LAKE DALECARLIA
REGIONAL WASTE DISTRICT

15901 Briargate Place • Lowell, Indiana 46356
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August 18, 2008

RE: Compliance Plan
Agreed Order Case No. 2008-17812-W

Dave Knox, Case Manager
Indiana Department of Environmental Management
Office of Enforcement - Mail Code 60-02
100 N. Senate Avenue
Indianapolis, IN 46204-2251

Dear Mr. Knox,

The above reference Compliance Plan is hereby submitted for your review and approval. The Compliance Plan includes three Exhibit diagrams and an Attachment 1 Design Summary for proposed wastewater treatment plant improvements Alternates No. (1) and (2).

We trust that the Compliance Plan clearly presents our intentions. If you have any questions or comments concerning the plan, please contact our engineering consultant, Jim Maurer, Haas & Associate at tel. no.

Sincerely,
LAKE DALECARLIA REGIONAL WASTE DISTRICT
BOARD OF TRUSTEES

Stanley Lee

Stanley Lee
President

Enclosures

COMPLIANCE PLAN
AGREED ORDER CASE NO. 2008-17812-W
WASTEWATER TREATMENT PLANT
LAKE DALECARLIA REGIONAL WASTE DISTRICT
LAKE COUNTY, INDIANA

I. INTRODUCTION

The Lake Dalecarlia Regional Waste District (LDRWD) was in the process of designing improvements and making critical repairs to their wastewater treatment plant (WWTP), which is operated under NPDES Permit No. IN 0033081, when the above referenced Agreed Order was received from the Indiana Department of Environmental Management (IDEM). As a result of the Agreed Order, the design of the WWTP improvements was halted, pending the inclusion of the improvements in this Compliance Plan and the approval of the Compliance Plan by IDEM. However, the critical repairs to the WWTP, the replacement of a bent chain drive shaft for the bottom sludge collector mechanism in the existing WWTP clarifier, was completed on June 13, 2008. The sludge collector mechanism has been operating continuously ever since, without any further drive chain breakage. LDRWD WWTP personnel are presently reestablishing proper WWTP operation now that the clarifier bottom sludge collector is back in operation.

II. WASTEWATER TREATMENT PLANT IMPROVEMENTS

The Attachment 1 Design Summary presents the details of the existing WWTP and its current problems and the proposed improvements to the WWTP. The contents of the design summary are "highlighted" as follows:

A. Existing WWTP: Capacity: 44,000 gal./day (average daily flow)
Components: See attached existing WWTP diagram (Exhibit No. 1)

Problems:

1. No baffle plate or skimmer mechanisms for scum collection and removal from the WWTP clarifier.
2. During high plant flow rates, aeration tank liquid sometimes flows though corrosion holes in the separation wall and into the clarifier effluent trough.
3. The aerobic sludge digestion tank level cannot be lowered to accommodate WWTP sludge wasting as a break in a separation wall allows leakage from the WWTP aeration tank to keep the aerobic sludge digestion tank full, at the aeration tank level.
4. Tablet feeders for chlorination and dechlorination chemicals have not been reliable during periods when the WWTP clarifier effluent quality is deteriorated.
5. Electric power outages have occasionally interrupted WWTP operation and the plant influent flow continues to enter and flow through the inoperable WWTP. There is no back-up means of providing electric power for the WWTP.

B. Proposed WWTP Improvements:

Two completely separate Alternates, No. (1) and (2), were being designed and construction bids will be received for both Alternates. The bid amounts will be used by the LDRWD Trustees to select either Alternate No. (1) or (2) for implementation.

Alternate No. (1):

Capacity: 60,000 gal./day (average daily flow)

Components: See attached Alternate No. (1) diagram (Exhibit No. 2)

Description:

(1).1 Renovated the existing prefabricated WWTP tank by replacing all corroded materials and inoperable equipment with new items which are designed and fabricated by a plant manufacturer. This renovation shall convert the existing aerobic sludge digestion tank into an additional aeration tank which will increase the aeration tank volume to 60,000 gal. and the plant capacity to 60,000 gal./day, average daily flow.

(1).2 Provide a new prefabricated aerobic sludge digestion tank, complete with diffused aeration equipment, sludge removal suction pipe and supernatant decant pump.

(1).3 Provide a new 3rd aeration blower to provide "firm" aeration capacity for the larger plant capacity.

(1).4 Provide liquid chlorination and dechlorination chemical feed equipment which is automatically controlled by plant flow rate, for always effective chlorination and dechlorination of plant effluent.

(1).5 Provide a permanent electrical generator with auto-transfer switch, to provide electrical service for the entire improved WWTP during electric power outages.

(1).6 During construction renovation of the existing prefabricated WWTP tank, provide temporary portable modular WWTPs to adequately treat the plant influent flow.

Alternate No. (2):

Capacity: 60,000 gal./day (average daily flow)

Components: See attached Alternate No. (2) diagram (Exhibit No. 3)

Description:

(2).1 Renovate the existing prefabricated WWTP tank by replacing all corroded material and (a.) convert the tank clarifier into an aerobic sludge digestion tank, complete with diffusion aeration equipment, sludge removal suction pipe and supernatant decant pump, and (b) convert the tank aeration and aerobic sludge digestion tanks into a plant inlet flow storage tank, complete with mixing and return flow submersible pump.

(2).2 Provide a new prefabricated WWTP tank with peripheral aeration tank and center clarifier. This new WWTP will be basically the same size and design as the renovated WWTP tank (item no. (1).1) for Alternate No. (1).

This Design Summary is intended to present the existing LDRWD problems and the details of two Alternates, No. (1) and No. (2), to correct all of the problems cited in the Agreed Order. The Design Summary is also intended to verify the acceptability of both WWTP Improvement Alternates No. (1) and No. (2). The LDRWD Trustees desire to have both Alternates No. (1) and No. (2) designed and approved and receive construction bids for both, before selecting one of the alternates for implementation.

It is understood that this Design Summary is subject to modification upon the completion of the LDRWD WWTP design and any such modifications will be included in a construction permit application that is submitted to IDEM.

It is also understood that final approval of the Design Summary by IDEM will be at the time of their issuance of a construction permit for the project. As a result, any approval of this Design Summary by IDEM will be on an interim basis and will be superseded by IDEM's issuance of a construction permit for the project and the Final Design Summary for the approved project design.

Prepared By: Haas & Associates, LLC
Consulting Engineers
Date: August 11, 2008

(2).3 Same as item no. (1).3 for Alternate No. (1)
(2).4 Same as item no. (1).4 for Alternate No. (1)
(2).5 Same as item no. (1).5 for Alternate No. (1)
(2).6 Construct the preceding item no. (2).2 WWTP and place it into service treating all plant influent flow, before taking the existing WWTP out of service for the preceding item no. (2).1 renovation.

III. WASTEWATER TREATMENT PLANT OPERATION AND MAINTENANCE

A. Existing Procedures:

The existing LDRWD WWTP is operated and maintained by LDRWD personnel and the plant operations chief is a State licensed operator and the certifier of the plant operation and reports. The plant samples are collected by the operations chief and taken to a certified laboratory for analysis. The digested sludge from the plant is hauled away to another WWTP and processed with the sludge from that WWTP.

B. Remaining Existing WWTP Use and O&M Procedures:

The existing LDRWD WWTP will continue in service until the previously presented WWTP improvements are (a.) approved as part of this Compliance Plan, (b.) the improvements design is completed, (c.) construction bids are received for the improvements and a construction contract is financed, awarded and the WWTP improvements are constructed and placed into operation. These implementation procedures are estimated to require a total of 15½ months (see the Section IV Implementation and Completion Schedule, which follows). During this 15½ month period, the existing WWTP will continue to be operated and maintained by LDRWD personnel. With a continuously operating WWTP clarifier bottom sludge collector, the LDRWD WWTP operation should return to a satisfactory status with plant effluent quality in compliance with NPDES permit requirements. To achieve and maintain this situation, the LDRWD personnel will have to continue to perform the following tasks on a daily basis:

1. Keep the 8" pipe between the WWTP aeration tank and clarifier fully open by injecting compressed air, to prevent back-up of water in the aeration tank and the resulting flow through the corrosion holes in the separator wall and into the clarifier effluent trough.
2. Manually direct clarifier scum into the scum box and to the air-lift pump for transfer into the WWTP aeration tank.
3. Keep the return sludge air-lift pump operable to transfer "activated sludge" from the clarifier to the aeration tank, and to waste "activated" sludge into the aerobic sludge digestion tank.
4. Waste "activated" sludge from the plant clarifier and into the aerobic sludge digestion tank in controlled amounts that can be received by a full digestion tank.
5. Have digested sludge frequently removed from the aerobic sludge digestion tank to accommodate sludge wasting into the tank and prevent excessive sludge concentrations in the plant.
6. Keep the existing tablet feeders full and effective, during the chlorination and dechlorination period of the year.

b. Aeration Tank Area = $(\pi/4)(34^2 - 18^2)$ = 653 sq. ft.
Aeration Tank Liquid Depth = 13.25 ft.
Aeration Tank Volume = 653 sq. ft. x 13.25 ft. = 8652 cu. ft. x 7.48 = 64,717 gal.
Aeration Tank Volume Capacity for Extended Aeration = Volume ÷ Required Detention Time = 64,717 gal. ÷ 1 day = 64,717 gal./day
Aeration Tank Loading Capacity = Volume x Allowable Loading = 8652 cu. ft. x 15 lb. BOD/day/1000 cu. ft. (for extended aeration and nitrification) = 130 lb. BOD/day ÷ .17 lb. BOD/day/PE = 765 PE

(2).3 Provide a new aeration blower of the same size and design and in the same type of enclosure, to supplement the two existing blowers:

New Blower Type: Positive Displacement
Speed: 1750 rpm
Capacity: 272 cfm @ 8.2 psi discharge pressure
Horsepower: 25

(2).4 Provide two liquid chemical feed systems for chlorination and dechlorination of the WWTP effluent. The chemical feed location for chlorination shall be into the plant piping ahead of the chlorine contact tank. The chemical feed for dechlorination shall be into the chlorine contact tank effluent flow.

Each chemical feed system shall consist of a 55 gal. plastic tank for chemical preparation and storage and two metering pumps, one as a standby. The metering pumps shall be controlled by the plant effluent flow meter to automatically adjust the chemical feed rates to the plant effluent flow rates.

(2).5 Chlorine Contact Tank – Continue to use existing tank.

(2).6 Chlorine Sludge Return System – Continue to use existing system with discharge into the WWTP aeration tank

(2).7 Plant Effluent Flow Meter – Continue to use existing meter

(2).8 Plant Outfall Sewer – Continue to use existing sewer

(2).9 Plant Influent Pump Station and Force Main – Continue to use existing facilities

(2).10 Plant Digested Sludge Removal – Continue to have digested sludge removed by vactor truck and hauled to another WWTP for disposal with the other plant's digested sludge.

III. CLOSURE

This Design Summary has been prepared as an Attachment to an Agreed Order Compliance Plan. It presents the design criteria for proposed improvements to the LDRWD WWTP that were being designed prior to the issuance of Agreed Order Case No. 2008-17812-W by IDEM. The design of the LDRWD WWTP improvements has been halted since the issuance of the Agreed Order and will not resume until the Compliance Plan is approved by IDEM.

7. Remove solids accumulations in the chlorine contact tank with the existing tank bottom drains and pumping system to pump the sludge into the WWTP aeration tank.

To assure that these daily tasks are done, until the existing WWTP is taken out of service and replaced, a daily "log" sheet will be prepared and used by LDRWD personnel. This daily "log" sheet will verify the performance of each of the preceding tasks and any required repairs, and also provided for resulting observations.

C. New WWTP O&M Procedures:
A new "log" sheet will be prepared and used by LDRWD personnel for the proposed WWTP improvements. The tasks on the new "log" sheet will be based on the specific requirements of the WWTP improvements facilities.

D. Existing and New WWTP O&M Results:
The preceding existing WWTP operation and maintenance tasks have resulted in WWTP effluent quality that has been in full compliance with the WWTP NPDES permit requirements, over the majority of the time (9 years) that the LDRWD has operated and maintained the WWTP. As the WWTP influent flow characteristics and volume have not changed significantly, it is reasonable to expect the existing WWTP effluent to return to NPDES permit compliance. It is also reasonable to expect the proposed WWTP improvements to maintain effluent compliance with the NPDES permit. As indicated on the Attachment 1 Design Summary, the design criteria for the proposed WWTP improvements, either Alternate No. (1) or (2), is in total conformance with IDEM requirements (10 State Standards).

IV. IMPLEMENTATION AND COMPLETION SCHEDULE

The anticipated implementation and completion schedule for this Compliance Plan, with specific "milestone" dates indicated by bold lettering, is presented as follows:

	Agreed Order Compliance Plan Item Descriptions	Anticipated Dates
1.	This Compliance Plan is accepted by the LDRWD Trustees and is submitted to IDEM for review and approval	8-20-08
2.	The LDRWD personnel prepare and use a daily "log" sheet for special operation and maintenance tasks at the existing WWTP due to the condition of the WWTP	9-1-08
3.	IDEM reviews and approves the Compliance Plan	**9-24-08***
4.	Haas & Associates begins the completion of the proposed WWTP improvements design, including both Alternates No. (1) and (2)	9-25-08
5.	Haas & Associates completes the preceding item no. 4 design and submits the construction drawings and specifications and a permit application to the LDRWD Trustees and then IDEM, for review and approval	11-20-08

Alternate No. (2) – Provide the preceding item II.1 WWTP Improvements with the following items:

(2).1 Renovate the existing prefabricated steel plant structure by removing and replacing everything that is damaged by corrosion, above and below the plant liquid level and replace the structure as necessary to (a) convert the center clarifier into an aerobic sludge digestion tank, complete with diffused aeration equipment and a sludge removal suction pipe and (b) convert the peripheral aeration tank and aerobic sludge digestion tank into a flow storage tank, complete with flow mixing and return pump. The details of these facilities in the renovated structure are presented as follows:

a. Aerobic Sludge Digestion Tank Area = $(\pi/4)(17')^2$ = 227 sq. ft.
Liquid Depth = 11.75 ft. (middle) and 11.05 ft. (side wall)
Volume = 227 sq. ft. x 11.05 sq. ft.+ 1/3 x 227 sq. ft. x.70 ft. = 2508 + 53 = 2561 cu. ft. x 7.48 = 19,156 gal.
Aerobic Sludge Digestion Tank Capacity = Volume x Pop. Equiv. /
Volume = 2561 cu. ft. ÷ (3 x 1.25 cu. ft./PE) (digestion only*)
= 2561 ÷ 3.75 = 683 PE

* No liquid sludge storage volume is required in the aerobic sludge digestion tank as explained on the bottom of page 2 of this Design Summary.

b. Tank Supernatant Decant Removal – Davit Crane and Perforated Basket containing Submersible Pump (2" Size) that is placed at the desired decant level.
Pump Capacity = 25 gal./min.

c. Flow Storage Tank Area = $(\pi/4)(34^2-17^2)$ = 681 sq. ft.
Liquid Depth = 13.25 ft.
Volume = 681 sq. ft. x 13.25 ft. = 9023 cu. ft. x 7.48 = 67,494 gal.

(2).2 Provide a new prefabricated WWTP with peripheral aeration tank and center clarifier. This new WWTP will be approximately the same size, design and capacity as the Alternate No. (1) renovated WWTP tank and with the same equipment: inlet flow screen, clarifier bottom scraper/surface skimmer mechanism, return and waste activated sludge and clarifier skimmings air lift pumps and diffuser aeration system.

New WWTP Tank Type: Welded Steel (Option a)
Reinforced Concrete (Option b)
New WWTP Outer Diameter = 34 ft. (aeration tank)
New WWTP Inner Diameter = 18 ft. (clarifier)

a. Clarifier Area = $(\pi/4)(18)^2$ = 254 sq. ft.
Clarifier Liquid Depth = 11.75 ft. (middle) and 11.05 ft. (sidewall)
Clarifier Volume = 254 sq. ft. x 11.05 ft. + 1/3 x 254 sq. ft. x .70 ft.
2807 + 59 = 2866 cu. ft. x 7.48 = 21,438 gal.
Clarifier Capacity = 254 sq. ft. x 1000 gpd/sq. ft. (at peak hourly flow rate)
254,000 gal/day = 176.4 gal./min. (peak hourly flow)
Peak Hourly/Average Flow Ratio = 4.0
Average Clarifier Capacity = 176.4 ÷ 4 = 44.1 gal./min. = 63,500 (average daily flow)

	Agreed Order Compliance Plan Item Descriptions	Anticipated Dates
6.	IDEM reviews and approves the preceding item no. 5 documents and issues a construction permit for both proposed LDRWD WWTP improvements, Alternate No. (1) and (2)	**1-3-09***
7.	Construction bids for the proposed LDRWD WWTP improvements, both Alternate No. (1) and (2) are publicly solicited, received and reviewed by the LDRWD Trustees. **The Trustees select either the best bid for Alternate No. (1) or the best bid for Alternate No. (2)** and submit the results to IDEM for approval	**2-11-09**
8.	IDEM approves the preceding item no. 7 bid selection	2-25-09
9.	Project financing is finalized and a construction contract is executed and construction commences on the selected LDRWD WWTP improvements	**4-25-09**
10.	Construction is completed and the selected LDRWD WWTP improvements, either Alternate No. (1) or (2), are placed into service	**11-25-09**
11.	The LDRWD personnel prepare and use a daily "log" sheet for the regular operation and maintenance tasks for the WWTP improvements	11-25-09
12.	The LDRWD WWTP improvements 12 month performance period begins	**11-25-09**
13.	The LDRWD WWTP improvements 12 month performance period ends upon six consecutive months with no effluent violations to the WWTP NPDES permit	**5-25-10 to 11-25-10**

* These anticipated dates cannot be estimated with any certainty and all subsequent dates are subject to adjustment to these actual dates.

V. APPROVAL AND SUBMITTAL

This Compliance Plan has been reviewed by the LDRWD Trustees and is hereby approved for submittal to IDEM, for review and approval. It is understood by the LDRWD Trustees that this Compliance Plan, upon its approval by IDEM, becomes a part of Agreed Order Case No. 2008-17812-W.

APPROVED THIS 11th DAY OF AUGUST, 2008
BY THE BOARD OF TRUSTEES OF THE LAKE
DALECARLIA REGIONAL WASTE DISTRICT

_____
Stanley Lee, President

Prepared By: Haas & Associates, L.L.C.
Consulting Engineers

c. Aeration Tank Loading Capacity = Volume x Allowable Loading = (67,494 gal. ÷ 7.48) x 15 lb. BOD/day/1000 cu. ft. (for extended aeration and nitrification) = 135 lb. BOD/day ÷ .17 lb. BOD/day/PE = 796 PE

(1).4 Provide a separate aerobic sludge digestion tank with the following details:

Tank Type = Welded Steel (Option 1)
Reinforced Concrete (Option 2)

Tank Size = 18 ft. diameter x 13 ft. center depth and 12 ft. sidewall depth (Options 1 and 2)

Tank Volume = $(\pi/4)(18')^2 (12') + (1/3)(\pi/4)(18')^2 (1') = 3054 + 85$ = 3139 cu. ft. x 7.48 = 23,480 gal.

(1).5 Tank Supernatant Decant Removal – Davit Crane and Perforated Basket containing Submersible Pump (2" Size) that is placed at the desired decant level. Pump Capacity = 25 gal./min.

(1).6 Provide a new aeration blower of the same size and design and in the same type of enclosure, to supplement the two existing blowers:

New Blower Type: Positive Displacement
Speed: 1750 rpm
Capacity: 272 cfm @ 8.2 psi discharge pressure
Horsepower: 25

(1).7 Provide two liquid chemical feed systems for chlorination and dechlorination of the WWTP effluent. The chemical feed location for chlorination shall be into the plant piping ahead of the chlorine contact tank. The chemical feed for dechlorination shall be into the chlorine contact tank effluent flow.

Each chemical feed system shall consist of a 55 gal. plastic tank for chemical preparation and storage and two metering pumps, one as a standby. The metering pumps shall be controlled by the plant effluent flow meter to automatically adjust the chemical feed rates to the plant effluent flow rates.

(1).8 Chlorine Contact Tank – Continue to use existing tank.

(1).9 Chlorine Sludge Return System – Continue to use existing system with discharge into the WWTP aeration tank

(1).10 Plant Effluent Flow Meter – Continue to use existing meter

(1).11 Plant Outfall Sewer – Continue to use existing sewer

(1).12 Plant Influent Pump Station and Force Main – Continue to use existing facilities

(1).13 Plant Digested Sludge Removal – Continue to have digested sludge removed by vactor truck and hauled to another WWTP for disposal with the other plant's digested sludge.

COMPLIANCE PLAN ATTACHMENT 1
DESIGN SUMMARY
WASTEWATER TREATMENT PLANT IMPROVEMENTS
LAKE DALECARLIA REGIONAL WASTE DISTRICT
LAKE COUNTY, INDIANA

I. EXISTING FACILITIES

1. Existing Situation: The existing Lake Dalecarlia Regional Waste District (LDRWD) wastewater treatment plant (WWTP) has been in service for more than 40 years, serving the Fairways Subdivision (85 single family residences). In 1999, the LDRWD purchased the treatment plant from a private sewer utility and in 2002 added the Block 30 community (29 single family residences) to the plant.

   A. The existing LDRWD WWTP is in deteriorated condition due to corrosion of the portions of the prefabricated steel structure at and above the water line. As a result of this corrosion;
      - a.1 there is no baffle plate or skimmer mechanism on the plant clarifier,
      - a.2 during high influent flow periods, the high liquid level in the plant aeration tank flows through corrosion holes in the clarifier separation wall and into the clarifier effluent trough,
      - a.3 the liquid level in the aerobic digestion compartment cannot be lowered to accommodate sludge wasting as one of its separator walls has broken away from the outer wall of the plant structure and resulting leakage from the aeration tank keeps the aerobic digestion compartment full, at the same liquid level as the aeration tank.

   B. Other plant problems that have caused operation problems in the past are described as follows:
      - b.1 The bottom sludge scraper in the clarifier had a bent chain drive shaft and chain drive breakage was a frequent problem. The resulting inoperable bottom sludge collector eventually caused insufficient return of activated sludge to the aeration tank which affected the stabilization and nitrification of the plant waste flow. Note: This problem has recently been corrected by the replacement of the chain drive shaft.
      - b.2 Tablet feeders for chlorine and dechlorination chemicals in the plant clarifier effluent line have not always been effective when the plant clarifier effluent quality is deteriorated.
      - b.3 Electric power outages at the LDRWD WWTP occur occasionally and can be lengthy. During these power outages, the plant influent flow continues to flow through the plant without any plant operation. The plant flow detention time is sufficient to withstand most localized electrical power outages, without plant effluent deterioration. However, wide-spread power outages can last long enough to result in plant effluent deterioration.

3. Existing Plant Influent Pump Station:
   Location – Across Lake Dalecarlia from WWTP
   Service History – 40 years (structure) and 6 years (pumps)
   Number of Pumps – 2
   Type – Dry-pit vertical centrifical
   Capacity – Each pump individually: 270 gal./min. @ 44 ft. TDH
   together: 280 gal./min. @ 48 ft. TDH
   Portable Pump Back-up – Trailer mounted gasoline engine driven horizontal centrifical pump
   Service History: 6 years
   Capacity: 340 gal./min. @ 65 ft. TDH w/ 10 ft. suction lift
   Force Main; Service History – 40 years
   Size: 6" diameter
   Type: Cast iron pipe w/ ball and socket joints on bottom of Lake Dalecarlia and push-on joints elsewhere
   Condition: Satisfactorily pressure tested and corrosion analyzed in 1999

II. PROPOSED FACILITIES

1. WWTP Improvements – The following improvements are proposed to the LDRWD WWTP:
   a. Provide a fully functional plant with a capacity increase to 60,000 gal./day.
   b. Provide a separate aerobic sludge digestion tank.
   c. Provide liquid chlorination and dechlorination chemical feed systems which are controlled by the WWTP flow rate, for improved control and effectiveness.
   d. Provide an emergency propane gas powered electrical generator for the entire WWTP.

Alternate No. (1) – Provide the preceding item II.1 WWTP Improvements with the following items:

(1).1 Renovate the existing prefabricated steel plant structure by removing and replacing everything that is damaged by corrosion, above and below the plant liquid level, all as determined, fabricated and furnished by a plant manufacturer. Also, permanently remove the radial walls for the existing aerobic sludge digestion tank to convert the digester into more aeration tank.

(1).2 Also replace the existing plant equipment: inlet bypass screen, clarifier bottom scrapers/surface skimmer mechanism, return and waste activated sludge and clarifier skimmings air lift pumps, diffused aeration system.
Note: The resulting capacities of the renovated plant will be determined as follows:

(1).3 Renovated Plant Size and Capacity

a. Clarifier – (same as existing) = 39.4 gal./min. = 56,740 gal./day (average daily flow)

b. Aeration Tank Volume = Existing Aeration Tank + Existing Aerobic Digester = 44,500 gal. + 22,994 gal. = 67,494 gal.
Aeration Tank Volume Capacity for Extended Aeration = Volume ÷ Required Detention Time = 67,494 gal. ÷ 1 Day
67,494 gal./day (average daily flow)

2. Existing Plant Size and Capacity: The existing LDRWD WWTP has the following sizes and resulting capacities:

a. Prefabricated Steel Structure:
Service History = 40 years
Outer Diameter = 34 ft. (aeration tank and aerobic digester)
Inner Diameter = 17 ft. (clarifier)

b. Clarifier Area = $(\pi/4)(17)^2$ = 227 sq. ft.
Clarifier Liquid Depth = 11.75 ft. (middle) and 11.05 ft. (sidewall)
Clarifier Volume = 227 sq. ft. x 11.05 ft. + 1/3 x 227 sq. ft. x .70 ft. =
2508 + 53 = 2561 cu. ft. x 7.48 = 19,156 gal.
Clarifier Capacity = 227 sq. ft. x 1000 gpd/sq. ft. (at peak hourly flow rate)
227,000 gal/day = 157.6 gal./min. (peak hourly flow)
Population Served by LDRWD WWTP = 115 residences x 2.5 PE/residence
288 PE
Peak Hourly/Average Flow Ratio for 288 PE = 4.0
Average Clarifier Capacity = 157.6 ÷ 4 = 39.4 gal./min. = 56,740 (average daily flow)

c. Aeration Tank Area = $(\pi/4)(34^2 - 17^2)$ x 66% = 449 sq. ft.
Aeration Tank Liquid Depth = 13.25 ft.
Aeration Tank Volume = 449 sq. ft. x 13.25 ft. = 5949 cu. ft. x 7.48 = 44,500 gal.
Aeration Tank Volume Capacity for Extended Aeration = Volume ÷ Required Detention Time = 44,500 gal. ÷ 1 day = 44,500 gal./day
Aeration Tank Loading Capacity = Volume x Allowable Loading = 5949 cu. ft. x 15 lb. BOD/day/1000 cu. ft. (for extended aeration and nitrification) = 89 lb. BOD/day ÷ .17 lb. BOD/day/PE = 523 PE

d. Aerobic Digestion Tank Area = $(\pi/4)(34^2 - 17^2)$ x 34% = 232 sq. ft.
Aerobic Digestion Tank Liquid Level Range = 13.25 ft.
Aerobic Digestion Tank Volume = 232 sq. ft. x 13.25 ft. = 3074 cu. ft. x 7.48 = 22,994 gal.
Aerobic Digestion Tank Capacity = Volume x Pop. Equiv./Volume =
3074 cu. ft. ÷ (3 x 1.25 cu. ft./PE)(digestion only)* = 3074 ÷ 3.75 = 820 PE

* No liquid sludge storage volume is required in the aerobic sludge digestion tank as liquid digested sludge is removed periodically and hauled to another WWTP for disposal. This occurs approximately every 60 days which compares with an aerobic sludge digestion tank detention time of almost 100 days, which is calculated as follows:

Existing Plant Inlet Load = 288 PE x .20 lb SS/PE/day = 57.6 lb SS/day
288 PE x .17 lb BOD/PE/day = 49.0 lb BOD day
Existing Plant Digested Sludge Load = 57.6 lb SS/day x .25 = 14.4 SS day (ash)
49.0 lb BOD/day x .5 = 24.5 lb. Act. Sl. day
38.9 lb. SS/day
Existing Plant Digested Sludge Influent Volume @ 2% Solids =

$$\frac{38.9 lb.SS/day}{\frac{.02 lb.SS}{lb.H_2O} x 8.34 lb./gal.} = 233 gal./day \text{ (WAS)}$$

Existing Aerobic Digestion Tank Volume = 22,994 gal.

$$\text{Detention Time} = \frac{22{,}994 gal.}{233 gal./day} = 98.7 days$$

e. Aeration Blowers; Number – 2, each in a "tip-up" insulated enclosure
Service History – 1 at 5 years and 1 at 3 years
Type – Positive Displacement
Speed – 1750 rpm, each
Capacity – 272 cfm at 8.2 psi discharge pressure, each
Horsepower – 25, each

f. Required Aeration Capacity; Each Blower with one as a Standby:
Aeration Tank = 2050 cu. ft./lb. BOD/day x 89 lb. BOD/day
= 182,450 cu. ft/day = 127 cu. ft./min.
Aerobic Digester Tank = 30 cu. ft./min/1000 cu. ft. x 3074
cu. ft. = 92 cu. ft./min.
Air Lift for Return Activated Sludge (RAS):
Required RAS Rate = 50% x Average Daily Flow = .5 x
44,000 gal./day = 22,000 gal./day = 15.3 gpm*
* Use 80 gpm for 2 ft./sec. velocity in 4" pipe
Required Air Flow for 80 gal./min. flow in 4" air lift
pump with 1 ft. lift and 9040 submergence =
10 cu. ft./min.
Total Air Required: aeration tank = 127 cu. ft./min.
aerobic digester = 92 cu. ft./min.
RAS air lift pump = 10 cu. ft./min.
229 cu. ft./min.

g. Chlorine; Type – tablet feeder
Capacity – 3 lb. chlorine/day
Average Chlorine Concentration –

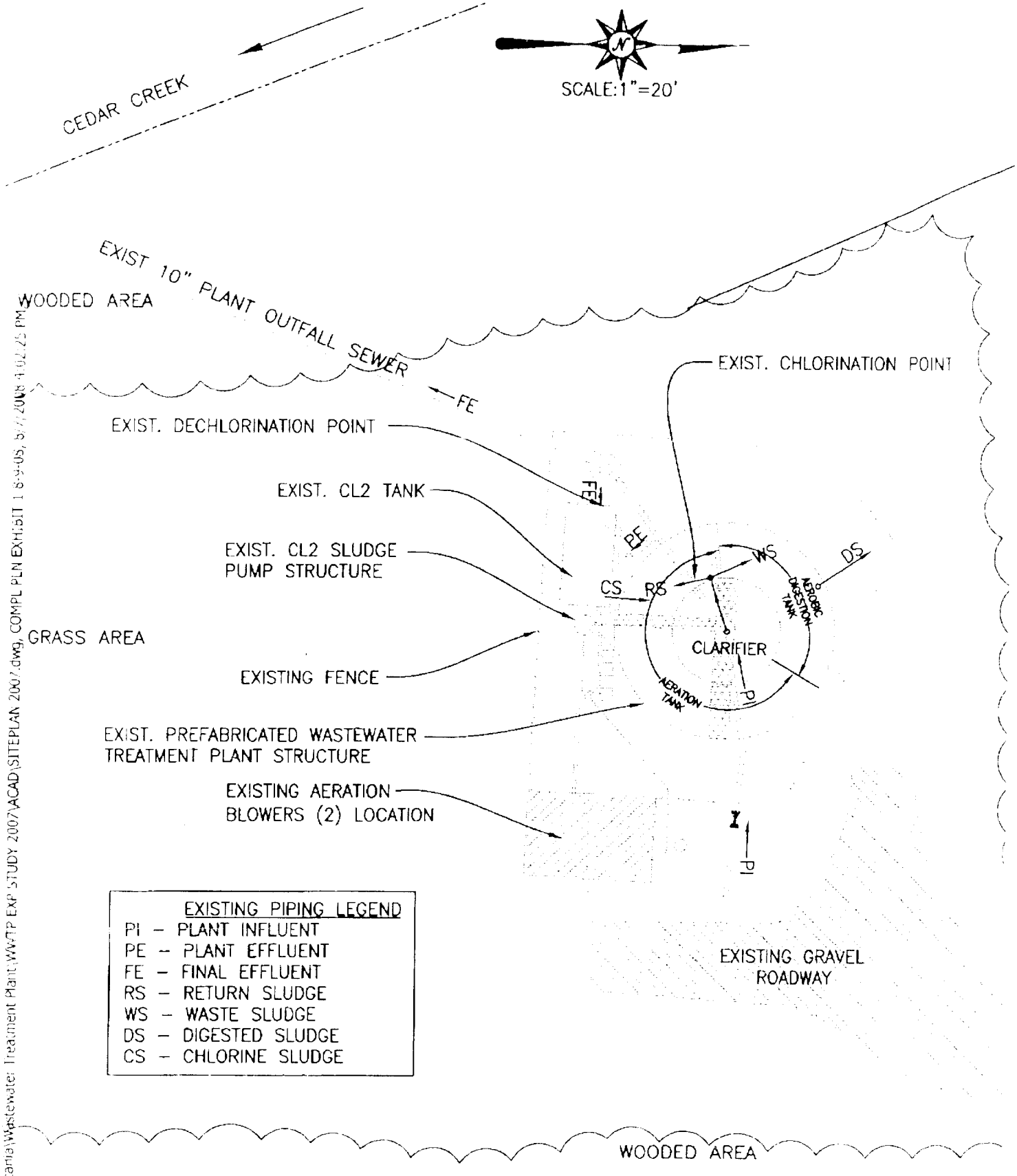
$$\frac{3lb.Chlorine/day}{44{,}000gal./dayx8.34lb./gal.} x10^6 = 8.2ppm$$

h. Chlorine Contact Tank; Service History – 6 years
Size = 14.75 ft. long x 7.00 ft. wide x 6.40 ft. liquid depth = 661 cu. ft.
x 7.48 = 4944 gal.
Mixing – flow pattern to prevent short circuiting
Flow Route – 30.5 ft. long x 3.0 ft. wide x 6.4 ft. liquid depth
Detention = Volume ÷ Maximum Hourly Flow Rate = 4944 gal./day
= 4944 ÷ 176,000 = .028 days = 40.5 min.
Chlorine Sludge Return System – Submersible pumps in a manhole
structure with two 4" suction pipes, one at each end of the chlorine tank.
Capacity: 60 gal./min. return to plant aeration tank

i. Dechlorination; Type – tablet feeder
Capacity – 3 lb./day

j. Flow Meter; Service History – 6 years
Type – 90° - V-north weir on effluent overflow of chlorine
contact tank
Maximum Flow Depth Through Weir = 0.6'
Maximum Flow Rate Through Weir = 300 gal./min.

k. Outfall Sewer; Size – 10 in. diameter
Slope - .92%
Capacity – 770 gla./min.



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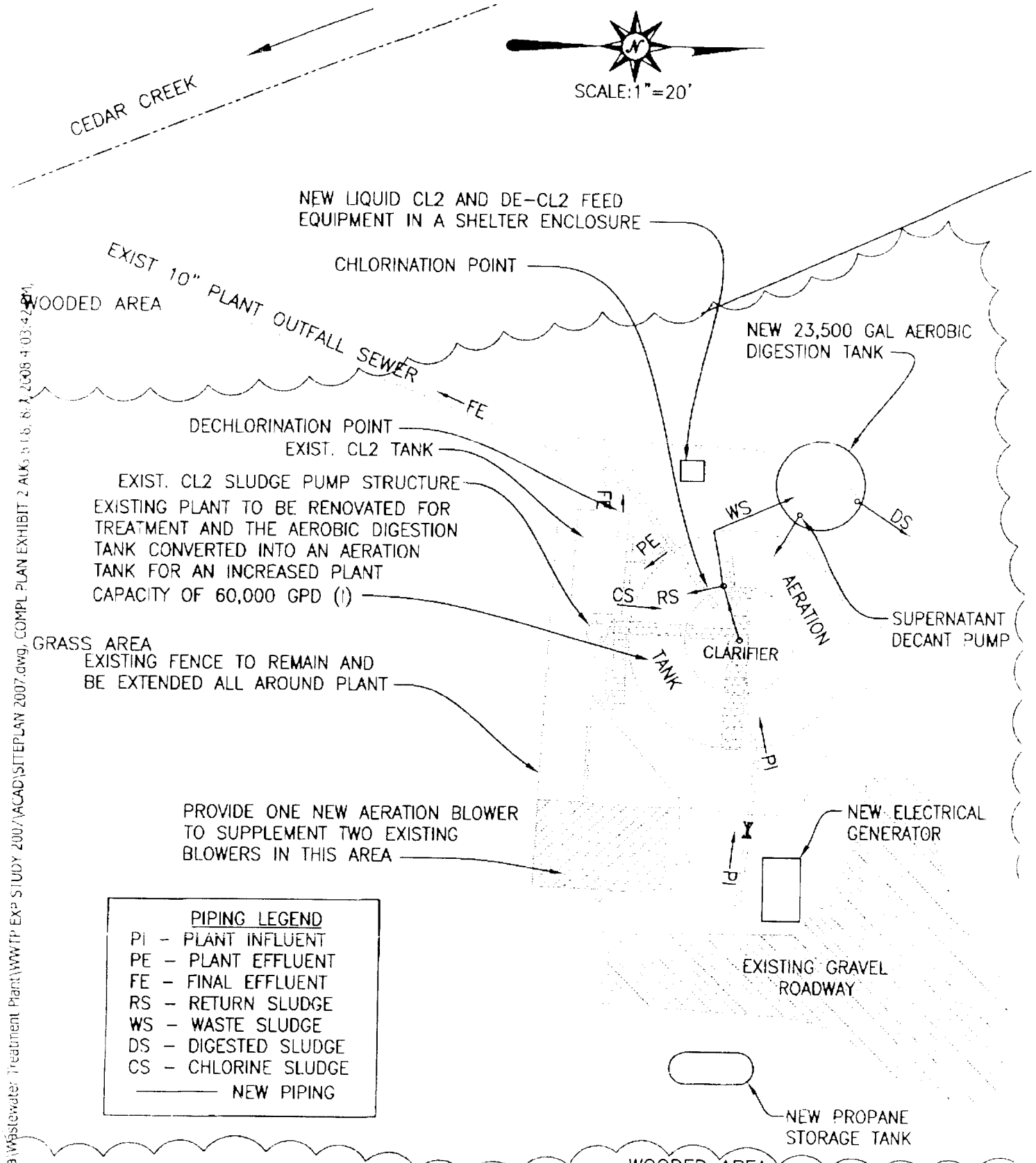
LAKE DALECARLIA REGIONAL WASTE DISTRICT; EXISTING WASTEWATER TREATMENT PLANT

COMPLIANCE PLAN
EXHIBIT NO. 1
AUGUST 9,2008



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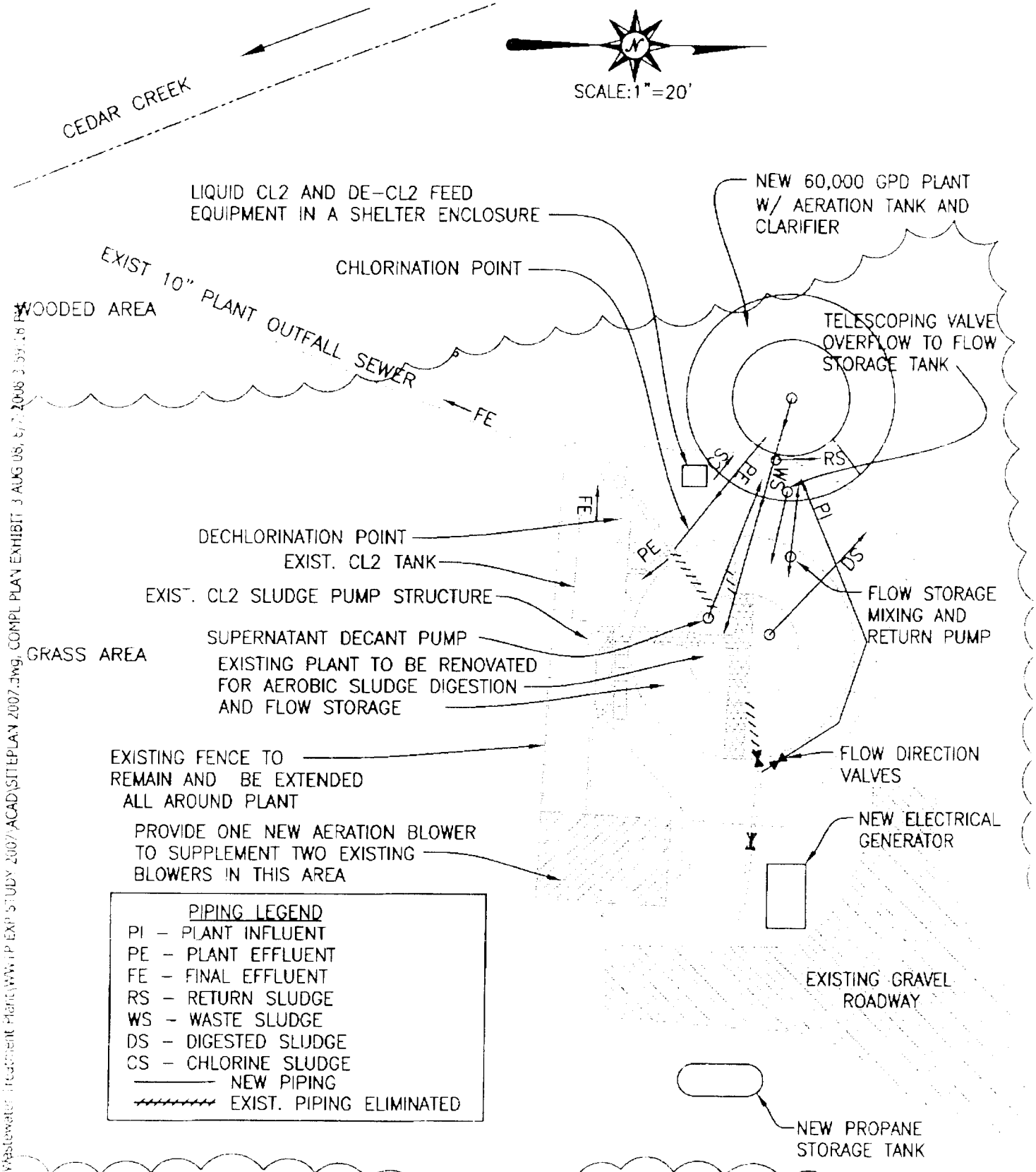
LAKE DALECARLIA REGIONAL WASTE DISTRICT; REMAINING WASTEWATER TREATMENT PLANT IMPROVEMENT ALTERNATES

ALTERNATE NO. (1)
COMPLIANCE PLAN
EXHIBIT NO. 2
AUGUST 9,2008



LAKE DALECARLIA REGIONAL WASTE DISTRICT; PROPOSED WASTEWATER TREATMENT PLANT IMPROVEMENTS

ALTERNATE NO. (2)
COMPLIANCE PLAN
EXHIBIT NO. 3
AUGUST 9,2008