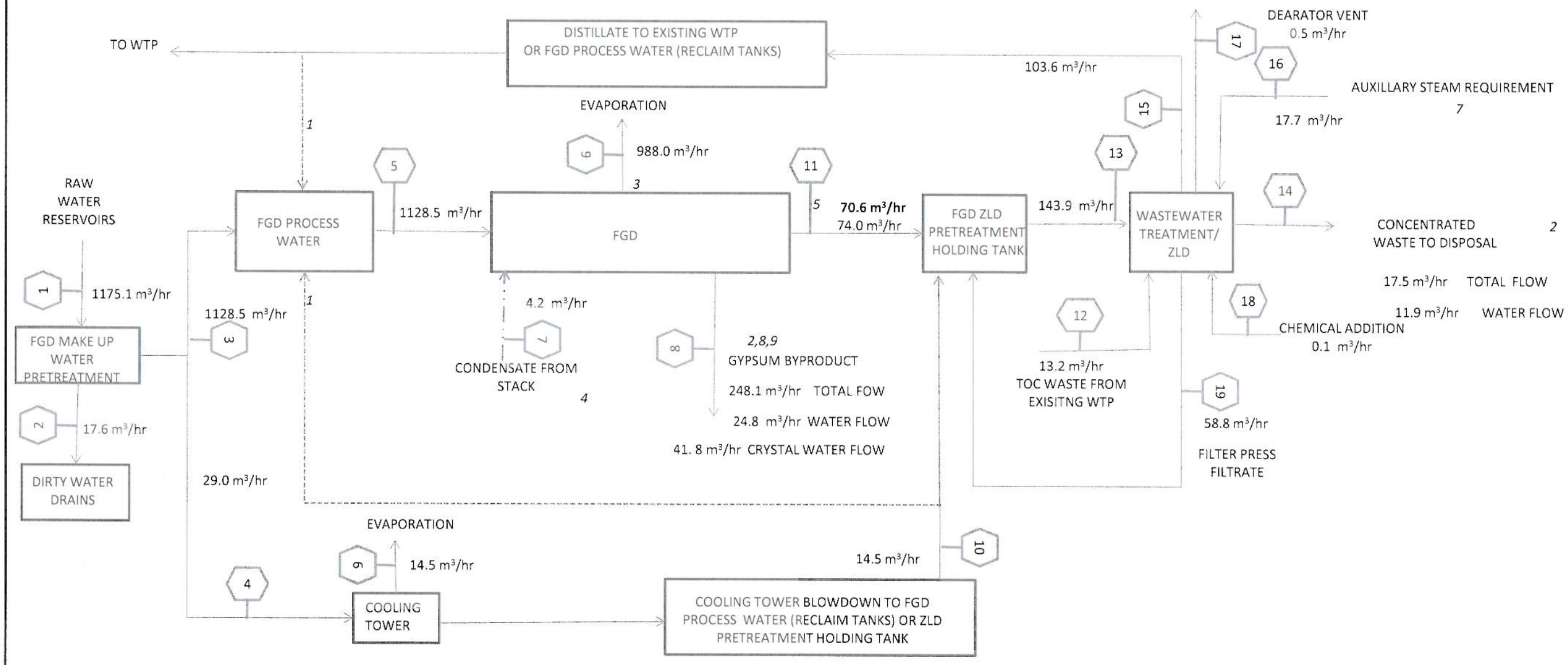
8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, CaCO3 AND WORST COAL 96%,CaCO3.

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR

FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,85% CaCO3 0.84/30066



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,85% CaCO3 0.84/30066, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

7 VOLUME IF STREAM WAS LIQUID WATER

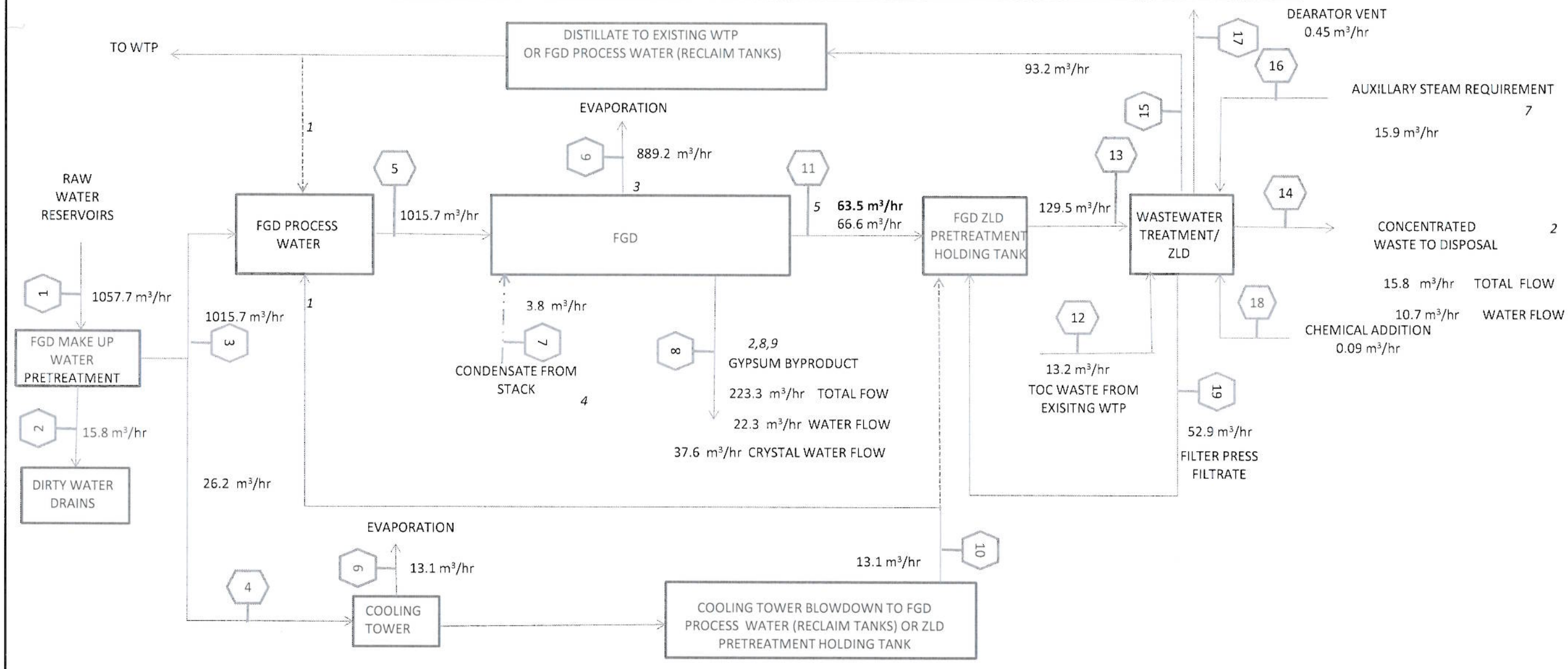
8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR

FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,85% CaCO3 0.84/30066



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,85% CaCO3 0.84/30066, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

7 VOLUME IF STREAM WAS LIQUID WATER

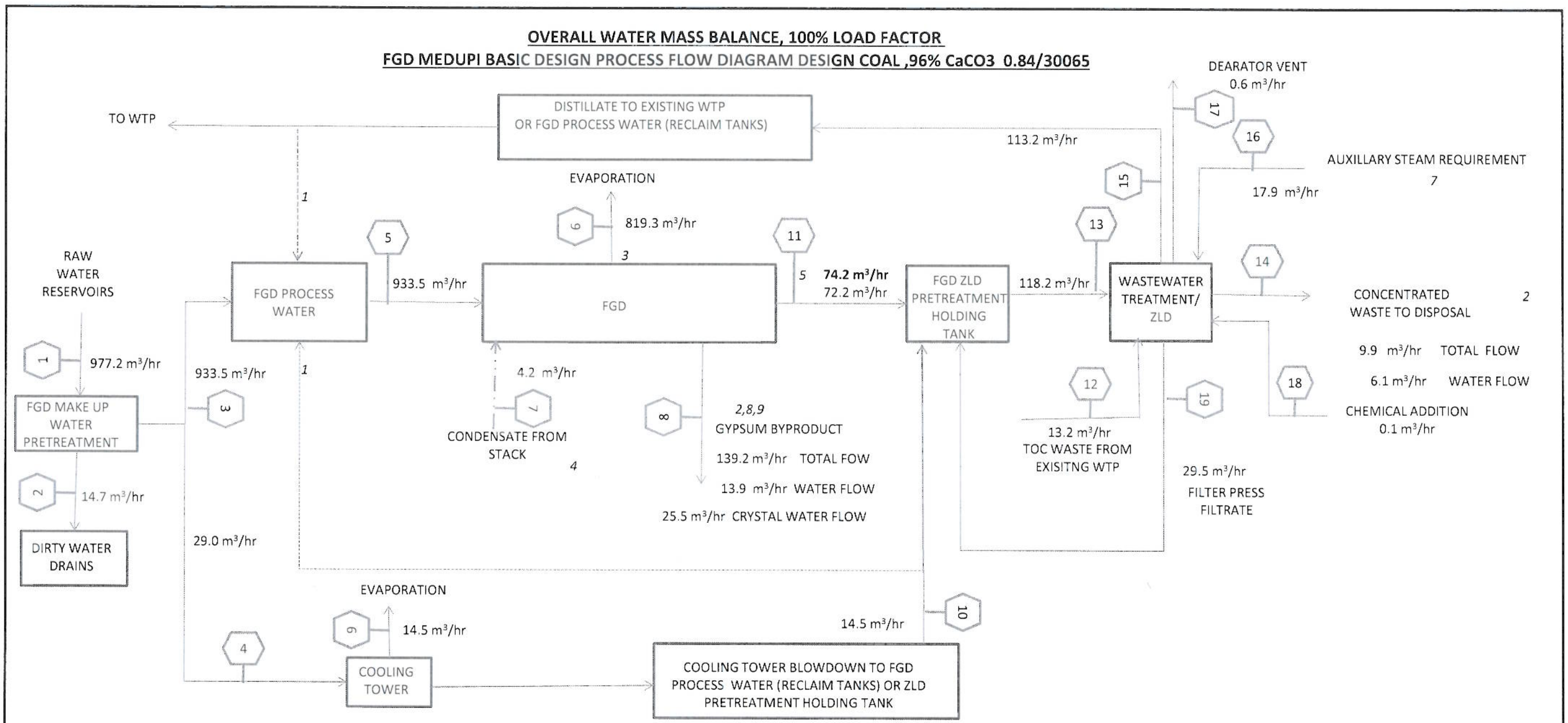
8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR

FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,96% CaCO3 0.84/30065



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,96% CaCO3 0.84/30065, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

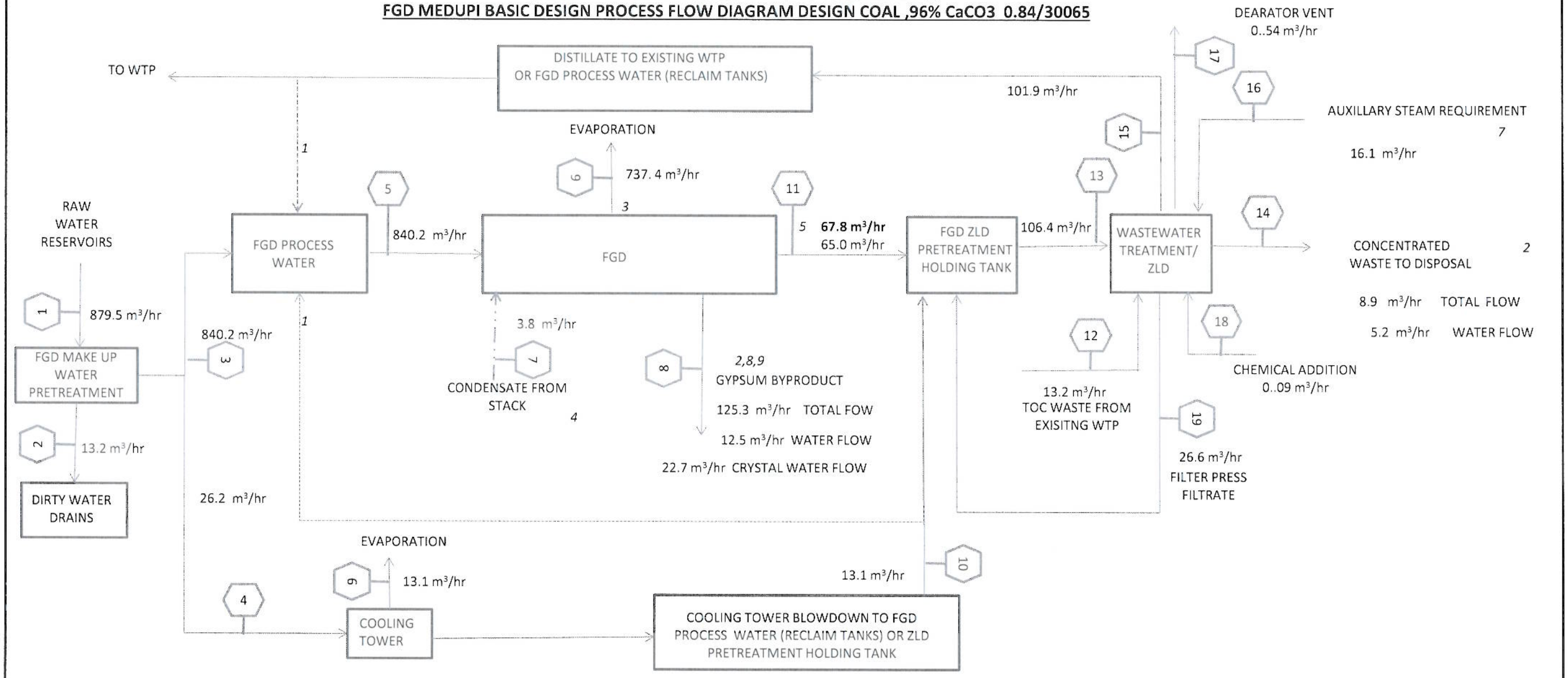
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,96% CaCO3 0.84/30065



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM DESIGN COAL ,96% CaCO3 0.84/30065, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

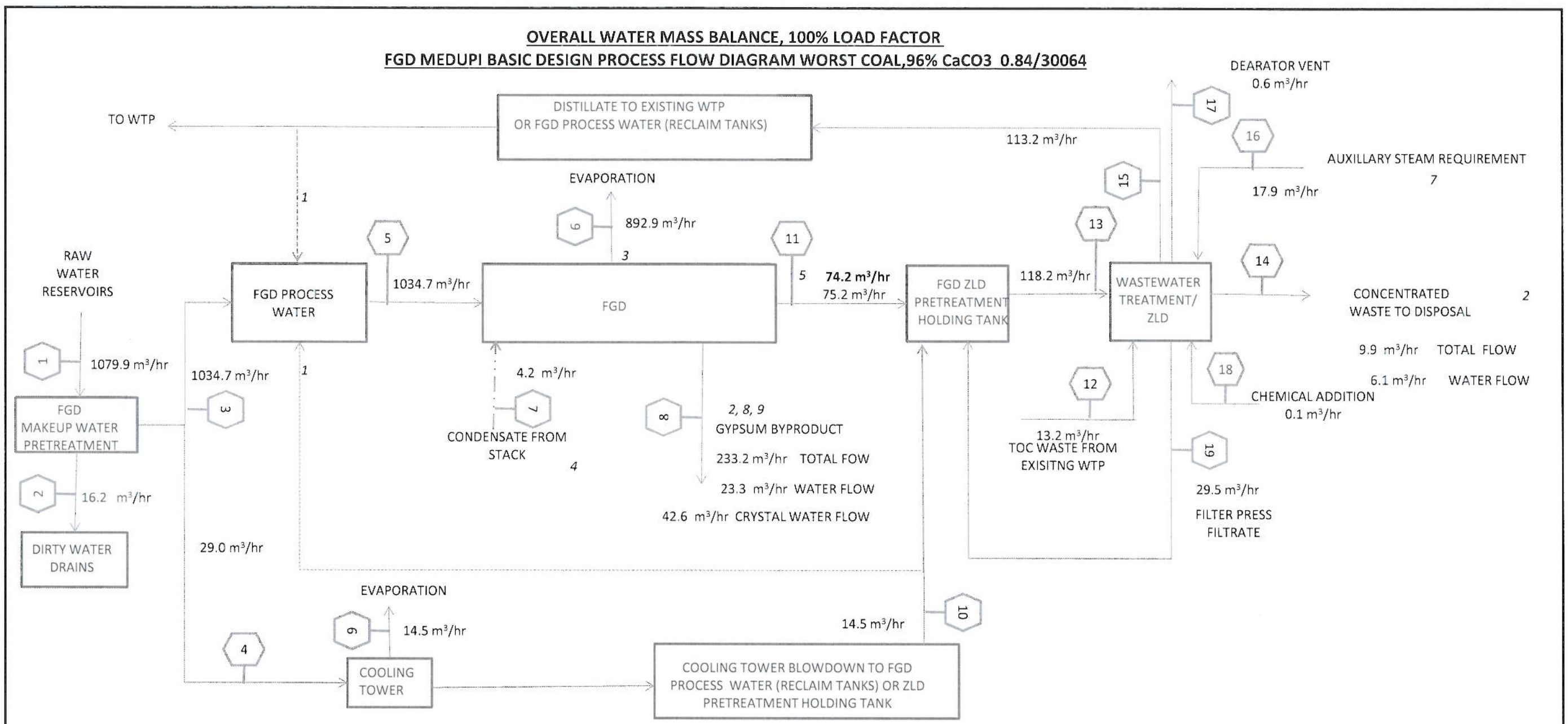
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS.THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL,96% CaCO3 0.84/30064



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL,96% CaCO3 0.84/30064, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

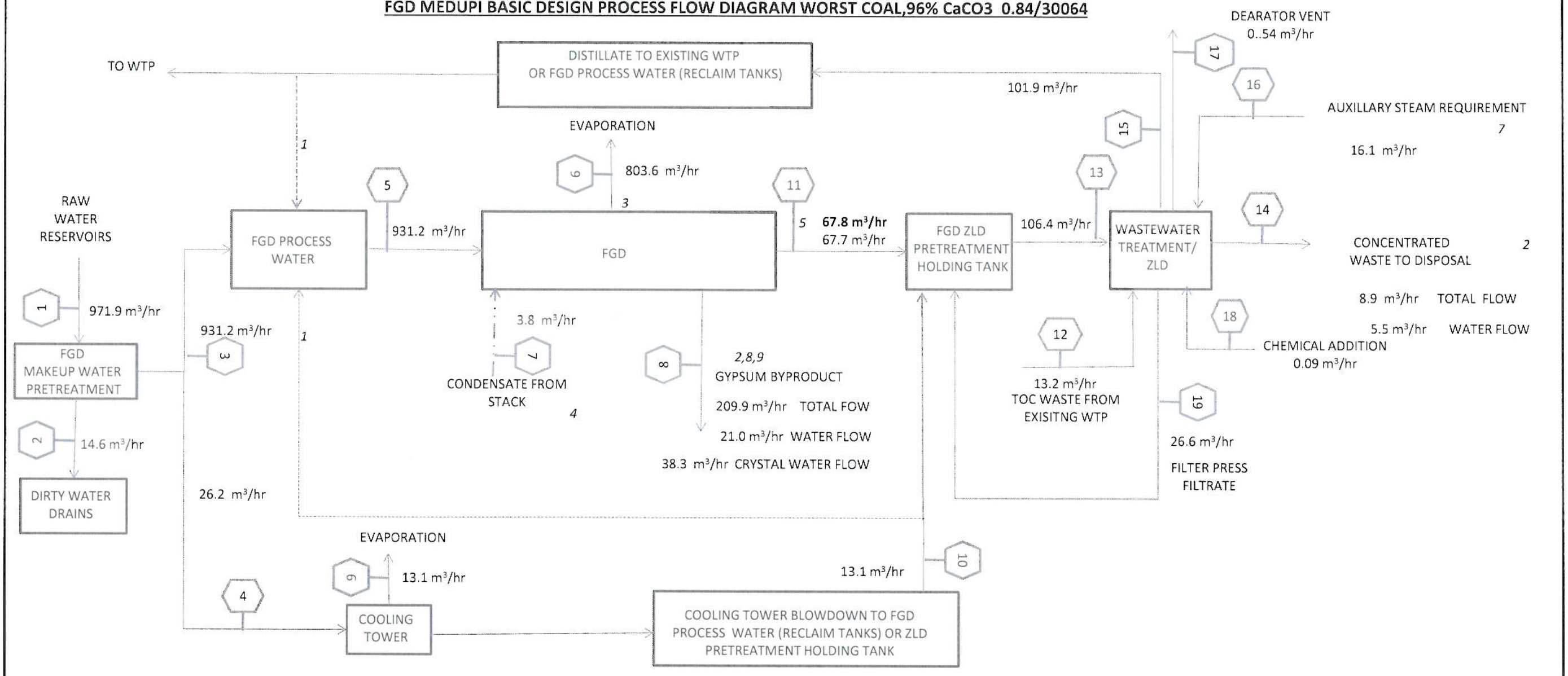
7 VOLUME IF STREAM WAS LIQUID WATER

8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS. THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR
FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL,96% CaCO3 0.84/30064



NOTES

1 IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT

2 THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN

3 FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL,96% CaCO3 0.84/30064, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX

4 IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE

5 STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

6 FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED

7 VOLUME IF STREAM WAS LIQUID WATER

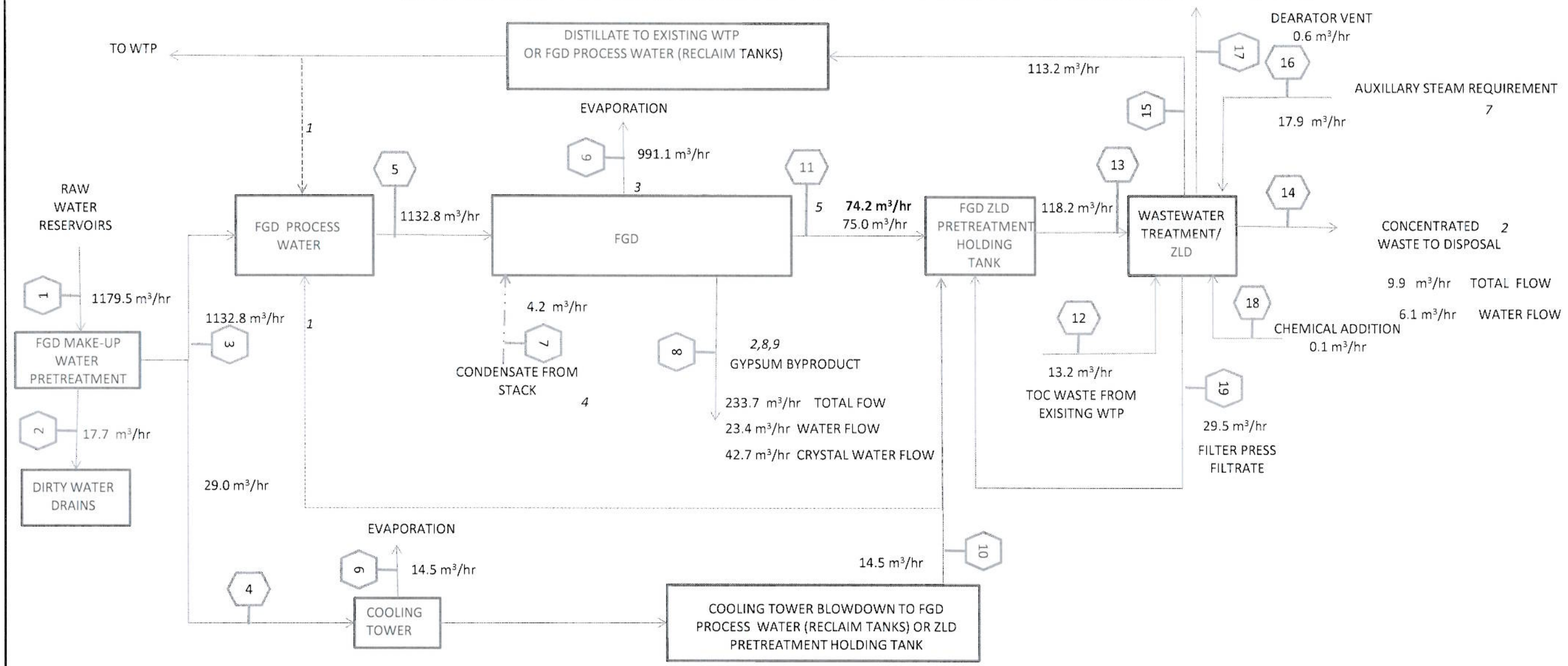
8 THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS. THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN

9 REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 100% LOAD FACTOR

FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,96% CaCO3 0.84/30063



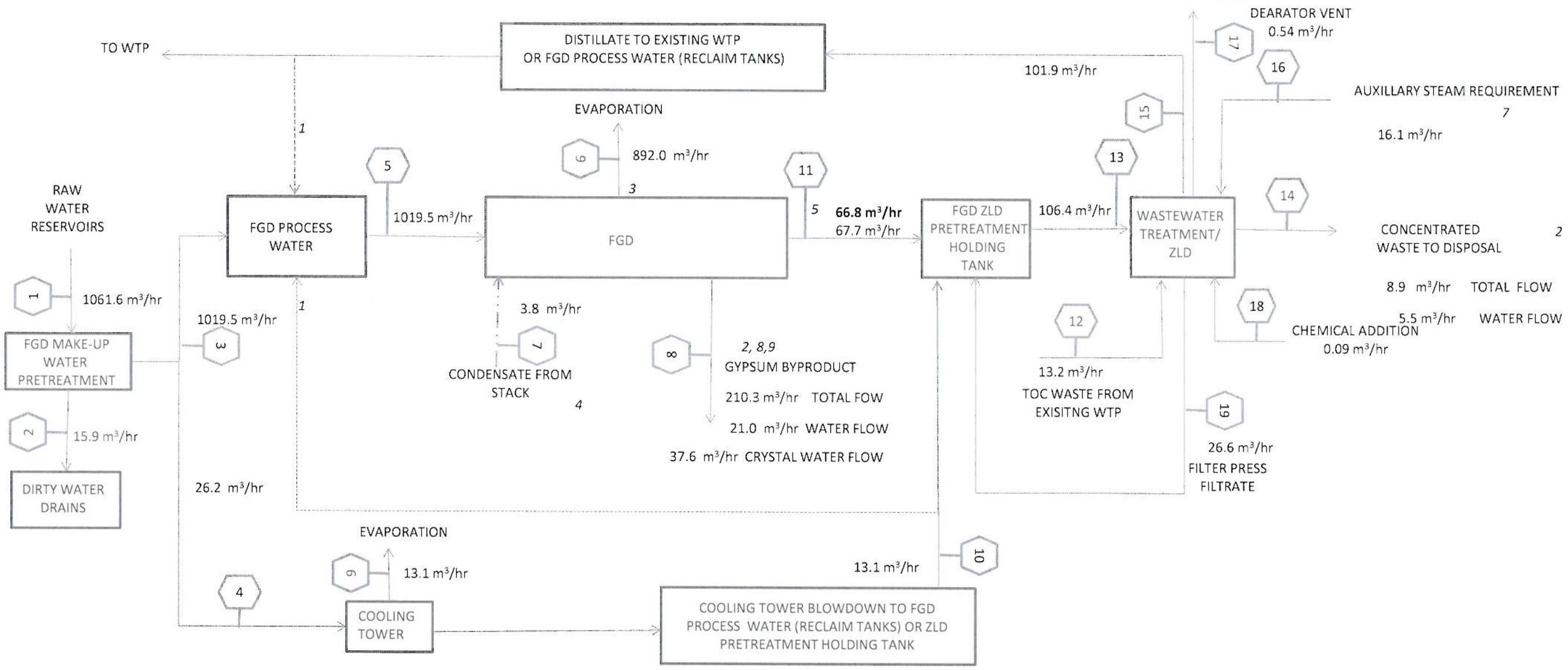
NOTES

1. IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT
2. THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN
3. FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,96% CaCO3 0.84/30063, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX
4. IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE
5. STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE WASTEWATER/ZLD. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.
6. FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED
7. VOLUME IF STREAM WAS LIQUID WATER
8. THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS. THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN
9. REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.

OVERALL WATER MASS BALANCE, 90% LOAD FACTOR

FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,96% CaCO3 0.84/30063



NOTES

1. IF A DASHED LINE IS SHOWN ON THE DIAGRAM THIS IS THE LOWER PRIORTY DESTINATION WHEN COMPLETING THE BALANCE WILL BE INCLUDED AT THE HIGHER PRIORTY POINT
2. THE WATER FLOW AND THE TOTAL FLOW OF THE STREAM IS SHOWN
3. FGD MEDUPI BASIC DESIGN PROCESS FLOW DIAGRAM WORST COAL + ATTEMPERATURE AIR ,96% CaCO3 0.84/30063, WAS USED TO DETERMINE THE FEED REQUIRMENT TO THE FGD BOX
4. IF DASHED AND DOTTED LINE SHOWN , STREAM NOT YET INCLUDED IN BALANCE
5. STREAM 11 REPRESENTS THE FGD BLOWDOWN TO THE ZLD WWTP. IT CHANGES FOR EACH CASE (REFERENCE 2-7) HOWEVER THE ZLD WMB WAS ONLY COMPLETED FOR 2 CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.
6. FLOWS SHOWN ARE TIME AVERAGE VOLUMETRIC FLOWS OF WATER, UNLESS OTHERWISE NOTED
7. VOLUME IF STREAM WAS LIQUID WATER
8. THE GYPSUM BYPRODUCT TOTAL VOLUMETRIC FLOW IS REFERENCED FROM STEINMULLER PFDs. THIS VALUE IS CONSERVATIVE FOR SIZING BULK MATERIAL HANDLING EQUIPMENT SIZING BASIS. THIS VALUE WILL NEED FURTHER REVIEWING DURING DETAILED DESIGN
9. REPRESENTS WATER LOCKED IN SOLID MATERIAL

Take Note STREAM 11: THE BOLD VALUE IS USED TO BALANCE THE WWTP FLOWS AND THE UNBOLD VALUE IS USED TO BALANCE THE FGD FLOWS AS THE WMB FOR THE WWTP WAS ONLY COMPLETED FOR TWO CASES NAMELY DESIGN COAL 85%, $CaCO_3$ AND WORST COAL 96%,$CaCO_3$.