Evaluation of Kraft Pulp Mill Compliance with the BAT's
Environmentally Sound Technologies & Clean Technologies

Best Available Techniques to the Pulp & Paper Industrial Segment
Bleached Kraft Process

QUESTIONNAIRE

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Levels of Compliance in the Evaluation (as compared to technical references)
See Eucalyptus Newsletter Nº 10 at www.eucalyptus.com.br

State of the art BAT & EST:	State-of-the-art
Standard Environmentally Sound Technology:	Standard EST
Best Environmental Practices are in force :	Best Practices OK
No compliance with the BAT or EST concepts:	No Compliance

Guidelines:

- Answers should be brief and limited to each of the specific tables. Annexes may be provided to supplement the answers.
- All consumption's or generations of pollutants should be provided in terms of specific values, what means related to one air dry metric ton, unless requested differently. When mentioning solid residues, specify moisture content and inform results in dry solids.

SECTION 01: Wood Yard and Wood Preparation

01. Debarking of wood logs

Process Technology for the Debarking of Wood Logs	References
Dry or wet concept:? **Capacity:** **Efficiency on debarking:** **Water consumption:** **Electricity consumption:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

02. Wood chippers and wood chip conveyors

Process Technology for the Wood Chippers & Conveyors	References
Equipment's models: **Capacity:** **Electricity consumption by chippers:** **Electricity consumption by conveyors:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

03. Wood yard water management

Process Technology for the Wood Yard Water Management	References
Conceptual design: **Destination of wood yard waters:** **Flows or volumes:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

04. Destination of organic wastes from wood yard

Process Technology for the Organic Wastes from Wood Yard	References
Composting or firing at power boiler: ? **Conceptual approach:** **Handled wastes from wood yard per month:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

05. Biomass boiler

Process Technology for the Biomass Boiler	References
Fuels at the power boiler: **Fuel proportion at the power boiler based on calorific value:** ▪ **Biomass** ▪ **Sludges** ▪ **Fuel oil** ▪ **Natural gas** **Equipment model:** **Boiler efficiency:** **Average moisture content for the burnt biomass:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

06. Bark presses or bark dryers

Process Technology for the Bark Preparation for Firing	References
Pressing and/or Drying: ? **Average moisture content of the bark before the treatment:** **Average moisture content of the bark after the treatment:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 02: Kraft Pulping Brown Line

07. Kraft cooking digestion

Process Technology for the Kraft Cooking Digestion	References
Type of digesting concept: Lo Solids; Compact Cooking; etc ??? **Expected screened pulp yield:** **Rejects content in the raw pulp:** **Effective Alkali charge:** **Kappa number range:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

08. Kraft cooking – Use of additives for improving digestion

Process Technology for the Kraft Cooking – Use of Additives	References
Any use of additives: ▪ **Anthraquinone** ▪ **Surfactant** ▪ **Crystal scaling inhibitors** **Chemical charges:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

09. Oxygen delignification

Process Technology for the Oxygen Delignification	References
One or two reactors: ? **Equipment model:** **Incoming kappa number:** **Kappa number after the O2 delig:** **O2 charge:** **NaOH charge:** **Oxygen delignification efficiency:** **COD carry over to the oxygen delignification:**	*Insert references for technology being used or to be adopted..*
Evaluation of the implemented technology:	

10. Kappa factor for initial bleaching

Process Technology for the Kappa factor	References
Kappa factor to be adopted:	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

11. Utilization of evaporation plant condensates for washing brown pulp

Process Technology for the <u>Utilization of EVA Condensates for Washing Brown Pulp</u>	References
Ratio condensates/clean water in the brown section: **COD of the used condensates:** **Type of condensates:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

12. Highly efficient closed cycle brown stock washing and screening

Process Technology for the <u>Brown Stock Washing and Screening</u>	References
Equipment model: **Fresh water used for washing pulp:** **Effluent generated by washing/screening section:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

13. Maximization of knots, dirt and shives removal from brown pulp to minimize chemical charges in the bleaching line

Process Technology for the <u>Removal of Knots, Dirt & Shives</u>	References
Equipment model: **Shives and dirt content in the screened brown pulp:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

14. Washing presses in the brown line to better remove carry-over of chemicals

Process Technology for the <u>Washing Presses in the Brown Line</u>	References
Type of brown pulp washers: **Equipment model:** **Consistency after presses:** **COD carry over after final brown line press:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 03: Kraft Pulp Bleaching Line

15. Bleaching sequence - ECF (Elemental Chlorine Free), ECF-Light, or TCF (Totally Chlorine Free) bleaching

Process Technology for the Bleaching Sequence	References
Bleaching sequence: **Specific charges:** ▪ **Total equivalent available chlorine charge:** ▪ **Total caustic soda charge:** ▪ **Total oxygen charge:** ▪ **Total hydrogen peroxide charge:** **AOX generation in the bleaching line per adt:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

16. Availability of a Hexenuronic Acids destruction stage (Acid stage or Dhot in pre-bleaching)

Process Technology for the HexAc Destruction Stage	References
First bleaching stage: **Expected content of HexAc in the incoming pulp to bleaching line:** **Ratio HexAc to lignin in the kappa number of O2 delig pulp:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

17. Highly efficient washing presses along bleaching line

Process Technology for the <u>Washers in the Bleaching Line</u>	References
Type of washers: **Equipment model:** **Washing efficiency:** **Consistency of the pulp leaving the washers:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

18. Partial recovery of bleaching stage filtrates

Process Technology for the <u>Partial Recovery of Bleaching Stages Filtrates</u>	References
Type of filtrate recovery: **Equipment model:** **Percentage of filtrate recovery:** **Destination given to the recovered filtrate:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

19. Cooling system for bleaching filtrates

Process Technology for the <u>Cooling System for Bleaching Filtrates</u>	References
Type of filtrate cooler: **Equipment model:** **Flow of filtrate that is being cooled:** **Efficiency in temperature reduction**: from __ º to __º	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

20. Filters to recover fibers and solids from bleaching effluents

Process Technology for the <u>Fiber Filtration from the Bleaching Filtrates</u>	References
Type of filter: **Equipment model:** **Percentage of bleaching filtrates being filtered:** **Efficiency in fiber recovery:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

21. Closed water cycle and low effluent flow generation in the bleaching line (less than 12 m3/adt)

Process Technology for the <u>Closed Water Cycle on Bleaching</u>	**References**
Total specific water consumption in the bleaching line: ▪ **Fresh water:** ▪ **Recovered water:** **Total specific effluent flow from bleaching line:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 04: Recovery of Liquor, Boilers, Energy & Steam

22. Low odor or odorless recovery boiler

Process Technology for the Recovery Boiler	References
Type of recovery boiler: **Equipment model:** **Total burnt dry solids per day:** **Guaranteed TRS emissions (please specify the level of excess O2):** **Ratio m³ of total combustion air / ton of dry solids:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

23. Efficient multiple effect evaporators. Totally indirect heating evaporators, with no direct contact.

Process Technology for the Evaporation Plant	References
Type of evaporation line: **Equipment model:** **Ratio water evaporated/steam consumed:** **Specific generation of condensates: m3 condensates/dry ton of solids** **Ratio GJ/ ton of dry solids:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

24. Type of demineralization plant

Process Technology for the DemineralizationPlant	References
Equipment model: **Generation of effluents(m^3/adt):** **Fresh water consumption:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

25. Firing of high solids black liquor in the recovery boiler

Process Technology for the Solids in the Fired Black Liquor	References
Percentage Solids in the black liquor before the addition of the recovered electrostatic precipitator ash: **Percentage Solids in the black liquor just after the addition of the recovered electrostatic precipitator ash:** **% Percentage of the total dry solids represented by the recovered ash:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

26. Reuse of the major part of evaporation condensates, including in the preparation of white liquor

Process Technology for the <u>EVA Condensates Management</u>	References
Destination of EVA condensates: **Equipment model:** **Percentage of condensates that goes to the Wastewater Treatment Plant for treatment (not recovered):**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

27. Condensate stripping and gas management: reuse of foul condensates

Process Technology for the <u>Condensate Stripping</u>	References
Equipment model: **Percentage of condensates that are stripped:** **Stripping efficiency in terms of COD reduction in the condensate:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

28. **Extra capacity in the recovery boiler and evaporation plant to cope with extra demands such spills, extra charges, etc.**

Process Technology for the <u>Recovery Boiler and Evaporation Plant Extra-capacities</u>	**References**
Excess of capacity in relation to designed pulp production mill capacity: ▪ **Recovery boiler:** ▪ **EVA:** Express the extra capacity in dry solids per day	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

29. **Closure of the smelt dissolver tank emissions**

Process Technology for the <u>Smelt Tank Emissions</u>	**References**
Type of closure adopted in the smelt tank emissions: **Volume of gases recovered:** **Increased generation of SO2 due to closure:** **Destination of solids collected from these gases:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

30. Definition of fuel sourcing, specifications and monitoring, both fossil and biomass fuels

Process Technology for the <u>Fuel Sourcing and Management</u>	References
Matrix of fuels: **Criteria for fuel selection:** **Main specifications for each fuel to be used in the mill:** **Storage of fuels:** ▪ **Volumes for each fuel**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

31. Chloride and potassium removal from recovery system in a clean procedure, avoiding the not so elegant method to purge recovery boiler ashes to the effluent

Process Technology for the <u>Chloride and Potassium Removal from Recovery Cycle</u>	References
Type of technology: **Efficiency in removal:** **Any expected purge of ashes from electrostatic precipitators? How much?** **Equipment capacity:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

32. Methanol recovery

Process Technology for the <u>Methanol Recovery</u>	References
Type of technology: **Generation of methanol per day:** **Destination to the generated methanol:** **GJ coming from methanol as fuel:** **Equipment capacity:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

33. Power boiler technology

Process Technology for the <u>Power Boilers</u>	References
Type of technology: **Number of power boilers** **Capacity for each boiler:** **Equipment capacity:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

34. Black liquor oxidation

Process Technology for the <u>Black Liquor Oxidation</u>	References
Availability of the BLO technology: **Reasons to have it or not have it:** **Equipment capacity:** **Equipment model:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

35. Design of appropriate combustion boiler furnaces (high turbulence, residual oxygen, temperature profiles) to prevent dioxins and furans presence in the flue gases

Process Technology for the <u>Boiler Furnaces</u>	References
Availability of the technology: **Temperature profile in the Recovery Boiler:** **Temperature profile in the Power Boilers:** **Residual oxygen (excess of air) in the flue gases for each of the boilers :**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

36. High performance electrostatic precipitators for dust abatement, in recovery boiler, power boiler and lime kiln

Process Technology for the Electrostatic Precipitators	References
Electrostatic precipitators concepts for each of the systems: ▪ **Recovery boiler** ▪ **Lime kiln** ▪ **Power boiler** **Efficiency for each one in the different dust emission sources:** ▪ **Recovery boiler** ▪ **Lime kiln** ▪ **Power boiler** **Guaranteed emissions in terms of dust in each stack:** ▪ **Recovery boiler** ▪ **Lime kiln** ▪ **Power boiler**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

37. Common chimney for boilers, lime kiln, smelt vent tank. The stack height should be based on optimum dispersion of fumes, and to prevent problems with weather thermal inversion layers

Process Technology for the Chimney	References
Stack height: **Individual flows in the shield stack (m^3/day):** ▪ **Recovery boiler** ▪ **Lime kiln** ▪ **Power boiler** ▪ **Smelt dissolver tank** **Is there a software to predict dispersion and impact of the plumes in the surrounding environment?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

38. Continuous monitoring of TRS, SOx, NOx, flue gas opacity and particulate matter

Process Technology for the <u>Continuous Monitoring of Emissions</u>	References
Equipment's for monitoring: ▪ **Recovery boiler** ▪ **Lime kiln** ▪ **Power boiler** ▪ **Smelt dissolver tank** **Equipment models:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

39. Management of concentrated NCG (Non Condensable Gases)

Process Technology for the <u>Management of Concentrated NCG</u>	References
Equipment's for burning concentrated NCG: **Efficiency in destruction of NCG:** **Generation of additional SO2 due to burning NCG:** **Equipment models:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

40. Management of diluted NCG (Non Condensable Gases)

Process Technology for the <u>Management of Diluted NCG</u>	References
Equipment's for burning diluted NCG: **Efficiency in destruction of NCG:** **Generation of additional SO2 due to burning NCG:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

41. Captive burner or incinerator for odor gases

Process Technology for the <u>Captive Burner or Incinerator</u>	References
Equipment model: **Are the flue gases scrubbed with caustic soda or white liquor?** **Is a complementary fuel required for the burning operation? Which one?** **What are the expected emissions from this captive burner?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

42. **Flash dryer to the lime mud in the kiln**

Process Technology for the <u>Mud Drying in the Kiln</u>	**References**
Equipment model: **% Solids in the lime mud after lime mud dryer:**	*Insert references for technology being used or to be adopted..*
Evaluation of the implemented technology:	

43. **Lime mud washer**

Process Technology for the <u>Lime Mud washer</u>	**References**
Equipment model: **% Solids in the lime mud after lime mud washer:** **Caustic soda in the washed lime mud:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

44. Highly efficient washing of the green liquor dregs and causticising grits to minimize leaching of caustic chemicals

Process Technology for the <u>Dregs & Grits Washing</u>	References
Dregs: **Equipment model:** **% Solids in the dregs after washer:** **% Solids in the blend dregs+grits:** **Residual caustic soda in the washed dregs:** **Residual caustic soda in the washed grits:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

45. Total specific electricity consumption

Process Technology for the <u>Total Electricity Consumption in the Mill</u>	References
Higher or less than 0,7 kWh per air dry ton of manufactured bleached pulp: **Projected value:** **Present value:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

46. Total specific steam consumption

Process Technology for the Total Steam Consumption in the Mill	References
Higher or less than 7 tons of steam per air dry ton of manufactured bleached pulp: **Projected value:** **Present value:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 05: Pulp Sheet Manufacturing (Pulp Machine)

47. Closure of water systems – Utilization of pulp machine white water in washing the bleached pulp

Process Technology for the Closure of Water Systems in the Pulp Machine Section	References
Fresh water consumption in the pulp machine: **Destination of excess of water:** **Effluent from pulp machine (in m^3/adt):** **Treatment of the water for recycling:** **Flow for the centricleaners rejects:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

48. Recovery of fibers in the pulp machines section

Process Technology for the Recovery of Fibers in Pulp Machines Section	References
Effluent from pulp machine (in m³/adt): **Fiber losses in the pulp machine section (in tons/day):** **Equipment model for recovering of fibers:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 06: Chemical Plant

49. Closed cycle chemical manufacturing

Process Technology for Closing the Cycle at Chemical Plant	References
Process effluent from chemical plant (in m³/adt): **Other effluent from chemical plant (in m³/adt):**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

50. Membrane cells to manufacture caustic soda

Process Technology for <u>Caustic Soda Manufacture</u>	References
Is caustic soda manufacture at mill site ?: **Independently where manufactured, what is the technology?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

51. Manufacture of chlorine dioxide (free from elemental chlorine)

Process Technology for <u>Chlorine Dioxide Manufacture</u>	References
Process technology to ClO2 manufacture: **Elemental chlorine content in chlorine dioxide solution (express in mg/L of ClO2 and Cl2):**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 07: Effluent Treatment Plant - WWTP

52. Utilization of indirect heat exchangers to reduce effluent temperature

Process Technology for Heat Exchangers at ETP	References
Type of heat exchanger: ▪ **Cooling towers ?** ▪ **Indirect contact heat exchangers ?** **Losses of effluents to the atmosphere due to cooling operation: m³/day**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

53. Effluent treatment plant. Secondary activated sludge

Process Technology for Secondary Biological Treatment	References
Type of biological treatment: ▪ **COD reduction at the secondary stage:** ▪ **BOD reduction at the secondary stage:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

54. Effluent treatment plant. Tertiary flocculation / flotation / clarification

Process Technology for Tertiary Treatment	References
Type of tertiary treatment: ▪ **COD reduction at the tertiary stage:** ▪ **BOD reduction at the tertiary stage:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 08: Solid Waste Treatment

55. Management plan to minimize generation of solid wastes

Process Technology for Solid Residues Minimization Plan	References
Is there a plan for reducing the generation of solid residues? **What are the goals and targets?** **Is recycling of residues included in the plan?** **Explain the expected measures to reduce the generation and to minimize disposal of residues in the landfill.**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

56. Landfill design and operation

Process Technology for Landfill Design & Operation	References
Area of landfill: **Summary of protective measures in the landfill design:** **Separate collection and storage of wastes?** **Percolates will be treated? Where?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

57. Hazard wastes management and disposal

Process Technology for Hazard Solid Wastes	References
Area of storage: **Type of storage:** **Summary of protective measures in the hazard waste disposal area:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

58. Alternative incineration of non-hazardous organic materials (bark, wood wastes, effluent sludge) in a designed and suited power boiler

Process Technology for Incineration of Wastes	References
Type of wastes to be incinerated: **Equipment's for incineration::** **Summary of protective measures in the incineration process:** **Follow up of Dioxins and Furans in the incineration process?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

SECTION 09: General Clean Technologies in Operation Facilities

59. Adequate automation and process control for environmental parameters

Process Technology for Automation in Environmental Control	References
Inform relevant automation being used in controlling the air, liquid and solid residues generations : **Equipment's models:** **Information Technology softwares available to control environment parameters:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

60. Extensive and mill-wide spill recovery system (basins, tanks, lagoons, etc)

Process Technology for <u>Spill Recovery Systems</u>	References
Spills control philosophy and conceptual design : **Covered operational areas:** **Equipment's models:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

61. Emergency spill lagoon (with extra capacity and continuous availability)

Process Technology for <u>Emergency Lagoon</u>	References
Volume / capacity : **Conceptual design:** **Equipment's models:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

62. Separation and recycling of cooling & sealing waters

Process Technology for <u>Recovery of Cooling & Sealing Waters</u>	References
Conceptual design: **Total volume a day of cooling waters:** **Total volume a day of sealing waters:** **Percentage of cooling waters being recovered:** **Percentage of sealing waters being recovered:** **Utilization for the recovered sealing and cooling waters:** **Treatment applied to these waters:** **Equipment's models:**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

63. Utilization of DBD & DBF free defoamers

Process Technology for <u>Utilization of Defoamers</u>	References
Type of defoamers to be used in the process: **Guarantee they are free from dioxins and furans: ?**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

64. Utilization of part of the storm water (from rain) in the Water Intake Plant or to wash logs

Process Technology for <u>Use of Storm/Rain Water</u>	References
Type of destination to the storm/rain water:	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

65. Recirculation and utilization of the excess of cold and/or hot waters

Process Technology for <u>Cold & Hot Water Management</u>	References
Type of destination to the excess of cold and hot water in the process:	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

66. Energy integration in the bleaching line to reduce temperature of the filtrates generated in each area

Process Technology for Energy Optimization for Bleaching Line Filtrates	References
Adopted procedures to optimize energy consumption and temperatures in the bleaching line filtrates:	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	

67. Maximum closures in the water system. Effluent specific flow in modern bleached kraft pulp mills should be below 30 m³/adt.

Process Technology for Total Fresh Water Consumption at the Mill	References
Please, specify fresh water consumption (m³/adt) at: ▪ **Fiberline** ▪ **Black liquor recovery area** ▪ **Other important water uses in the mill (specify and provide numbers for these consumption's)** **Please, specify effluent generation (m³/adt) at:** ▪ **Fiberline** ▪ **Black liquor recovery area** ▪ **Other important effluent generation in the mill (specify and provide numbers for these generations)**	*Insert references for technology being used or to be adopted.*
Evaluation of the implemented technology:	