CDM

Town of Exeter, New Hampshire

Public Works Department
Phase 2 Water Treatment Plant
Preliminary Design Report

May 2003

Report

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May 28, 2003

Mr. Keith R. Noyes
Director of Public Works
Town of Exeter
Ten Front Street
Exeter, New Hampshire 03833

Subject: Final Phase 2 Water Treatment Plant Preliminary Design Report

Dear Mr. Noyes:

Camp Dresser & McKee Inc. (CDM) is pleased to present this final report on Phase 2 of the Water Treatment Plant Preliminary Design. A process pilot testing report will be transmitted under separate cover.

CDM is grateful for your assistance and that of your staff throughout this project. We especially thank Mrs. Victoria Del Greco, Water/Sewer Superintendent; Ms. Jennifer Perry, P.E., Town Engineer; Mr. W. Robert Kelly, P.E. of the Water/Sewer Advisory Committee; Mr. William Campbell of the Town Selectmen; Mr. Dan Daigle, former Assistant Water/Sewer Superintendent; and Mr. Tony Calderone, Chief Water Treatment Plant Operator.

This report was prepared by CDM staff under the general supervision of Mr. Edward Nazaretian, P.E., Officer-in-Charge. Mr. Jeffrey Diercks, P.E. served as Project Manager. Mr. Alan LeBlanc, P.E. and Ms. Julie Simonton, P.E. served as Project Engineers.

Very truly yours,

Alan G. LeBlanc, P.E.
Project Engineer
Camp Dresser & McKee Inc.

Jeffrey E. Diercks, P.E.
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Contents

Contents

Appendices

Tables

Section 3 Preliminary Facilities Design

Section 4 Permitting Plan

Figures

Executive Summary

Executive Summary

Over the past three years, the Town of Exeter has been working with Camp Dresser & McKee Inc. (CDM) to evaluate the needs of its overall drinking water system. Based on recommendations in CDM's January 2002 water system evaluation report, town officials recognized the need to plan carefully for the construction of a new water treatment plant (WTP). The town established a steering committee to guide phases 1 and 2 of the preliminary design project. In Phase 1, CDM conducted a broad site investigation and examined various treatment technologies and their associated costs; those findings were presented in CDM's draft report of September 2002. Phase 1 identified wetlands; concluded that the proposed site had no "fatal flaws" that would preclude WTP construction, and that ballasted flocculation/clarification with deep-bed filtration should be further evaluated and pilot tested on Exeter's water. Phase 2 built on those findings by:

- Investigating two specific site issues – lead shot/firing range assessment and geotechnical investigation.
- Further developing the preliminary design. This process included
  - Pilot testing to verify the appropriateness of the ballasted flocculation/clarification and deep-bed filtration process with Exeter's water
  - Obtaining design criteria specific to Exeter's water supply
  - Developing the process-specific design to a preliminary level sufficient for re-examination of overall project capital costs
- Developing a permitting plan

The results of this work are the subject of this report. These results are to be used to establish the focus for the final design phase. Detailed pilot testing results are presented in a separate report.

Steering Committee

The project was completed through a collaborative effort among town officials and CDM. As it did during the previous Water System Evaluation Study, the town established a steering committee to guide the Phase 1 and Phase 2 preliminary design work. Steering committee members were:

- Keith Noyes, Director of Public Works
- Victoria Del Greco, Water/Sewer Superintendent
- Jennifer R. Perry, P.E., Town Engineer
- Tony Calderone, Senior WTP Operator

- W. Robert Kelly, P.E., representing the Water/Sewer Advisory Committee (and currently its chairman)
- Bill Campbell, representing the Town Selectmen
- Dan Daigle, Assistant Water/Sewer Superintendent (with Town of Exeter from the beginning of this report until April 25, 2003)

The steering committee participated in five half-day workshops during the execution of Phases 1 and 2. They evaluated the draft version of this report; the draft was also evaluated by a third party value engineering team in October 2002. Comments from the steering committee and from the value engineering team have been incorporated in this final report.

Site Investigations

CDM investigated two specific issues at the site.

Lead Shot / Firing Range Assessment

While the 8-acre parcel of land proposed for WTP siting features many benefits, lead deposition by the Exeter Sportsman's Club presents a potential complication. Section 2 and Appendix B of this report provide details of the preliminary assessment of lead shot deposition at the site, which is currently leased from the town by the Exeter Sportsman's Club. The club uses the site as a rifle and trap shooting range. In the course of more than 40 years, a significant amount of lead has been deposited on the site. Though this preliminary investigation did not detect lead in the adjacent Exeter Reservoir, it will be necessary to remove the site's lead-containing soils to meet state- and federally-mandated standards, and the removal cost will be significant. As indicated in Appendix B, CDM estimates that the probable remediation cost for the 0.8-acre present-day trap range area will be approximately $450,000. And as indicated in Section 3.9, the overall Opinion of Probable Project Cost, CDM suggests a site-wide allowance of $1,000,000 for lead remediation in aforementioned 0.8-acre area *plus* the adjacent wetlands and the formerly used firing range, if required. To refine the costs and scope of remediation, CDM recommends that a detailed lead shot/firing range assessment be conducted, including additional site investigation and discussion with regulatory agencies.

Geotechnical Investigation

CDM conducted initial subsurface investigations on September 3, 2002. Eight test pits were excavated on the proposed WTP site, to a depth of 8 to 10 feet. No groundwater was observed, though groundwater levels do change according to time, season, temperature, the presence of nearby construction activities, and other factors. Obstructions were encountered at the bottom of four of the test pits, indicating the possible presence of either large boulders or bedrock at those locations.

Detailed subsurface investigations (i.e., borings, grain size distribution testing on selected soil samples, and foundation design engineering analyses) should be conducted in the detailed, final design phase.

Preliminary Facilities Design

Section 3 of this report presents the preliminary facilities design, which uses the ballasted flocculation / gravity filtration package treatment process as its centerpiece. Ancillary items are also discussed, such as renovations to the Exeter River Pumping Station and construction of a new, low-lift pumping station adjacent to the Exeter Reservoir.

The water treatment plant process is designed around the ballasted flocculation / gravity filtration ("Actifloc") system offered by US Filter. This pretreatment and filtration system will provide a treatment process that is compatible with Exeter's source water and provides a compact footprint, minimizing impact to the proposed site.

Based on data developed in CDM's January 2002 report, *Town of Exeter, New Hampshire—Water System Evaluation Study*, CDM based the draft version of the new WTP's preliminary design on processing a maximum daily flow of 3.4 million gallons per day (mgd). The 3.4-mgd criteria represents the projected maximum daily demand in the Year 2020, assuming the entire town is ultimately provided water supply. After discussions among the town, CDM, and value engineering review team, all parties agreed that the use of 3.0-mgd design criteria would be satisfactory. The 3.0-mgd criteria would theoretically meet town-wide demands through 2016—and longer if the entire town is not serviced. Furthermore, providing 3.0-mgd capacity allows the use of smaller "Actifloc" modules, resulting in capital cost savings.

A 400,000-gallon clearwell is provided for, which will allow Exeter to achieve adequate disinfection contact time and volume sufficient for backwashing filters as needed. This will be an improvement over Exeter's existing WTP, which features a clearwell with 89,000-gallon useable capacity.

The preliminary design presents a treatment process layout sized to accommodate all chemicals required for use at the new WTP, as well as space allocation for chemicals potentially used in the future. To address concerns regarding present-day disinfection byproduct concentrations in the treated water, the preliminary design incorporates the use of chloramines (chlorine combined with ammonia) as a secondary disinfectant. Chloramines, known to reduce disinfection byproduct formation, proved to be effective during the process pilot-testing program.

The preliminary WTP building layout reflects input from town officials, provided in a July 10, 2002 workshop. The town's physical space requirements were evaluated in developing the layout presented in Figure 3-7 in Section 3 of this report.

Preliminary design criteria are presented in Section 3, as are twelve preliminary design drawings. CDM's Opinion of Probable Project Cost, at the end of Section 3, presents costs for all work described in this report. The estimated total project cost is $18.0 million, including engineering and contingencies, in 2005 dollars.

Permitting Plan

Section 4 and Appendix I present a permitting plan for the overall project. The plan provides an overview of the permits required for implementing this project and describes the scheduling requirements for obtaining all necessary approvals.

Table 4-1 lists the permits and approvals required for this project's successful implementation.

1 Section One

Section 1
Introduction

1.1 Purpose of this Project

Based on recommendations described in CDM's January 2002 report, *Town of Exeter, New Hampshire – Water System Evaluation Study*, Town officials recognized the need to carefully plan for the construction of a new water treatment plant (WTP). In the first phase of preliminary design, the Town retained CDM to perform a review of a Town-owned parcel previously identified as a potential site for a new WTP, and to narrow the focus to only one or two treatment process trains for evaluation. In its report dated September 2002, *Town of Exeter, New Hampshire – Phase 1 Water Treatment Plant Preliminary Design Report*, CDM found that the Town-owned parcel did not feature any "fatal flaws", and, based on the evaluation of both cost and non-cost factors, CDM concluded that the ballasted flocculation/clarification and deep-bed filtration process is the most appropriate for Exeter. Therefore, the Town and CDM developed a scope of work for Phase 2 of preliminary design, summarized as follows:

- Develop a pilot testing program for the ballasted flocculation/clarification and deep-bed filtration process to obtain design criteria specific to Exeter's water supply;
- Initiate preliminary architectural and mechanical/process design of the new WTP based upon the ballasted flocculation/clarification and deep-bed filtration process; and
- Perform an assessment of the Town-owned parcel, including development of a permitting plan and preliminary assessments of lead contamination and geotechnical conditions.

The purpose of this project was to (a) verify compatibility of the ballasted flocculation/clarification and deep-bed filtration process with Exeter's water, (b) obtain design criteria specific to Exeter's water supply, and (c) develop the process-specific design to a preliminary level sufficient for re-examination of overall project capital costs. A third party value engineering team evaluated the process selection and draft preliminary facilities design. After discussions among the Town of Exeter, CDM, and the value engineering team, CDM incorporated appropriate modifications. The end result of this phase is this finalized report, which will be used to establish the focus for the project's final design phase.

Pilot testing results will be presented in a separate report, and are not included herein.

1.2 Previous Studies and Reports

CDM's previous reports on the Town of Exeter's water system were referenced during the preparation of this report:

- *Town of Exeter, New Hampshire – Water System Evaluation Study,* Camp Dresser & McKee Inc., January 2002
- *Town of Exeter, New Hampshire – Draft Phase 1 Water Treatment Plant Preliminary Design Report,* Camp Dresser & McKee Inc., September 2002

1.3 Report Organization and Workshops

Several facilities are referenced in this report, including the existing and proposed water treatment plants, the Exeter River Pumping Station, and Skinner Springs. Those facilities are identified on the Location Plan presented as Figure 1-1.

The results of site-specific investigations, including lead shot deposition and geotechnical test pitting operations, are described in Section 2.

The preliminary facilities design and opinion of probable project cost is presented in Section 3.

The project permitting plan is described in Section 4.

Phase 1 of the project included two workshops attended by the Town and CDM, which focused on developing the project and reporting progress at appropriate intervals. Those workshops were designated as Workshop Nos. 1 and 2.

During Phase 2 of the project, three workshops were held to develop project scope. The workshops were as follows:

No.	Purpose	Date
3	Room Programming / Architectural Design	July 10, 2002
4	Room Programming, Building Layout, Landscaping, Residuals Handling, Raw Water Pumping Systems	March 20, 2003
5	Follow-up on Workshop No. 4 Issues	April 15, 2003

Meeting summaries for Workshop Nos. 3, 4 and 5 appear in Appendix A.

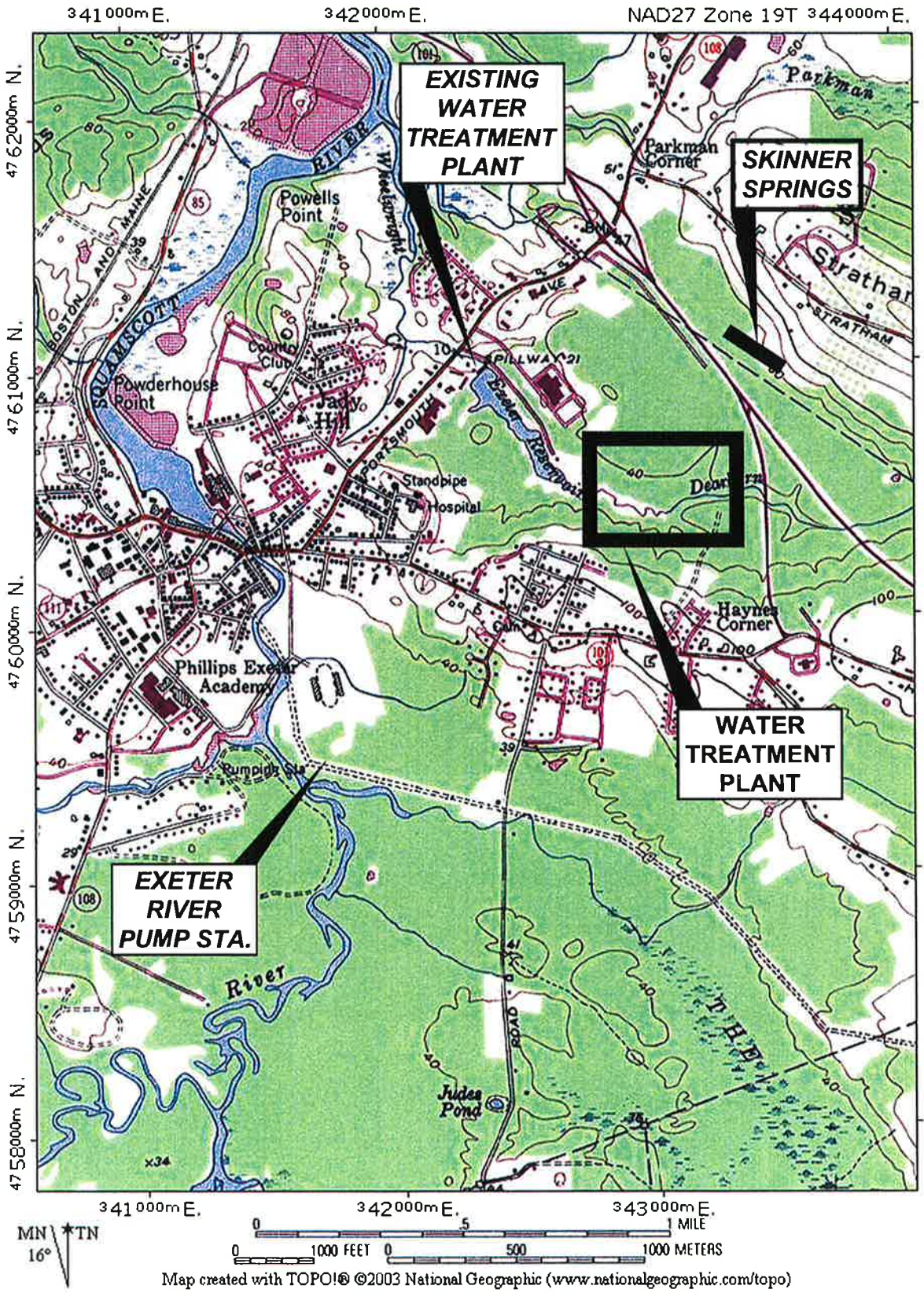

Figure 1-1
Exeter Location Plan

CDM

2

Section Two

Section 2
Site-Specific Preliminary Investigations

2.1 Phase I Lead Shot / Firing Range Assessment

The 8-acre parcel of land proposed for WTP siting features many benefits, including:

- Presently Town-owned.
- Proximity to the existing WTP and Exeter Reservoir minimizes modifications to raw water delivery and finished water pipeline systems.
- Its elevation is above the 100- and 500-year floodplains.
- With acquisition of access rights (through easements or property takings), traffic may be routed from Portsmouth Avenue onto Holland Way and into the new WTP. This would provide an accessible, safe route for chemical delivery trucks and other WTP traffic so that such vehicles will not travel through the vast majority of the Town of Exeter.

Lead shot deposition by the Exeter Sportsman's Club, however, presents a potential complication. To investigate the extent of the lead contamination, CDM was tasked with performing an initial screening of the site. The field sampling occurred on August 6 and August 12, 2002. In preparation for report development, representatives from the Town, CDM and the New Hampshire Department of Environmental Services (NHDES) met on August 15, 2002 to discuss the project. CDM subsequently developed the memorandum that is included in Appendix B to this report.

Soils were sampled in locations chosen with consideration to (a) where the highest lead concentrations were most likely to be found, and (b) where construction is proposed. During the field sampling of soils, CDM staff measured sampling locations by permanent structures on the site. CDM then subcontracted the firm of TF Moran, Inc. of Bedford, New Hampshire to provide professional land survey services in locating the permanent structures. Thus, the site plan within Appendix B was developed utilizing the survey and field measurement data.

In summary, NHDES requires that action be taken if the lead concentration is greater than 400 mg/kg. CDM found soils within the existing trap shooting range to contain between 420 mg/kg and 280,000 mg/kg (the latter indicating a 28 *percent* lead content), and between 610 mg/kg and 1,600 mg/kg in the rifle range soil berm. CDM found lead concentrations were below 400 mg/kg in the areas where WTP structures, pipelines, and roadways are presently proposed. Appendix B presents a preliminary opinion of probable construction cost of $450,000 to remediate an 0.8-acre area to a 12-inch depth. The cost is presented with the caveat that more investigation is required to fully define the extent of lead contamination and required removal. The Appendix B memorandum goes on to explain that this cost does not include

remediation of the nearby wetland nor the buried, formerly used trap shooting range which could cause overall remediation costs to approach $1,000,000.

At NHDES's suggestion, the Town obtained water samples on three separate days from surface water immediately adjacent to the existing trap shooting range. The analytical results for those samples indicate all contained less than the 0.005 mg/L detection limit for lead, and are included within Appendix B.

2.2 Phase I Geotechnical Investigation

In CDM's Phase I Geotechnical Investigation, a Town contractor excavated eight test pits under the supervision of a CDM geotechnical engineer on September 3, 2002. The test pits were dug immediately outside the proposed building footprints to avoid disturbance to potential foundation bearing conditions. The results of this work are presented in a memorandum appearing in Appendix C to this report.

Though as many as eleven test pits were originally planned, three were deleted from the program due to the presence of high lead concentrations. CDM observed no evidence of lead within the test pits that were excavated.

Several of the test pits were excavated within the "plateau-like" mound described in CDM's draft *Phase 1 Water Treatment Plant Preliminary Design Report*. CDM observed fill ranging from approximately 2 feet to 7 feet in thickness in those excavations, lending further evidence that suggests the "plateau" was man-made. Text in the Phase I Lead Shot Study memorandum (Appendix B) presents a discussion that indicates the plateau was constructed between 1962 and 1974.

On the same day of the test pit excavation work, CDM's subcontracted surveyor, TF Moran, Inc. of Bedford, New Hampshire surveyed the test pit locations and obtained the ground surface elevation at each. Thus, the site plan within Appendix C was developed utilizing this survey data.

The Phase I Geotechnical Investigation provides preliminary information on subsurface conditions. CDM recommends test borings as part of a detailed subsurface investigation program to be conducted at the beginning of the WTP final design phase.

3 Section Three

Section 3
Preliminary Facilities Design

3.1 Overview

The goal of the preliminary facilities design task was to develop the design to a preliminary level sufficient for re-examination of overall project capital costs, and to present concepts suitable for evaluation by the Town and a third party value engineering team. The results of the preliminary facilities design are intended to establish the focus for a future final design phase.

CDM's January 2002 report, *Town of Exeter, New Hampshire – Water System Evaluation Study*, evaluated population and demand projections for future water requirements. As that part of the water system study was performed in 2000, the 20-year planning horizon provided the basis for CDM's demand projections for the year 2020. Utilizing data from the January 2002 report, and using industry-accepted consumption curves for other flow rate criteria, Table 3-1 presents the water system demand projections for 2020.

Characteristic	Year 2020 Demand Flow Rates (mgd)	Flow Rates Used as Basis of Facilities Design (mgd)
Minimum Hourly	0.5(2)	N/A
Average Hourly	2.0(2)	2.0
Maximum Hourly	5.6(2)	N/A
Minimum Daily	1.0(2)	1.0
Average Daily	2.0(1)	2.0
Maximum Daily	3.4(1)	3.0(3)

Notes:

(1) Flow rates cited reflect the values listed in CDM's January 2002 Water System Evaluation Study, plus an approximate 4% allowance for process waste.

(2) These flow rates computed using industry-accepted consumption curves.

(3) See text below for explanation of maximum daily flow reduction.

Table 3-1

Water System Flow Design Criteria

Industry practice is to design treatment plants to reliably produce water up to the maximum daily flow rate—in this case, 3.4-mgd. The treatment plant, therefore, would be sized to reliably receive, treat, and discharge 3.4 mgd. Higher, hourly demands will be met through withdrawal from distribution storage. The treatment

plant's ability to deliver lower flows will be limited by the turndown capability of the pumping and treatment processes. During periods when demands are less than the WTP can be turned down, the distribution storage will be replenished and the plant will operate at its lowest possible rate. The plant should be operated continuously at the expected daily flow rate. Alternately, if partial day operation is desired (this is the current operational practice) during periods of low demand, withdrawal from distribution storage would make this feasible.

During and following the October 2002 Value Engineering session, CDM and the Town of Exeter discussed the subject of basing the design on 3.4 mgd, versus considering a revision. All parties agreed that the basis of design would be 3.0 mgd given the following points:

- Exeter's demand history demonstrates that peak demands are experienced on a limited number of days per year. These peaks serve to inflate the year 2020 maximum daily flow projection significantly.
- The Year 2020 demand was based on supplying drinking water to the extremities of the town borders, which is viewed as unlikely by many on the town's project steering committee.
- Basing design on 3.0 mgd would meet previously projected maximum daily flow through the year 2016, without exclusion of the points of conservatism noted above.
- As discussed below, selecting 3.0 mgd as the basis for design will allow specification of smaller pre-packaged treatment modules.

Individual unit processes can often limit an entire WTP's rated capacity. All processes are assigned a "reliable capacity," which is also referred to as "firm capacity." Reliable, or firm, capacity of a given unit process is defined as the maximum capacity that can be handled while one of that processes' largest units is out of service. Thus, all unit processes will be designed such that 3.0-mgd of firm capacity is provided.

Given the findings presented in CDM's September 2002 draft of the *Phase 1 Water Treatment Plant Preliminary Design Report*, the preliminary facilities design was developed around a ballasted flocculation / clarification – deep bed filtration system, such as the "Actifloc" system offered by US Filter. Actifloc is manufactured in modules nominally rated for 0.5-, 1.0-, 2.0-, and 4.0-mgd increments. To achieve 3.4-mgd firm capacity, three 2.0-mgd modules were included in the draft preliminary design. Given the revised criteria of 3.0-mgd firm capacity, four 1.0-mgd modules are included herein. US Filter commonly provides their 1.0-mgd modules in pairs, with each pair providing 2.0-mgd capacity. Thus, the four 1.0-mgd modules would be provided as two of US Filter's Model AF-1400 units.

Figure 3-1, the General Process Flow Diagram, presents an overview of the entire proposed water treatment system. *(All figures are located at the end of this section)*

3.2 Exeter River Pumping Station

The Exeter River Pumping Station (ERPS) was designed and constructed between 1972 and 1974. It is located on the eastern bank of the Exeter River, near the Stadium Well. The station discharges flow to a single, 12-inch diameter pipeline running northerly toward the water treatment plant (WTP) on Portsmouth Avenue. The ¼-mile access road to the station is entered via a locked gate off High Street, and passes through land owned by Phillips-Exeter Academy.

The station features the following equipment:

- One 24-inch low-level ductile iron intake pipelines, two 12-inch diameter higher-level intake pipelines (apparently installed after the original station construction), a manually actuated sluice gate, and stationary water screens.
- One constant speed vertical turbine pump, rated for 1,400 gpm at 140 ft Total Dynamic Head; equipped with inverter-duty rated, 75-hp electrical motor.
- Miscellaneous valving, piping, and appurtenances.
- Potassium Permanganate ($KMnO_4$) storage and feed equipment.
- Electrical equipment.

The majority of Exeter's source water is delivered by this facility from approximately April to November each year. The ERPS is also used when the reservoir is the primary source water, to augment the reservoir's supply. The presence of only one pump and lack of standby power gives this station no redundancy, leaving the Town to rely on the Exeter Reservoir (and its upstream drainage basin for replenishment) when the River Pumping Station fails.

The station's chemical feed system was added after the original pumping station construction, and does not provide precise chemical dosing capability. Further, complete building and fire code conformance is not provided.

The electrical systems in the Exeter River Pumping Station are approaching 30 years of age and are in poor condition. As described in CDM's January 2002 report, *Town of Exeter, New Hampshire Water System Evaluation Study*, the electrical evaluation identified the following deficiencies:

- The electrical systems are obsolete and at the brink of their life expectancy (30 years). Obtaining spare parts is extremely difficult.
- There is no provision for standby power in the station.

- Installation of additional pumps will require an upgrade of electrical service to the station including replacing of utility transformer and main incoming service to the building.

- The station does not have a fire alarm system despite the use of chemicals. This is a violation of the current Building Code requirements.

- Electrical panels and other electrical equipment enclosures located in the station are of NEMA Type 1, suitable for dry locations only. They are corroded and in poor condition. Because of use of chemicals, enclosures of electrical equipment are required to be of NEMA Type 4X, required for corrosive areas.

A summary of electrical improvements recommended at the station is as follows:

- Upgrade the electrical systems completely to accommodate the electrical load of additional pumps and motors. The utility transformer and overhead line should be replaced with systems rated sufficiently for the specified pump sizes.

- Install standby power as requested by the Town.

- Install main service circuit breaker and auto-transfer switch, and provide electrical panels and other electrical equipment enclosures located in the station.

- Install Variable Frequency Drives with bypass starters to allow delivery of lower flow rates.

- Provide a Fire Alarm System in the station.

- Install new interior and exterior lighting.

Given the age of the station (approximately 28 years at the time of this report), the roof is likely at the end of its useful life. CDM found the door, door hardware, and louvers to be in need of replacement. The HVAC systems, of similar age, are also at the end of their useful lives.

According to the 1972 design drawings included within Appendix D, the ERPS features an operating floor elevation of 28 feet (USGS NGVD 1929). The 100-year flood elevation in this area is 31.7, which would inundate the operating floor. Though the actual, as-built floor elevation should be verified by a professional land surveyor during the final design phase, the rehabilitated pumping station should be equipped with specially fabricated pumps that place the motor and discharge valving above elevation 31.7. Similarly, electrical and other equipment should be installed on pedestals to offer the same level of protection from flooding.

CDM did not perform a structural audit of the station during the preliminary design phase. Such an audit should be performed prior to any major rehabilitation to this facility. The opinion of probable project construction cost (included at the end of this

report section) includes an allowance for miscellaneous concrete repairs within the wet well.

A comprehensive overhaul of the ERPS is recommended. This renovation would include removal of the existing pump and associated electrical equipment, installation of three new pumps, an electrical upgrade, new valving, flow metering, architectural improvements, upgraded HVAC, and fire alarms. Removal of the potassium permanganate feed system is also recommended, as further discussed in Section 3.3 of this report. Careful planning to assure operational availability during the majority of the construction phase will be required. Costs for such work are included in Table 3-11. Table 3-2 presents the design criteria for the three pumps proposed for this station.

Criteria	Unit of Measure	Proposed Pump No.		
		1	2	3
Flow Rate Design Point	mgd	1.5	1.5	1.5
	gpm	1,042	1,042	1,042
	cfs	2.32	2.32	2.32
Total Dynamic Head at Design Point	ft	135	135	135
Motor Horsepower	hp	60 hp	60 hp	60 hp
Voltage / Phase	Voltage / No. of Phases	480 / 3	480 / 3	480 / 3
VFD Proposed?	Yes/No	Yes	Yes	Yes

Table 3-2

Exeter River Pumping Station Design Criteria

The ERPS is not equipped with a gauge for the Exeter River stage or flow rate. The Town and CDM have had limited discussion recently regarding Exeter installing its own gauge adjacent to the ERPS. As part of the overall WTP project, a stage recorder could be installed, which would transmit data through the future SCADA system and allow the Town excellent monitoring of the river during low flow events. With velocity profile readings through the river at this location, the Town would be able to develop a rating curve and the SCADA system could translate that information into a flow rate, in addition to the stage. Such a gauging system is not included within the overall opinion of probable construction cost, but is recommended for the Town's consideration.

3.3 Exeter Reservoir Low Lift Pumping Station

The Exeter Sportsman's Club site offers the benefit of being situated above the 100- and 500-year flood plain, but this feature eliminates the ability to deliver reservoir water to the plant by gravity. To this end, CDM recommends a new low lift pumping

station be constructed adjacent to the reservoir and above the 100- and 500-year flood plains. Figure 3-2 presents an overview of the project area, and identifies a potential site for this new pumping station. As the strip of Town-owned land north of the reservoir is generally no wider than a one-lane driveway, CDM has shown this station to be situated on the shore of the Exeter Reservoir at a noticeably wide spot in the road. This location, of course, calls for construction within the 300-ft shoreline protection buffer. Review by the Exeter Conservation Commission and state wetlands bureau will be necessary.

The Exeter Reservoir is generally quite shallow - its depth at the existing WTP's intake is approximately 14 feet according to design drawings by Weston & Sampson dated October 1973. Though a bathymetric map by Whitman & Howard (though to be created in 1987) depicts the deepest regions to be further upstream (east) of the existing WTP's intake, the new pumping station's intake will be located very near the existing WTP intake structure. Thus, CDM has called for the installation of a new intake pipeline laid from the area of the existing WTP intake southeasterly toward the new pumping station. Given aeration-induced mixing (discussed below), and as current operations feature withdrawal from only one water level (the existing configuration includes two intake pipelines), CDM has recommended a single intake pipeline in the interest of economy.

Flow from Skinner Springs (located north of the proposed WTP site, in the Town of Stratham) is conveyed via a gravity pipeline into the existing WTP, and is introduced into the treatment process immediately upstream of the filters. The existing Skinner Springs pipeline is located immediately adjacent to the proposed pumping station. Thus, the preliminary design calls for connection of that pipeline into the new pumping station. Metering of Skinner Springs flow rate is also included in the design.

Skinner Springs delivers a very small flow rate—estimated to be no more than 0.05 to 0.10 mgd, per CDM's January 2002 report, *Town of Exeter, New Hampshire Water System Evaluation Study*. As its use will be desired during times when the Exeter Reservoir is off line, a dedicated, lower-flow pump has been included in the low lift pumping station design. Because of the low flow rate and availability of other sources, only a single pump is included.

Within the existing WTP, three air compressors of fractional horsepower deliver air to the Exeter Reservoir. These units continuously deliver compressed air to the reservoir, which is consistent with a recommendation in Whitman & Howard, Inc.'s December 1986 *Report on Water Supply System for the Town of Exeter, New Hampshire*. In the Whitman & Howard report, the intention of the air addition is said to be to "...eliminate rapid temperature fluctuations..." and to provide for "...oxidation of iron and manganese constituents enabling plant operations to proceed with relatively constant chemical application...". CDM concurs with this assessment, as aeration likely keeps the reservoir aerobic, preventing conditions that would dissolve iron and manganese in bottom deposits. The aeration also likely keeps the reservoir from becoming stratified, thus eliminating the need for a dual-level intake. Town staff

have indicated that they wish to retain this unit process. Thus, the relocated air compressors are shown on the preliminary design drawing for the low lift pumping station, Figure 3-5.

Manganese, iron, taste and odor are all of concern in the Town's two major surface source waters, the Exeter River and the Exeter Reservoir. To centralize chemical storage and feed facilities, this preliminary design provides for both potassium permanganate (to target iron and manganese) and powdered activated carbon (for taste and odor control) feed systems to be located within the proposed low lift pumping station. Locating these chemicals as such allows a single point of application for both sources. With some 1,800 linear feet of 16-inch raw water pipeline between the low lift pumping station and the proposed WTP, the travel (contact) time at 3.0 mgd is nearly 9 minutes. At 2.0 mgd, the time increases to over 13 minutes. These contact times are judged to be adequate for oxidation and taste and odor removal to occur prior to entry into the main WTP process building.

Design criteria for the pumps proposed for installation in the new low lift pumping station are presented in Table 3-3.

Criteria	Unit of Measure	Proposed Pump No.			
		1	2	3	4 (1)
Flow Rate Design Point	mgd	1.5	1.5	1.5	0.1
	gpm	1,042	1,042	1,042	69
	cfs	2.32	2.32	2.32	0.15
Total Dynamic Head at Design Point	ft	74	74	74	74
Motor Horsepower	hp	30 hp	30 hp	30 hp	2 hp
Voltage / Phase	Voltage / No. of Phases	480 / 3	480 / 3	480 / 3	480 / 3
VFD Proposed?	Yes/No	Yes	Yes	Yes	Yes

Notes:

(1) Dedicated to pumping flow from Skinner Springs to proposed WTP

Table 3-3

Proposed Exeter Reservoir Pumping Station Design Criteria

3.4 Water Treatment Plant

As stated previously, CDM developed the preliminary facilities design around a ballasted flocculation / clarification – deep bed filtration system, offered as the "Actifloc" system manufactured by US Filter. To achieve 3.0-mgd firm capacity, four 1.0-mgd modules are included in this preliminary design.

A preliminary hydraulic profile through the proposed water treatment plant is presented as Figure 3-6, which appears at the end of this report section.

3.4.1 Ballasted Flocculation / Clarification - Deep-Bed Filtration

The "Actifloc" modules include pretreatment and filtration processes in one contiguous vessel. The pretreatment features high rate sedimentation, facilitated by introducing sand as a "ballast" to serve as a heavy nucleus within floc particles. As the floc is heavier than is common in conventional treatment processes, settling occurs more quickly. The density of the particles and higher rate settling allow a much more compact WTP footprint than is possible with conventional treatment. The pretreatment portion includes a coagulation, injection, maturation, and settling stage, followed by gravity filtration. Because the modules are a "package system" offered by one manufacturer, little flexibility is granted to the design engineer in the system's physical configuration. Process optimization is achieved by properly dosing chemicals, following good backwash practice, and performing routine maintenance on the system. One option granted to the design engineer is that of the filter media selection. Both anthracite-sand layering and granular activated carbon were evaluated by the process pilot testing program. The 1.0-mgd Actifloc modules feature design criteria as summarized in Table 3-4.

As the ballasted flocculation / filtration modules are a proprietary package system, CDM recommends that guaranteed pricing be solicited from US Filter during the final design phase. Such guaranteed pricing has been obtained from vendors by CDM for other clients, and can be arranged in the form of a "Proposal to Bidding Contractors" from US Filter. The firm cost proposal, with an explicit listing of goods and services to be supplied, can be made part of the bidding documents.

Characteristic	Unit	Criteria
Number of Modules	N/a	4
Vessel Material	N/a	Type 316L Stainless Steel (1)
Coagulation Stage		
Mixers per Module	N/a	1
Mixer Specifications	Hp/Voltage/Hz/Phase	¾ hp / 460 V / 60 Hz / 3 phase
Injection Stage		
Mixers per Module	N/a	1
Mixer Specifications	Hp/Voltage/Hz/Phase	¾ hp / 460 V / 60 Hz / 3 phase
Maturation Stage		
Mixers per Module	N/a	1
Mixer Specifications	Hp/Voltage/Hz/Phase	¾ hp / 460 V / 60 Hz / 3 phase
Clarification Stage		
Type	N/a	Hexagonal, 60°, 2-in plastic tubes
Clarified Water Troughs – Troughs per Module / Trough Material	N/a	3 / Type 304 Stainless Steel
Recirculation Pump No. / Horsepower	No. / Hp	1 per module / 5 hp
Filtration Stage		
Number of Filters	N/a	4
Typical Filter Dimensions	Ft x Ft	Approximately 8 x 17.5
Surface Area Per Filter	Ft^2/Filter	140
Maximum Capacity Per Filter	Mgd / gpm	1.0 / 694
Filter Loading Rate at Max. Capacity	Gpm/ Ft^2	4.96
Standard Media – Top Layer	Depth/Type	18-in / Anthracite Coal(2)
Standard Media – Intermediate Layer	Depth/Type	9-in / Silica Sand(2)
Standard Media – Lowest Layer	Depth/Type	3-in / High Density Garnet Sand(2)

(1) Material selected for module longevity purposes.

(2) Granular Activated Carbon could also be installed to a greater overall depth.

Table 3-4

"Actifloc" Design Criteria

3.4.2 Finished Water Clearwell

One of the challenges in operating the existing WTP is the size of the clearwell. The existing plant has a clearwell with only 89,000 gallons between the high water set point and the floor of the structure. This requires operators to cease finished water pumping operations when backwashing a filter. Not following such practice would draw the clearwell down to unacceptably low levels, thereby jeopardizing the disinfection process.

CDM's preliminary design for the new WTP includes a 400,000-gallon clearwell. This includes storage for the following:

- Meeting "CT" disinfection requirements within the clearwell, based on the use of free chlorine as the primary disinfectant. CDM's computations conservatively considered 0.5-log inactivation of *Giardia*, a 1.0 to 2.0 mg/L chlorine residual exiting the clearwell, finished water pH of 8.0 within the clearwell, the maximum plant flow rate of 3.4-mgd (retained vs. 3.0 mgd to provide additional storage volume), a cold water temperature basis of less than 0.5° Celsius, and a baffling factor of 0.6.

- Adequate volume to provide backwash supply water for washing each of the four filters once per day.

- A factor of safety, to allow for the finished water pumping rate to briefly exceed the flow entering the WTP.

The clearwell sizing does not include allowances for supplemental distribution storage, or for fire flow augmentation. In the January 2002 *Water System Evaluation Study*, CDM recommended other distribution system improvements that will address these needs.

Figure 3-4A preliminarily depicts the clearwell beneath the main WTP process building. The Ten State Standards require the bottom of clearwell to be located above normal groundwater level. The Phase I Geotechnical Investigation (discussed in Section 2.2 of this report) found no groundwater within 10-ft of the ground surface. These test pits were dug during a summer drought, however, and may not be indicative of "normal" groundwater levels on the site. Further geotechnical investigation (borings, etc.) is recommended, as discussed in Appendix C to this report. This preliminary design calls for a clearwell set into the ground some 15-ft. This must be re-examined as further groundwater data is obtained, and adjusted as necessary.

Table 3-5 summarizes the preliminary design criteria for the clearwell structure.

Characteristic	Unit	Criteria
Number of Clearwell Chambers	n/a	2
Assumed Capacity (total)	Gallons	400,000
Tank Material	n/a	Cast-in-place Concrete Tank
Assumed Design T_{10}/T (minimum)	n/a	0.6
Assumed Water Depth	Feet	15

Table 3-5

Clearwell Design Criteria

3.4.3 Finished Water Pumping System

The finished water pumping system is designed to offer variable speed pumping capabilities in the form of three 1.5-mgd pumps. Surge relief valving is recommended as part of the finished water pump discharge piping arrangement, to match the valving recently installed at the existing WTP. The pumps' discharge head has been computed considering CDM's January 2002 recommendation to raise the system hydraulic grade line 30-ft overall. If the WTP were to be operational prior to the distribution system improvements, the finished water pumps would have to be operated at less than full speed. As 30-ft is not regarded as a major reduction in the total discharge head requirement, the pumps will still operate at a reasonable level of efficiency in such an application.

Criteria	Unit of Measure	Proposed Pump No.		
		1	2	3
Flow Rate Design Point	mgd	1.5	1.5	1.5
	gpm	1,042	1,042	1,042
	cfs	2.32	2.32	2.32
Total Dynamic Head at Design Point	ft	220	220	220
Motor Horsepower	hp	100 hp	100 hp	100 hp
Voltage / Phase	Voltage / No. of Phases	480 / 3	480 / 3	480 / 3
VFD Proposed?	Yes/No	Yes	Yes	Yes

Table 3-6

Finished Water Pumping Station Design Criteria

3.4.4 Filter Backwashing Systems

The US Filter Actifloc modules require filter backwashing common to all conventional, granular medium, gravity filters. US Filter's quoted equipment package includes two air scour blowers. The Owner (the Town of Exeter) is required to supply the backwash water supply pumps. Table 3-7 summarizes the assumed backwashing sequence and intensities. Findings from process pilot testing and manufacturer recommendations should also be evaluated as the project progresses.

Characteristic	Unit of Measure	Criteria
Surface Area per Filter	Ft^2/Filter	140
Backwash Stage 1	Air Flow (scfm/sf)	2
(Assumed 5 minute duration)	Air Flow (scfm)	280
	Backwash Water (gpm/sf)	6
	Backwash Water (gpm)	840
Backwash Stage 2	Air Flow (scfm/sf)	0
(Assumed 2 minute duration)	Air Flow (scfm)	0
	Backwash Water (gpm/sf)	6
	Backwash Water (gpm)	840
Backwash Stage 3	Air Flow (scfm/sf)	0
(Assumed 5 minute duration)	Air Flow (scfm)	0
	Backwash Water (gpm/sf)	15
	Backwash Water (gpm)	2,100
Backwash Stage 4	Air Flow (scfm/sf)	0
(Assumed 3 minute duration)	Air Flow (scfm)	0
	Backwash Water (gpm/sf)	20
	Backwash Water (gpm)	2,800

Table 3-7

Preliminary Backwash Sequencing Design Criteria

Table 3-8 presents the design criteria for the air scour blowers, which are part of US Filter's Actifloc package. CDM's preliminary design depicts the blowers being housed in a dedicated, sound-insulated room, to mitigate noise during filter backwashing.

Characteristic	Unit	Criteria
Number of Blowers	Number	2
Blower Mfr. / Type	nN/a	EG&G Rotron / High Pressure Regenerative Blower
Maximum Flow	Scfm	Approximately 600
Maximum Pressure	Psig	Approximately 6.5
Horsepower	Hp	30
Voltage / Phase / Frequency	Volts / Phases / Hz	230/460 / 3 / 60

Table 3-8

Air Scour Blowers – Preliminary Design Criteria

Table 3-9 presents preliminary design criteria for the backwash supply pumps. To achieve all flow rates required for backwashing, three 1,400-gpm backwash supply pumps are recommended. While only one such unit would be used during the early, low rate backwashing stages, two units would be utilized to deliver the highest flow rates.

Criteria	Unit of Measure	Proposed Pump No.		
		1	2	3
Flow Rate Design Point	mgd	2.02	2.02	2.02
	gpm	1,400	1,400	1,400
	cfs	3.12	3.12	3.12
Total Dynamic Head at Design Point	ft	32	32	32
Motor Horsepower	hp	15 hp	15 hp	15 hp
Voltage / Phase	Voltage / No. of Phases	480 / 3	480 / 3	480 / 3
VFD Proposed?	Yes/No	Yes	Yes	Yes

Table 3-9

Backwash Supply Pumping Station Design Criteria

3.4.5 Chemical Storage and Feed Systems

The process pilot testing report (included in a separate document) indicates optimal chemical dosages for a treatment process utilizing the Actifloc process. CDM used the piloting results to (a) determine which chemicals would be used in the overall process, and (b) perform preliminary sizing of storage and feed systems to establish building area requirements.

Past data indicates that Exeter's disinfection byproducts concentrations will exceed regulatory limits if treatment goes unchanged. CDM's preliminary design therefore includes an ammonia feed system. Based on pilot testing results, CDM has assumed that chloramines will be used as a secondary disinfectant, which is expected to decrease disinfection byproduct concentrations to levels within regulatory limits.

CDM's preliminary facilities design drawings, included at the end of this report section, depict chemical storage and feed areas. Secondary chemical containment areas are preliminarily sized based on 3-ft high containment walls designed to provide an area adequate to contain 100 percent of the tank storage volume within, plus an allowance for fire sprinkler discharge. Further information on the preliminary chemical systems design criteria is presented in Table 3-10.

3.4.6 Wash Water Holding/Settling Ponds, Backwash Recycle, and Sanitary Systems

CDM's preliminary design includes a dual-cell holding/settling pond system intended to receive backwash waste flow from the water treatment process. While the existing WTP directs all waste flows to the sanitary sewer system, the Town has experienced problems with both the quantity and solids of the WTP waste. Inundation of a downstream sanitary lift station, and clogging of a siphon have been reported. Thus, CDM's preliminary design is based on a wash water system that seeks to (a) concentrate solids upstream of, or within the settling ponds, (b) minimizes flow directed to the sewer by recycling water to the headworks of the WTP, and (c) provides a holding pond system sufficiently sized to hold a nominal volume of solids and an allowance for waste wash water storage, plus freeboard. The waste flow handling facilities are presented schematically on Figure Nos. 3-1 and 3-3. Appendix L to this report contains a memorandum on WTP waste flows which presents estimated waste flow volume and solids production, and recommended handling thereof.

Returning all such flows continuously to the headworks of the plant would provide relief to the sewer system, which presently receives all of the existing WTP's waste flow. CDM recommends a duplex pumping station including VFD-driven pumps be provided to return flow to the head of the plant.

Sanitary flows will likely be directed toward the existing gravity sanitary sewer in Portsmouth Avenue. CDM anticipates that a small pumping system and a sanitary force main will be required to deliver sanitary flows.

Chemical	Assumed Chemical Delivery Mode / Weight / Concentration	Dosage		Basis of Preliminary Facilities Layout			
		Year 2001 Average	Assumed Maximum	Required Storage Volume *(30 days storage at Year 2020 Average Day Flow with Maximum Dosage)*	Number / Volume / Type of Bulk Storage Tanks	Day Tank?	Comments
$KMnO_4$ - Potassium Permanganate	Shipped as dry chemical, in 25-kg drums	0.58 mg/L	1.5 mg/L	715 lb	Space for storage of $KMnO_4$ drums and feed system	No	
PAC - Powdered Activated Carbon	Shipped as dry chemical, in 40-lb bags	1.2 mg/L	16 mg/L	7,150 lb	Space for pallet storage of dry PAC bags and dry feed system	No	The maximum assumed dosage reflects a substantial increase over present-day PAC dosing. Pilot test data identified a dose adequate to remove taste and odor.
Poly-Aluminum Chloride	Liquid 4,000 Gallon Tanker Truck 11.2 lb/gal	47 mg/L	60 mg/L	2,850 gallons	(2) 2,550 Gallon XLPE Tanks	No	Existing WTP currently uses Poly-Aluminum Chloride as its coagulant. Preliminary Design based on continued use of this chemical. Bulk storage tanks sized to accept full 4,000-gallon delivery plus allowance for product still in inventory.
Polymer Coagulant Aid	Shipped as dry chemical, in 55-lb bags	(Records not available)	0.27 mg/L	145 lb	(1) 400-Gallon open top XLPE mixing tank	Yes, (1) 230 gal XLPE tank	Polymer feed system included in US Filter package. Future use based on CIBA's LT22S polymer.
Microsand	Shipped in 50-lb bags	(Not used)	8 lb/MG	480 lb	Space for pallet storage of Microsand bags	No	Assumed maximum microsand loss rate of 8 lb per million gallons of water treated.
Cationic Polymer Filter Aid	Shipped as liquid, in 55-gal drums	0.15 mg/L using CP1160P	1.5 mg/L	80 lb	Space for (4) 55 gallon drums	No	Existing WTP currently uses Betz Dearborn's Polyfloc® CP1160P. Cationic polymer (EC461 – Southern Water Consultants Inc.) used during pilot testing.
NaOCl – Sodium Hypochlorite	Liquid 4,000 Gallon Tanker Truck 10.1 lb/gal 12.5% concentration	5 mg/L (as Cl_2)	5 mg/L (as Cl_2)	2,100 gallons	(2) 1,250 gallon XLPE Tanks w/ OR1000 Liner by Poly Processing or equal	Yes, (1) 115-gallon XLPE Tank w/ OR1000 Liner by Poly Processing or equal	Doses likely to decrease with improved treatment. Reductions potentially offset by increase with use of chloramines.
$ZnPO_4$ – Zinc Orthophosphate	Liquid Delivered in 360 lb drums 13.3 lb / gal	3.0 mg/L (as product)	5 mg/L (as product)	210 gallons	Space for (8) 360 lb drums	No	Existing WTP currently uses "C-9" Zinc Orthophosphate from Ondeo Nalco. Typical drum stores ~360lb/drum, or 27 gallons of product per drum.
NaOH – Caustic Soda	Liquid 4,000 Gallon Tanker Truck 10.66 lb/gal 25% concentration	40 mg/L	50 mg/L	2,500 gallons	(2) 2,550 gallon steel tanks	No	Bulk storage tanks sized to accept full 4,000-gallon delivery plus allowance for product still in inventory.
Ammonia (Aqua Ammonia)	Liquid 4,000 Gallon Tanker Truck 6.7 lb/gal 30% concentration	(Not used)	Ratio: 5 Cl_2 to 1 Ammonia	95 gallons	Space for (4) 55 gallon Drums with vapor control appurtenances	No	Delivery of ammonia drums to be more cost effective than small, periodic deliveries from bulk tank truck.
(future) Fluoride - Hydrofluosilicic Acid	Liquid Tanker Truck 10.17 lb/gal 23% solution (With 79.2% fluoride in solution)	(Not used)	1 mg/L	285 gallons	(1) 545-gallon XLPE Tank	Yes, (1) 30-gallon XLPE Tank	Space allowance for future fluoridation of water.

Table 3-10
Chemical Systems Design Criteria

3.4.7 Future Process Considerations

The preliminary facilities design was developed with consideration of processes that may be required in the future. Such consideration is critical at this stage of design, as the provision for physical space and hydraulic capacity is most economically provided earlier than later.

CDM's preliminary layout drawings, included at the end of this report section, depict a potential site for an ozonation system upstream of the pretreatment/filtration modules, as well as a liquid oxygen tank. Sodium bisulfite or another chemical, which are often used to "quench" ozone, could be located within the future ozonation facility. The main WTP's chemical storage and feed area includes a space allowance for fluoridation equipment should Exeter one day fluoridate its drinking water. Pipe taps will be provided for the future installation of particle counters, as well.

The Town has begun analyzing its two surface water sources for *Cryptosporidium*. The sampling will continue for a total at least 24 consecutive months, in anticipation of future sampling requirements and to help guide the design of the new WTP. In anticipation of possible *Cryptosporidium* detection, CDM recommends pipe spools be provided at the filtered water effluent piping exiting each Actifloc module, to allow the future installation of ultraviolet (UV) light disinfection equipment.

3.4.8 Architectural Design

The Town and CDM met on July 10, 2002 to discuss WTP space and building type considerations. Appendix A to this report includes a summary of that workshop.

The preliminary design presented herein depicts a pre-engineered metal building for process/administrative structure. Figure Nos. 3-7A, 3-7B, 3-8 and 3-9 present the preliminary architectural design of the new WTP. Block construction, to provide durability at a remote, un-manned facility, is proposed for the low lift pumping station.

CDM based the Opinion of Probable Project Cost (Table 3-11) on the above-listed criteria. CDM notes, however, that the work presented in Figure Nos. 3-1 through 3-9 does not precisely represent the work estimated within Table 3-11. The layout presented in Appendix K represents the basis of the costs depicted in Table 3-11. The Town requested a reconfiguration of the main WTP building in the March 20, 2003 workshop (see Appendix A for meeting summary). Accordingly, Figure Nos. 3-1 through 3-9 supercede the layout depicted in Appendix K.

3.4.9 Site/Civil Design

The site/civil design presented on Figure 3-3 (appearing at the end of this report section) features the following:

- A driveway adequate for 2-way traffic entering and exiting the WTP via Holland Way.

- Paved roadways where the heaviest vehicles and heaviest traffic is anticipated. As this site is directly up-gradient of the Exeter Reservoir, minimization of impervious surfaces is desirable.

- Unsurfaced access roads are recommended within the 300-ft shoreline protection buffer. Primary access to the WTP and Low Lift Pumping Station is to be via Holland Way. Only occasional Town vehicle and lift station maintenance traffic will be accessing or exiting the site via Portsmouth Avenue.

- A stormwater detention basin is recommended, to mitigate increased runoff from the introduction of impervious rooftops and roadways. Flow rates exiting the WTP site will be dampened by the basin, and storm water quality can be improved by this and other measures. A single-cell basin is presented on Figure No. 3-3.

- A 55-ft semi- tractor trailer (WB-50 design vehicle) shall be the basis for all turning radii on roads immediately adjacent to the WTP. Smaller vehicles should be evaluated for the design of other, unsurfaced roadways.

3.4.10 Security

Given the modern-day emphasis on water system security, regulations have been adopted at the state and federal level that require water systems to take action, as follows:

- The State of New Hampshire passed Env-Ws 360.14, "Emergency Plans for Community Water Systems" on March 15, 2002, which supplements the state's rules for operating drinking water systems. All community water systems are required to develop an emergency plan (EP) which must be submitted to the New Hampshire Department of Environmental Services (NHDES) by March 15, 2003. The EP is to be updated by the water system annually, with resubmittal to NHDES every 6 years.

- At the federal level, H. R. 3448, the government passed the Public Health Security and Bioterrorism and Response Act on June 12, 2002. The act requires all community water systems that serve 3,300 people or more to complete a vulnerability assessment (VA), and to submit an emergency plan 6 months after the VA is complete. The deadlines for VA submission vary according to the water system's service population. Exeter is within the "3,300 to 49,999 persons served" category, thus requiring Exeter to complete its VA by June 30, 2004, with the emergency plan due within six months of the completion of the VA or no later than December 31, 2004.

The State of New Hampshire's web site provides the information summarized above, and offers further commentary on security measures. The web site address is: http://www.des.state.nh.us/wseb/emergency_planning.htm

This preliminary design report depicts fencing encircling the water treatment plant and its immediately adjacent ancillary facilities. Gates will be provided at the main access road from Holland Way, and at the southern service road leading toward the Exeter Reservoir. Other appropriate security measures should be reviewed with the Town during the final design phase and incorporated into the detailed design as needed.

3.5 Electrical Systems

A summary of the preliminary electrical systems design approach is included within Appendix E to this report.

3.6 Instrumentation and Control Systems

A summary of the preliminary instrumentation and control system design approach is included within Appendix F to this report.

3.7 Heating, Ventilation, and Air Conditioning Systems

A summary of the preliminary design criteria for heating, ventilation, and air conditioning (HVAC) systems is included within Appendix G to this report.

CDM contacted Northern Utilities, the local natural gas provider. Natural gas exists on Portsmouth Avenue, and on Holland Way, though only from Hampton Road to the Tyco facilities. The final design phase should include further evaluation of natural gas supply availability.

3.8 Plumbing and Fire Protection Systems

A summary of the preliminary design criteria for plumbing and fire protection systems is included within Appendix H to this report.

3.9 Opinion of Probable Project Cost

Based on a construction start date of 2004, and a completion date of 2005, Table 3-11 presents CDM's Opinion of Probable Project Cost.

The construction contingency used in the table below is based on the recommendations of the American Association of Cost Estimators (AACE) for projects at this level of design. AACE recommends the construction contingency be lessened as the design is further developed.

The majority of the markup factors (contractor overhead and profit, construction contingency, and inflation escalation) are identical to those used in CDM's January 2002 Town of Exeter, New Hampshire – Water System Evaluation Study. Refinement of all factors, values, and allowances occurs as projects are further developed.

Item Description	Facility			Project Total
	WTP	LLPS	ERPS	
Site Work	$ 304,000	$ 115,000	$ 5,000	$ 424,000
Site Yard Piping	$ 250,000	$ 150,000		$ 400,000
Exeter River Pumping Station Rehabilitation			$ 371,000	$ 371,000
New Exeter Reservoir Low Lift Pumping Station		$ 850,000		$ 850,000
New WTP, including Ancillary Facilities on Same Parcel	$ 4,955,000			$ 4,955,000
New Intake Pipeline and Sluice Gate Replacement at Reservoir	$ 205,000	$ 55,000		$ 260,000
Clearwell	$ 500,000			$ 500,000
Washwater Lagoons	$ 51,000			$ 51,000
Instrumentation and Control Work	$ 586,000	$ 65,000	$ 50,000	$ 701,000
Subtotal of Capital Construction Cost	**$ 6,851,000**	**$ 1,235,000**	**$ 426,000**	**$ 8,512,000**
General Conditions and General Contractor's Overhead & Profit (15%)	$ 1,028,000	$ 185,000	$ 64,000	$ 1,277,000
EEO/MBE/WBE Requirements (SRF-Triggered) Allowance (3%)	$ 206,000	$ 37,000	$ 13,000	$ 255,000
Subtotal	**$ 8,085,000**	**$ 1,457,000**	**$ 503,000**	**$ 10,045,000**
Construction Costs at Midpoint of Construction (September 2002 to Spring 2005 midpoint, 2.5 years, 4% per year) *(20-City National ENR Index = 6588)*	$ 8,918,000	$ 1,607,000	$ 555,000	$ 11,080,000
Construction Contingency (25%)	$ 2,230,000	$ 402,000	$ 139,000	$ 2,770,000
Engineering Design Phase				$ 1,581,000
Engineering/Bidding Phase				$ 50,000
Engineering Construction Phase				$ 1,108,000
Allowance for Decommissioning of New WTP and Site Reuse				$ 250,000
Allowance for Land Acquisition / Easement Costs				$ 100,000
Allowance for Lead Shot Abatement				$ 1,000,000
Allowance for Value Engineering				$ 70,000
Opinion of Probable Project Costs				$ 18,009,000
Recommended Project Planning Cost				**$18.0 Million**

Table 3-11
Opinion of Probable Project Cost

INDICATES LIMITS OF EQUIPMENT AND VALVES FURNISHED BY FILTER MFR. (NOT ALL VALVES ARE SHOWN ON THIS DRAWING. SEE INSTRUMENTATION P&ID DRAWINGS AND SPEC. FOR ADD. DETAILS. TYP)

EXETER RIVER

EXISTING EXETER RIVER PUMPING STATION

EXETER RESERVOIR (60± MILLION GALLONS)

UNTREATED WATER FROM SKINNER SPRINGS

NEW LOW LIFT PUMPING STATION

SODIUM HYPOCHLORITE
CAUSTIC SODA
COAGULANT
POTASSIUM PERMANGANATE
POWDERED ACTIVATED CARBON

INJECTION (TYP)
MIXER (TYP)
MATURATION (TYP)
UP FLOW CLARIFICATION (TYP)

AIR SCOUR BLOWERS

MICROSAND (PERIODIC AUGMENTATION)
POLYMER COAGULATION AID
POLYMER FILTER AID
SODIUM HYPOCHLORITE
MIXED MEDIA FILTER (TYP)

UNIT No. 1
UNIT No. 2
UNIT No. 3
UNIT No. 4

CAUSTIC SODA

TURB
PC (FUTURE)
PH/T
SCD (FUTURE)

FUTURE UV LAMPS

BACKWASH SUPPLY PUMPS
FINISHED WATER PUMPS

CLEAR WELL NO. 1
CLEAR WELL NO. 2

CL2

SODIUM HYPOCHLORITE
ZINC ORTHOPHOSPHATE
AQUA AMMONIA
FLUORIDE (FUTURE)

TO DISTRIBUTION SYSTEM

SOLIDS SEPARATION UNIT

SANITARY FLOW FROM WTP

WASHWATER/SOLIDS HOLDING PONDS

TO SANITARY SEWER SYSTEM

BACKWASH RECYCLE PUMPING STATION

LEGEND AND NOTES:

- ORIFICE TYPE FLOW METER
- MAGNETIC FLOW METER
- VENTURI FLOW METER
- AE TURB — TURBIDITY METER
- AE PH/T — pH/TEMPERATURE MONITOR
- AE PC — PARTICLE COUNTER
- AE SCD — STREAMING CURRENT DETECTOR
- AE CL2 — CHLORINE RESIDUAL ANALYZER
- CHEMICAL FEED APPLICATION POINT
- PUMP GENERIC SYMBOL (PUMP TYPE VARIES)

NOTE:
THIS IS A GENERAL PROCESS FLOW DIAGRAM
NOT ALL VALVES AND APPURTENANCES ARE SHOWN

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

GENERAL PROCESS FLOW DIAGRAM

PROJECT NO. 0260-36493
FILE NAME: \MECH\MPRD001

FIGURE NO. 3-1

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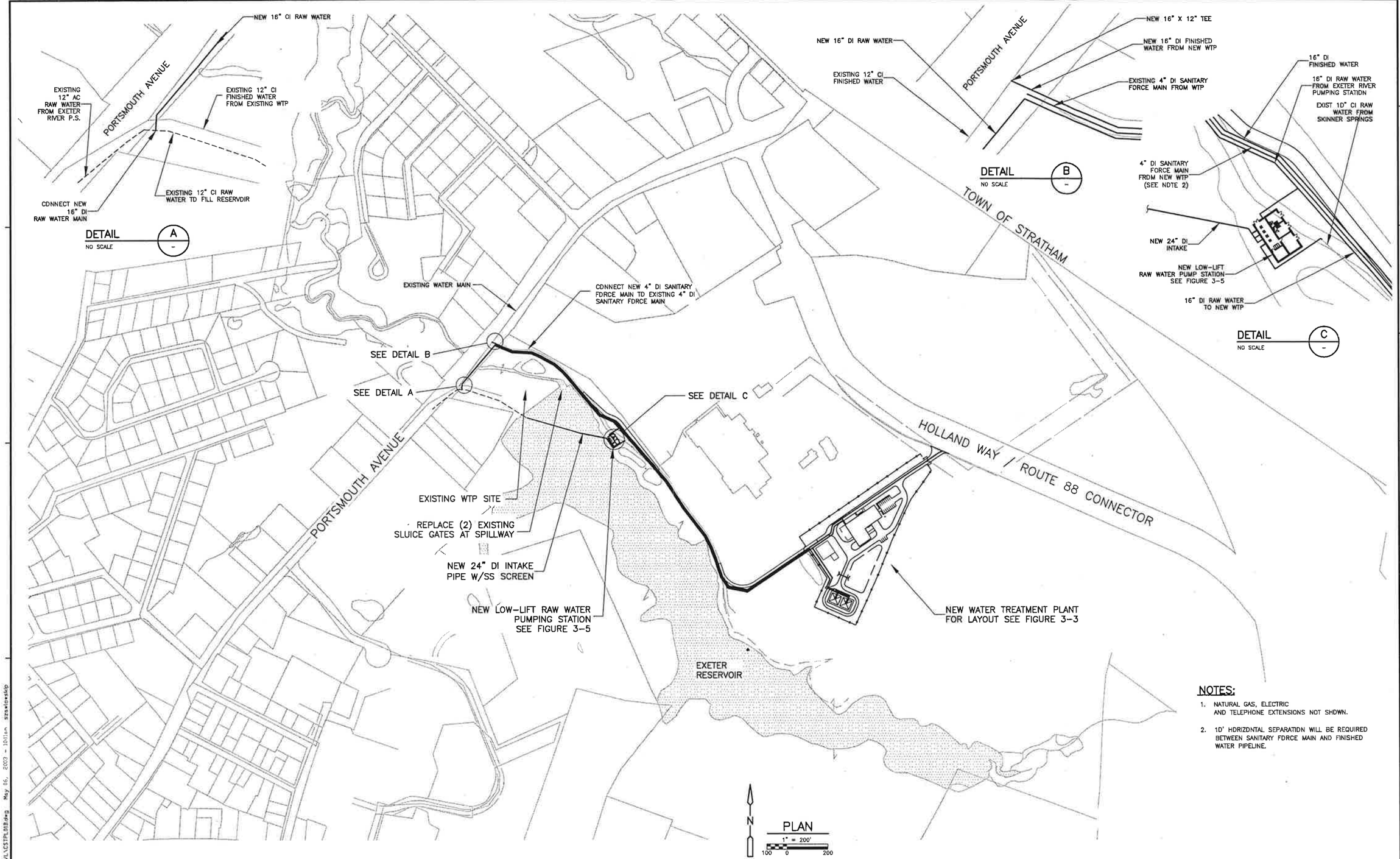


NOTES:

1. NATURAL GAS, ELECTRIC AND TELEPHONE EXTENSIONS NOT SHDWN.
2. 10' HDRIZDNTAL SEPARATION WILL BE REQUIRED BETWEEN SANITARY FDRCE MAIN AND FINISHED WATER PIPELINE.

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: MOSHER/SZAP
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

AREA PLAN

PROJECT NO. 0260-36493
FILE NAME: \CML\CSTPL01B

FIGURE NO.
3-2

C:\Projects\0260\36493\CIVL\CSTPL01B.dwg May 06, 2003 - 10:11am szawieskip

NOTES:

1. BASE MAPPING PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. CDM ASSUMES PARCEL LIMITS WERE DEVELOPED THROUGH TAX MAP SCANNING AND TOPOGRAPHY WAS DEVELOPED FROM AERIAL SURVEY CAUSING THESE NOT TO ALIGN PRECISELY. DETAILED PROFESSIONAL LAND SURVEY TO BE PROCURED IN SUBSEQUENT PHASE OF DESIGN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUDY FOR EXETER, NEW HAMPSHIRE.
3. WETLANDS MITIGATION/REPLACEMENT WILL BE REQUIRED IN NOTED AREAS OF IMPACTED WETLANDS.

300' SHORELINE PROTECTION BUFFER
FUTURE TREATMENT MODULE
PRELIMINARY EDGE OF WETLAND
POTENTIAL OZONE FACILITY LOCATION
POTENTIAL LIQUID OXYGEN TANK LOCATION
12' WIDE GRAVEL ACCESS ROAD
SINGLE LEAF GATE
50.00'
1066.3'
24' WIDE PAVED ACCESS ROAD
DOUBLE LEAF GATE
GROUND OBSCURED
ROUTE 88 CONNECTOR
EXETER RESERVOIR
EXISTING RIFLE RANGE
EXISTING TRAP SHOOTING RANGE
SANITARY PUMPING STATION
PROCESS & ADMIN BUILDING
PROVIDE 16" BUTTERFLY V. AND PLUG. FOR FUTURE INSTALLATION OF FINISHED WATER PIPELINE IN HOLLAND WAY
WASHWATER RECYCLE PUMPING STATION
16-CAR PARKING LOT
SEE NOTE 3
EXETER & HAMPTON ELECTRIC COMPANY EASEMENT
100-YEAR & 500-YEAR FLOOD PLAIN LIMITS
SEE NOTE 3
4-CAR PARKING LOT
FLAG POLE
PRELIMINARY APPROXIMATE LIMITS OF STORMWATER DETENTION BASIN
CHAINLINK FENCE
EASEMENTS OR TAKINGS REQUIRED WITHIN HATCHED AREA FOR DRIVEWAY AND PIPELINE CONSTRUCTION
2-CELL WASHWATER/ SOLIDS HOLDING POND
50.00' REQUIRED SETBACK FOR "CT" ZONING DESIGNATION

N

PLAN
1" = 50'
25 0 50

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: MDSHER/SZAP
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
cambridge environmental

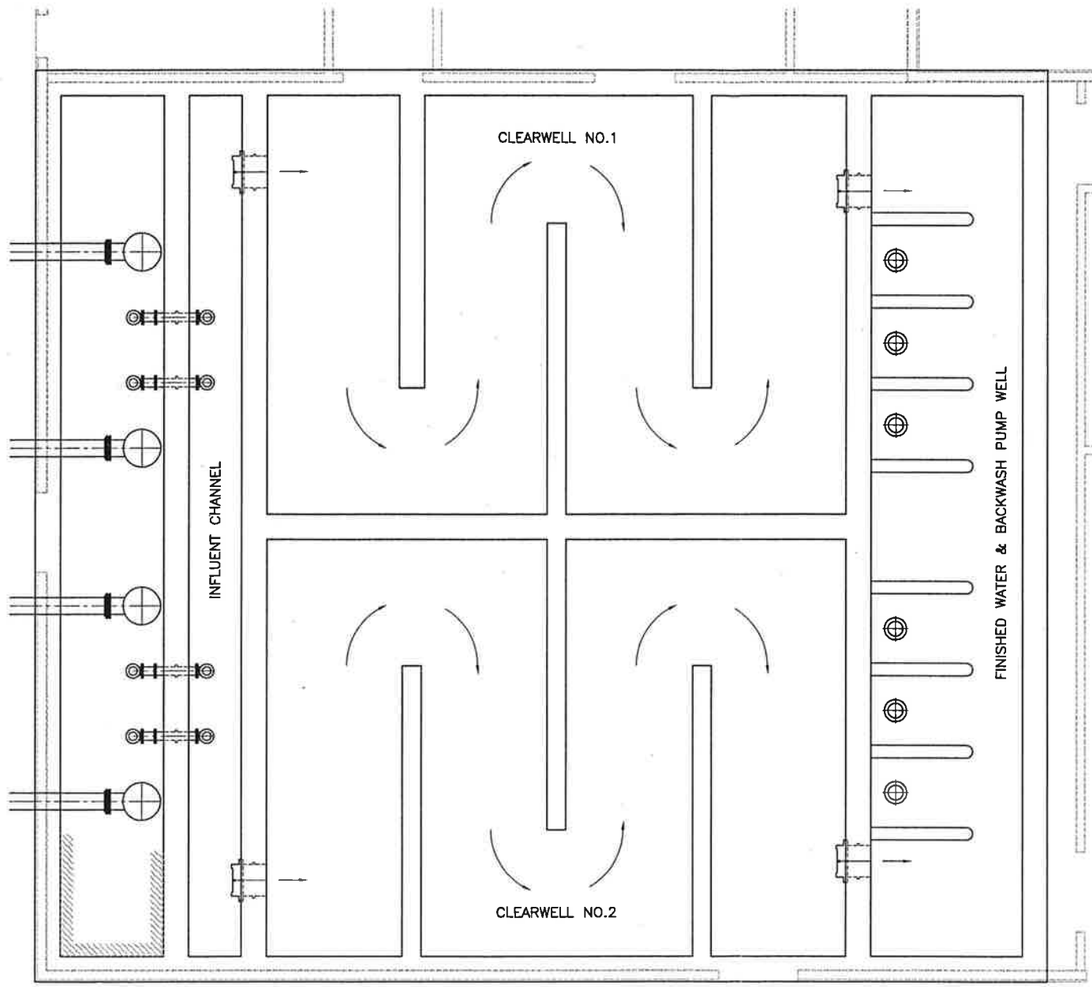
TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PRELIMINARY WTP LAYOUT PLAN

PROJECT NO. 026D-36493
FILE NAME: \CIVL\CSTPL02B

FIGURE NO.
3-3

C:\Projects\026D\36493\CIVL\CSTPL02B.dwg May 06, 2003 - 9:59am stanislowskip



PLAN

3/16" = 1'- 0"

4 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
CLEARWELL
PLAN AT EL. 37.0

PROJECT NO. 0260-36493
FILE NAME: \MECH\MPBPL001

FIGURE NO.
3 - 4A

C:\Projects\0260\36493\Mech\MPBPL001.dwg May 06, 2003 - 9:13am szawlowskip

FOR ADMIN. AREA DETAILS SEE PLAN FIGURE 3-7A

FILTER MODULE (TYP)

FILTER BACKWASH PUMP (TYP. OF 3)

SODIUM HYPOCHLORITE FEED SYSTEM

AIR SCOUR BLOWER (TYP)

DRY POLYMER STORAGE

AIR COMPRESSOR

CAUSTIC SODA FEED SYSTEM

POLYMER FEED SYSTEM (COAGULANT AID)

POLYMER FEED SYSTEM (FILTER AID)

POLY-ALUMINUM CHLORIDE FEED SYSTEM

AMMONIA FEED SYSTEM

FUTURE FLUORIDE SYSTEM

FINISHED WATER PUMP (TYP. OF 3)

ZINC ORTHOPHOSPHATE FEED SYSTEM

MICROSAND STORAGE

PLAN

3/16" = 1'- 0"

4 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS

WATER TREATMENT PLANT

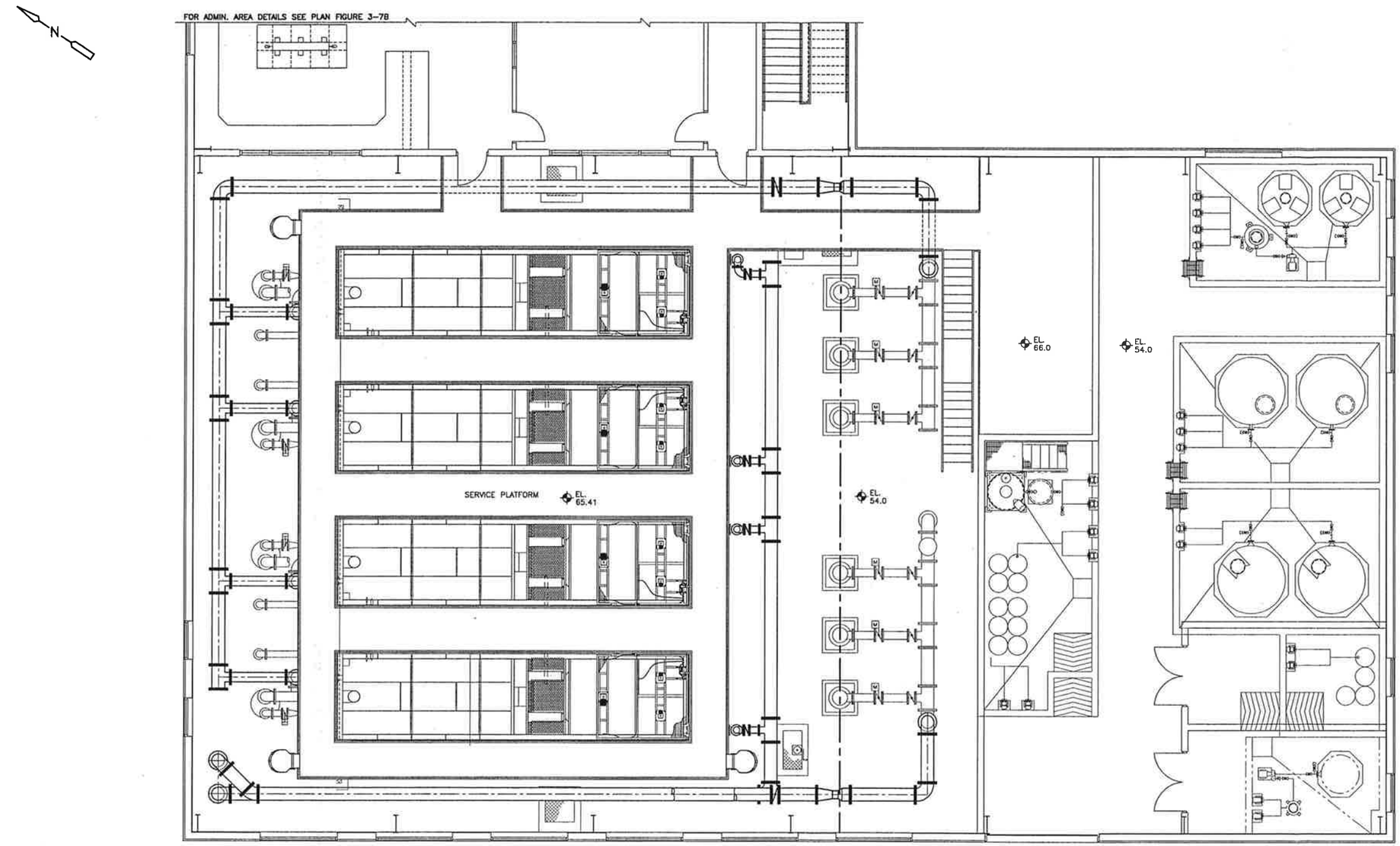
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
TREATMENT MODULES AND CHEMICAL AREA
PLAN EL. 54.0

PROJECT NO. 0260-36493
FILE NAME: \MECH\MPBPL002

FIGURE NO.
3 - 4B

C:\Projects\0260\36493\Mech\MPBPL002.DWG May 06, 2003 - 9:13am szawlowskip



PLAN

3/16" = 1'- 0"

4 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

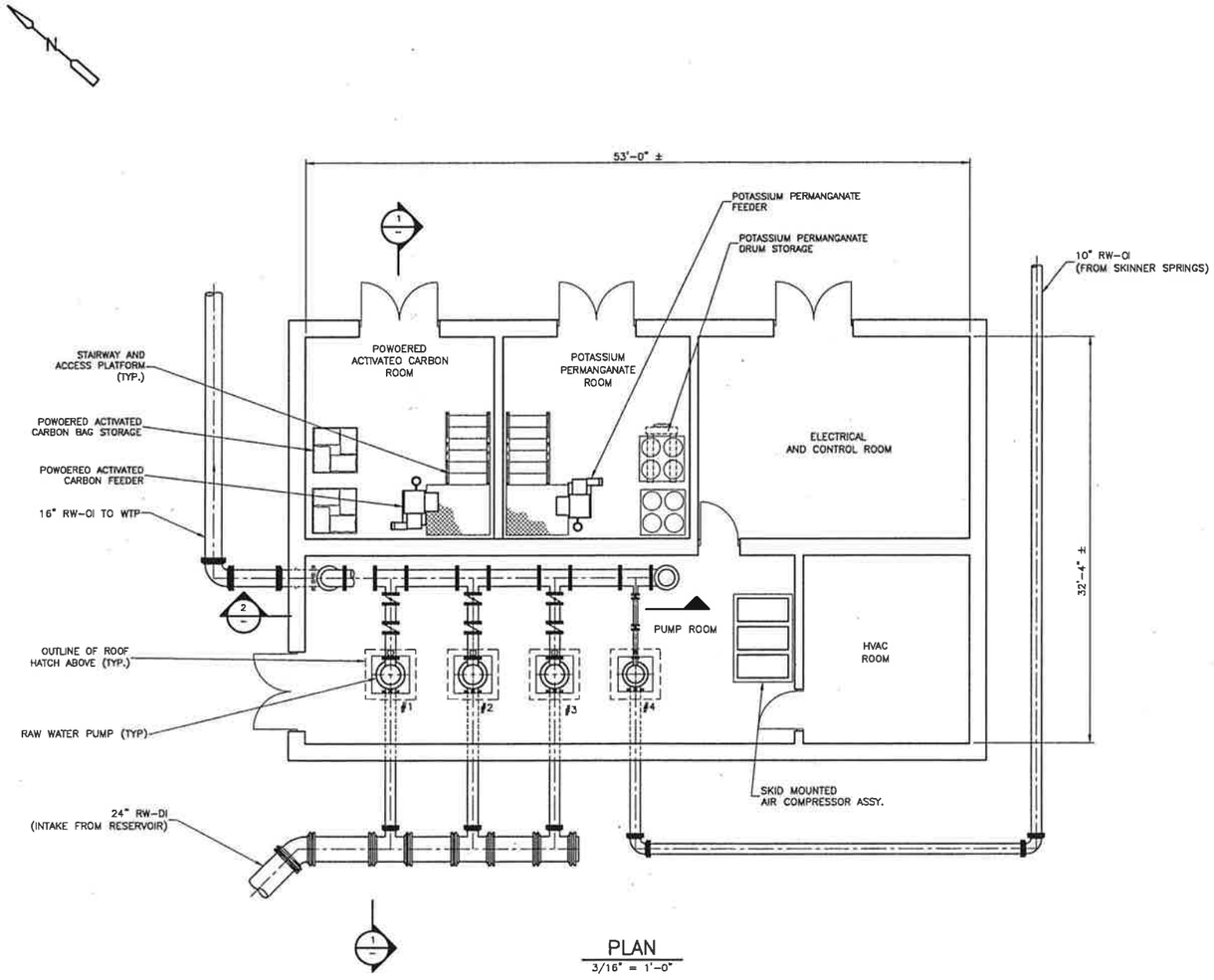
TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

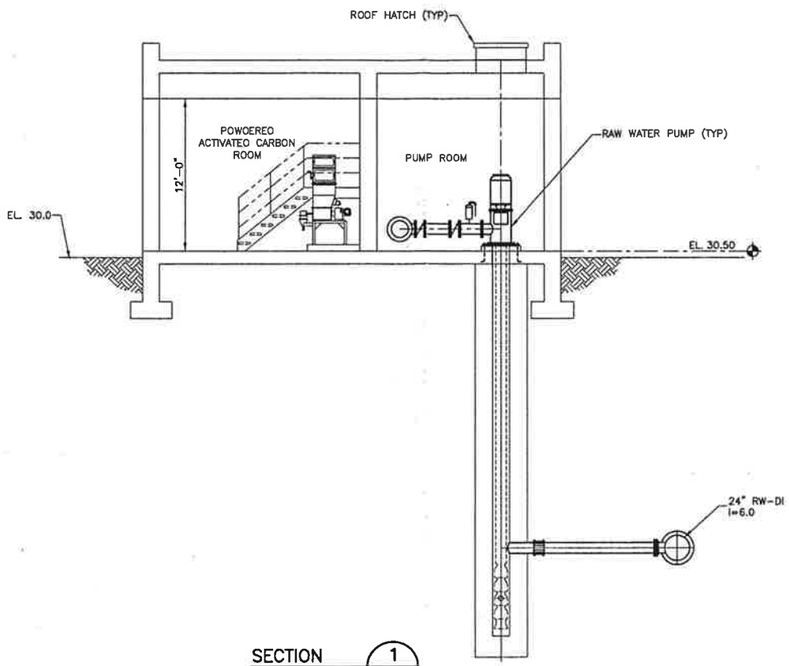
PROCESS BUILDING
TREATMENT MODULES AND CHEMICAL AREA
PLAN EL. 66.0

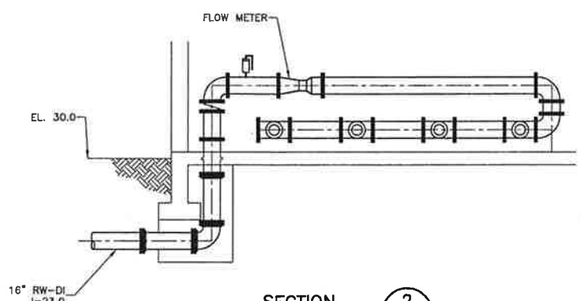
PROJECT NO. 0260-36493
FILE NAME: \MECH\MPBPL003

FIGURE NO.
3 - 4C

C:\Projects\0260\36493\Mech\MPBPL003.DWG May 06, 2003 - 9:40am szawlowskip







3/16" = 1'- 0"
4 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

NEW LOW LIFT RAW WATER PUMPING STATION PLAN AND SECTION

PROJECT NO. 0260-36493
FILE NAME: \MECH\MPBPLD01

FIGURE NO.
3-5

C:\Projects\0260\36493\Mech\MPBPLD01.dwg May 07, 2003 - 9:35am Szawlowskip

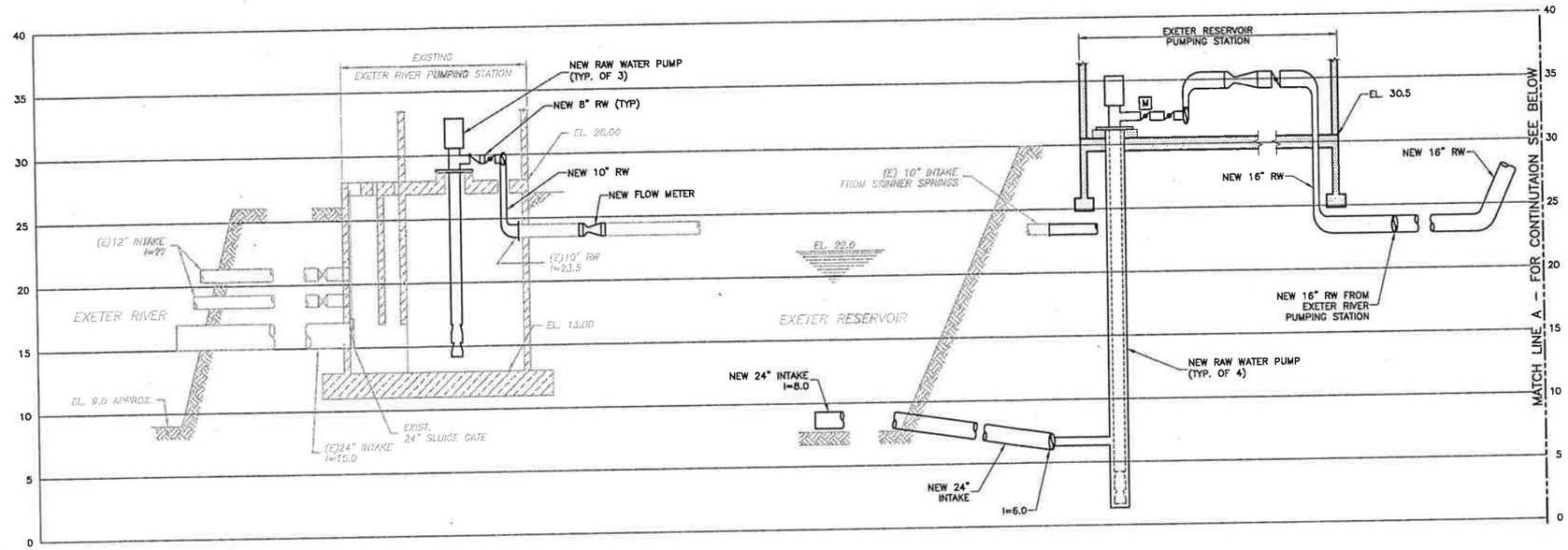
NOTES AND LEGEND:

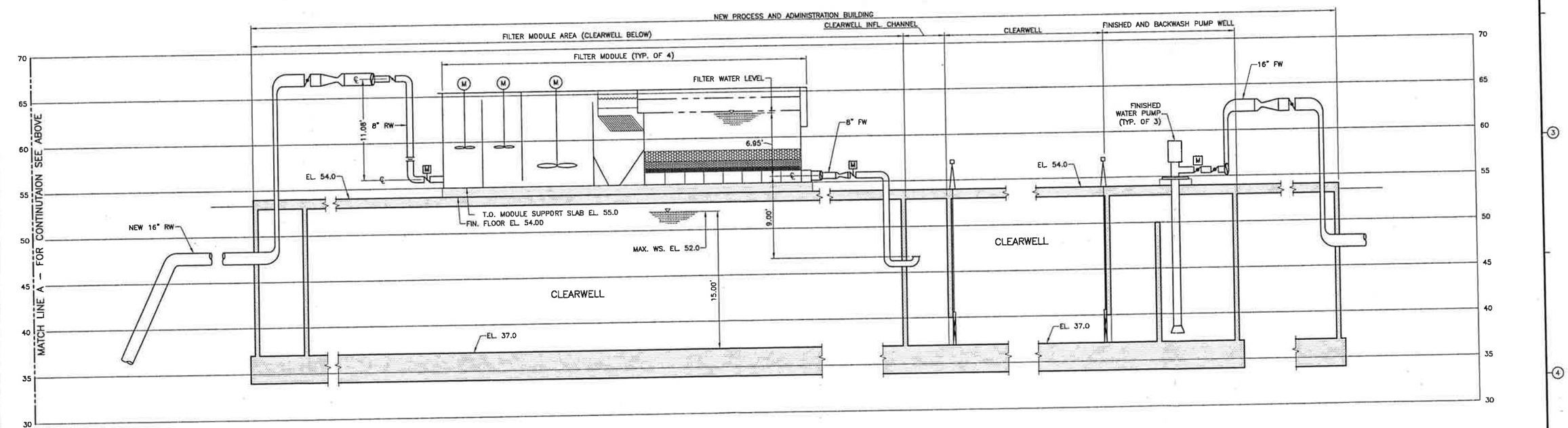
CERTAIN STRUCTURE DETAILS HAVE BEEN OMITTED FOR CLARITY.
FOR SYMBOL LEGEND AND LIST OF ABBREVIATIONS SEE SHEET M-1 AND M-2

16" RW — NEW FACILTY ANNOTATION

(E) 24" RW — EXISTING FACILITY ANNOTATION

WS 63.0 — ESTIMATED HYDRAULIC GRADE LINE ELEVATION AT ?? MGD





PROFILE

HORIZONTAL: NO SCALE
VERTICAL: 1" = 5'

1" = 5'
2.5 0 5

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: P. SZAWLOWSKI
SHEET CHK'D BY: J. WILLIS
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

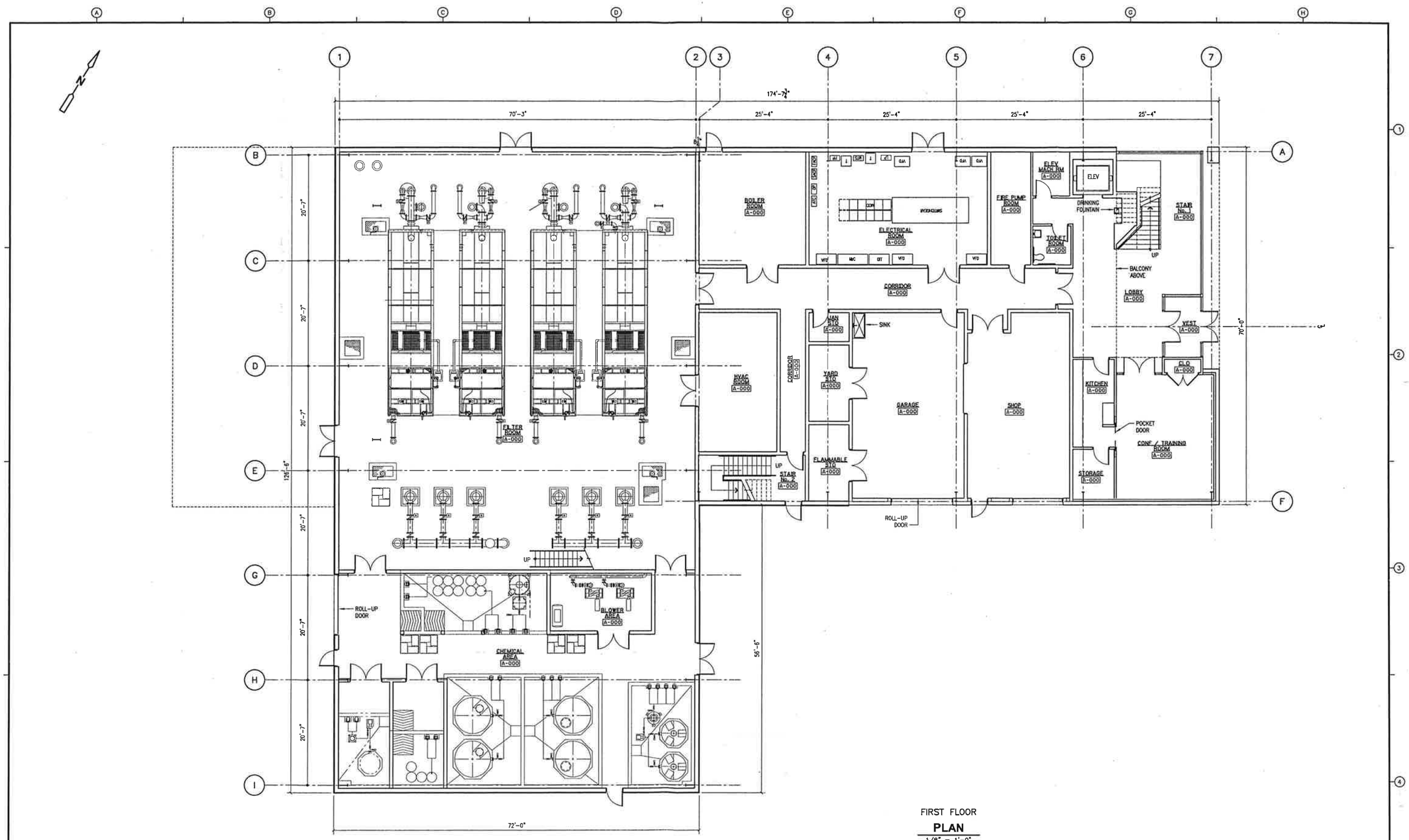
TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

HYDRAULIC PROFILE

PROJECT NO. 0260-36493
FILE NAME: \MECH\MHYPR001

FIGURE NO.
3-6
0260-xxxx

C:\Projects\0260\36493\Mech\MHYPR001.DWG May 06, 2003 - 10:15am szawlowskip



FIRST FLOOR

PLAN

1/8" = 1'-0"

1/8" = 1'- 0"

0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: B. GIORGI
CROSS CHK'D BY: DIERCKS/WILLIS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS

WATER TREATMENT PLANT

PHASE 2 - PRELIMINARY DESIGN

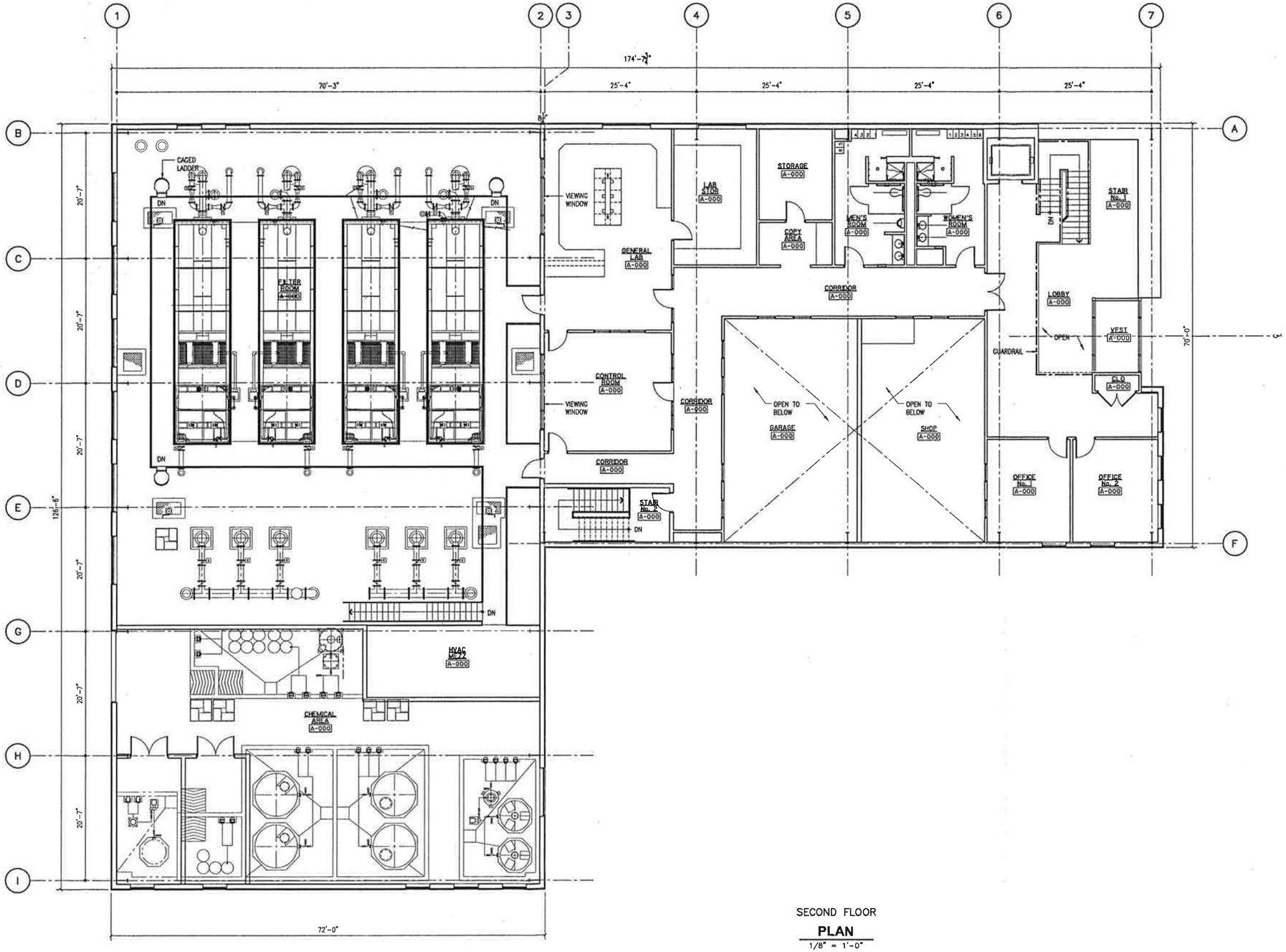
PROCESS BUILDING

FIRST FLOOR PLAN

PROJECT NO. 0260-36493
FILE NAME: APBPL001

FIGURE NO.

3-7A



SECOND FLOOR

PLAN

1/8" = 1'-0"

1/8" = 1'- 0"

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHK'D	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: R. GIORGI
CROSS CHK'D BY: DIERCKS/WILLIS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS

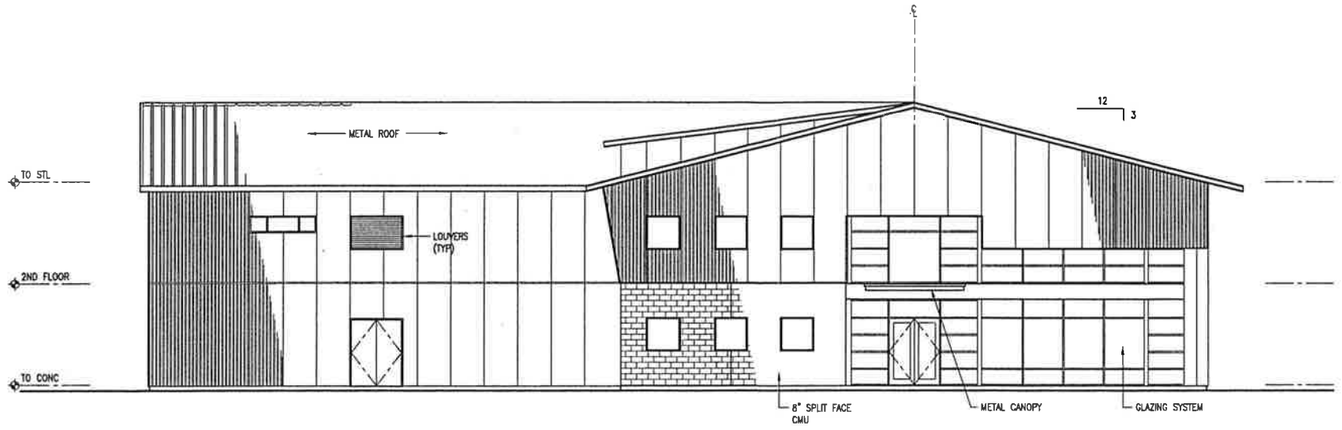
WATER TREATMENT PLANT

PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
SECOND FLOOR PLAN

PROJECT NO. 0260-36493
FILE NAME: APBPL001

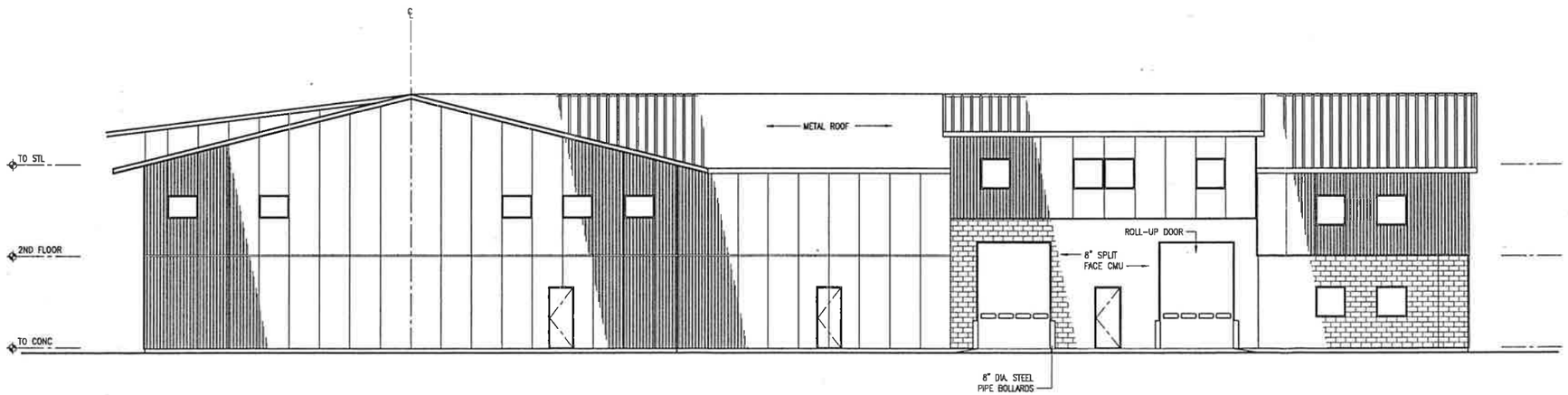
FIGURE NO.
3-7B



NORTH

ELEVATION

1/8" = 1'-0"



EAST

ELEVATION

1/8" = 1'-0"

1/8" = 1'- 0"

4 2 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: R. GIORGI
CROSS CHK'D BY: DIERCKS/WILLIS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

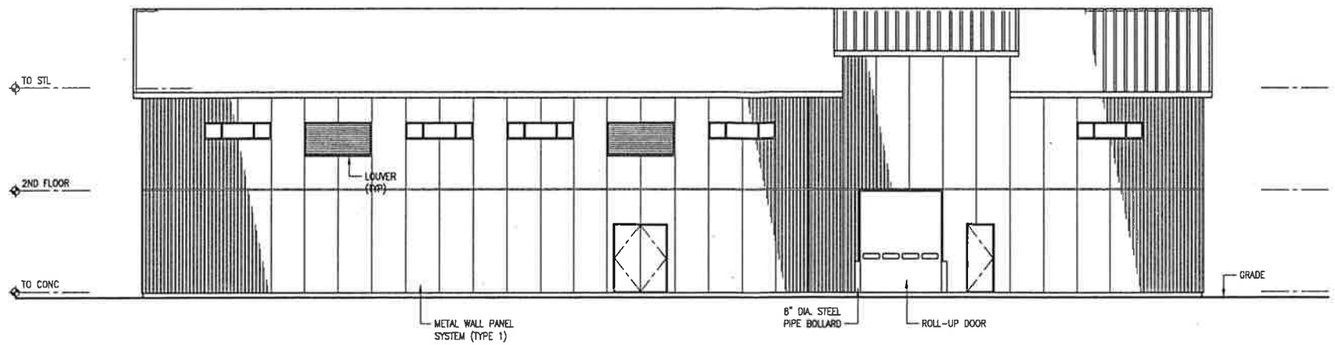
CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
EXTERIOR ELEVATIONS 1 OF 2

PROJECT NO. 0260-36493
FILE NAME: APBEL100

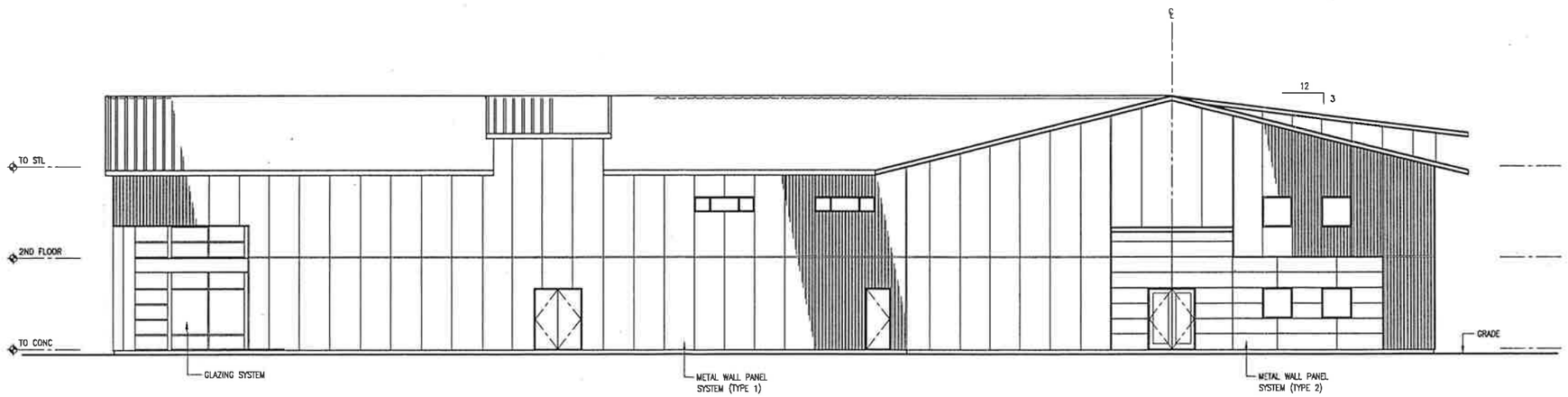
FIGURE NO.
3-8



SOUTH

ELEVATION

1/8" = 1'-0"



WEST

ELEVATION

1/8" = 1'-0"

1/8" = 1'- 0"

4 2 0 4 8

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: R. GIORGI
CROSS CHK'D BY: DIERCKS/WILLIS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS

WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
EXTERIOR ELEVATIONS 2 OF 2

PROJECT NO. 0260--36493
FILE NAME: APBEL200

FIGURE NO.
3-9
x

4 Section Four

Section 4
Permitting Plan

4.1 Overview

Adequate planning of regulatory and permitting requirements is a critical success factor in developing major construction projects. Exeter's proposed water system improvements are no exception.

As part of CDM's scope of work, a permitting plan has been developed for this project. The memorandum included in Appendix I to this report provides a summary of anticipated permitting requirements, further information requirements, subsequent steps in the execution of the project, and schedule.

A tabulation of anticipated permits and approvals appears in Table 4-1.

Table 4-1: Summary of Anticipated Permits and Approvals

Permit / Approval	Agency	Comments
U.S. Army Corps of Engineers (Section 10 and/or Section 404)	Army Corps of Engineers	Required for work in wetlands and waterways.
EPA National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit	USEPA	Commonly included in general contractor's scope of work during construction.
NHDES Wetlands Bureau Permit	NHDES	Required for work in wetlands and waterways. Communication with other federal and state agencies (US Fish & Wildlife Service, et al – see Appendix I) to augment this permitting effort.
New Hampshire Comprehensive Shoreland Protection Act	NHDES	Triggered when working within 250-ft of Exeter Reservoir.
Alteration of Terrain Permit (Site Specific)	NHDES	Focused on minimizing soil erosion and controlling stormwater runoff.
Historical / Archaeological Preservation Review & Compliance	NH Division of Historical Resources	Review triggered when federal funding is applied to project.
Exeter Shoreland Protection District	Town of Exeter	Triggered when working within 300-ft of Exeter Reservoir.
Local Zoning District Designation	Town of Exeter	Zoning Department review needed for compliance with "CT" zoning district requirements.
Exeter Conservation Commission	Town of Exeter	Local review / approval of projects necessary for processing of state and federal permits.

Permit / Approval	Agency	Comments
Other Potentially-Required Permits		
NHDES WTP Design Standards – State Design Review	NHDES	State review and approval of detailed design required at appropriate milestones.
Sewer Connection Permit	NHDES	Required for new WTP's sewer connection into existing sewer.
NPDES Permit for Process Water Discharges to Water Bodies	Not applicable, based on current preliminary design approach.	
Construction Related Permits / Approvals	(Various agencies)	Includes NHDOT coordination for Holland Way curb cut, easement procurement, and blasting approvals.
Fuel and Chemical Storage Permits	Town of Exeter and state agencies	Coordination with local and state fire and safety officials required during detailed design phase.
Emergency Response Plan (ERP) and Spill Prevention Control and Countermeasure (SPCC) Plans	Administered by NHDES	ERP required for security-related regulatory compliance (see Section 3 of this report). SPCC to be developed as design is further developed.
Tight Tanks / Underground Storage Tank Permits	Administered by NHDES	To be evaluated as design is developed.
New Hampshire Air Program	NHDES	Air emissions from a variety of sources are regulated through a statewide permitting program.

Abbreviations:

USEPA = United States Environmental Protection Agency

NHDES = New Hampshire Department of Environmental Services

Table 4-1

Summary of Anticipated Permits and Approvals

Appendices

Appendices

Appendix	*Title*
A	Workshop Summaries
B	Memorandum Regarding Lead Shot on Proposed WTP Site
C	Memorandum Regarding Geotechnical Test Pit Findings
D	Exeter River Pumping Station – 1972 Construction Drawings
E	Electrical Systems Preliminary Design Memorandum
F	Instrumentation and Control Systems Preliminary Design Memorandum
G	HVAC Systems Preliminary Design Memorandum
H	Plumbing and Fire Protection Systems Preliminary Design Memorandum
I	Permitting Plan Memorandum
J	Value Engineering Comment / Response Table
K	Drawings Representing Basis of Opinion of Probable Project Cost
L	Memorandum Regarding WTP Design Waste Handling Facilities

Appendix A

CDM

WORKSHOP SUMMARY

TOWN OF EXETER, NEW HAMPSHIRE
PHASE 2 PRELIMINARY DESIGN OF NEW WATER TREATMENT PLANT

WORKSHOP NO. 3
ARCHITECTURAL / ROOM PROGRAMMING WORKSHOP

WORSHOP DATE: July 10, 2002, 10:00 a.m. to 12:00 noon

LOCATION: Novak Room, Town Office Building

ATTENDANCE:

Exeter: Tony Calderone, Dan Daigle, Victoria Del Greco, Keith Noyes, and Jennifer Perry

CDM: Jeff Diercks, Barry Giorgi, and Al LeBlanc

NOTES PREPARED BY: Al LeBlanc, CDM

DATE OF NOTES: August 9, 2002

DISTRIBUTION: All Workshop attendees, plus Bill Campbell and Bob Kelly (Exeter) and Carol Ashe, Ed Nazaretian, and Julie Simonton (CDM)

PURPOSE OF WORKSHOP

The purpose of this Workshop was to review and discuss the Town's preferences for room programming, materials selection, and roof type at the proposed new WTP. CDM architect Barry Giorgi led the discussion, in which the group reviewed the Town's responses to items listed in the "Facilities Programming Questionnaire", distributed to the Town on June 28, in advance of the July 10 workshop.

GLOBAL ISSUES PERTAINING TO WTP ROOM PROGRAMMING

The Town noted that while the water department will be the primary user of the WTP facilities, it is conceivable for other departments to use them, as well. The Town requested the design be such that it provides the ability to expand the WTP in the future. The Town also noted that expansions over the next 20 years are not likely.

PERSONNEL STATIONED AT THE WTP

The Town listed the following personnel who would be assigned to the WTP:

- (4) WTP Operators, manning 2 shifts, with the 3rd shift operating unmanned
- Assistant Water/Sewer Superintendent
- Two maintenance workers
- There are no accounting / billing personnel to be stationed at the WTP.

CDM

MISCELLANEOUS ROOM REQUIREMENTS

The group agreed that the following are desired for the new WTP:

- The senior operator is to be provided an office (with a door). The remaining operators will utilize common space in the control room.
- Office (with door) requested for Assistant Water/Sewer Superintendent
- Large, divided lockers for all WTP Operators, with lockers also provided for 2 maintenance employees
- Men's and women's toilet, shower, and locker facilities
- The Operations room should be the "greeting area" – no dedicated reception desk is required.
- A dividable combination lunch / training / conference room. Accommodations for up to 14 people around a conference table (said table to be made up by arranging several small tables together, vs. providing one large table) should be provided. Room also to feature a "package luncheonette unit" on a wall, with doors to hide it, television with videotape recorder desired for training, bookshelves with shrouding doors.
- Size of rooms to be based on economics. Town advised CDM to fill out the WTP confines where possible. All promoted avoidance of "jogs" in building, as such "jogs" typically increase construction cost.
- A copier and printer shall be housed in the control room.
- Office supplies – some (but not large quantities) will be kept at WTP.
- Provisions for a plan rack, shop drawing files, and bookshelves should be made.

LABORATORY

The group agreed that counter space is a leading requirement for the new WTP's lab. Mandatory equipment in the new lab will include jar testing, a turbidimeter, a spectrophotometer, a pH meter, and potentially a Total Organic Carbon (TOC) analyzer. A sample sink, with sample lines delivering flow to the lab from the WTP process areas, is desired as part of a sample receiving lab with washup area. The group also discussed possible additions such as bacteria/microbiology and autoclave equipment, pilot equipment, and filter test columns. CDM indicated it has seen medium sized WTPs with certified laboratories. The Town remarked that "...it's difficult, often, to add on to a lab." CDM will size the laboratory preliminarily in a conservative manner, perhaps at 20-ft x 30-ft. CDM noted that it often resolves many of these issues during the detailed final design phase, and that it often consults with Ms. Diane Chaplick. (Ms. Chaplick managed CDM's laboratory in the 1970s, and is now a laboratory consultant.)

VISITORS

Public tours (schoolchildren, etc.) are likely to be held at the WTP, though it was agreed that separate restrooms are not needed for such visitors. An area should be reserved for a sample filter column, which will demonstrate the layering of media for visitors to view.

CDM

MAINTENANCE WORKSHOP

Carpentry will not likely be conducted in the WTP's workshop, but requested equipment includes a compressor, bench grinder, cutting torches, and lifting device(s). A pipe rack, tool rack, shelving for parts, and a heavy-duty workbench are desired. A sign shop will not be part of the workshop. A 24-ft x 24-ft footprint was mentioned as a reasonable size for this workshop. Hoisting items is a Town-wide issue. Exposed beams were mentioned as a possible means of hoisting various pieces of equipment, and the Town requested CDM consider this and/or crane access in its design of the workshop.

EMERGENCY ELECTRICAL GENERATOR

A generator enclosed in a building or hidden from view by other means is desired.

AIR SCOUR BLOWERS

Due to noise, a separate room for air scour blowers is desired.

GARAGE SPACE

The Town indicated that a large service pickup truck should be able to enter a garage area for offloading equipment, but garages to permanently house vehicles are not required. The Town noted a less costly alternative might be carport-type assemblies where vehicles are not fully enclosed. MWRA in Chelsea, MA has such an arrangement, the Town noted.

No snow removal equipment, beyond a snow blower, will be housed at the WTP.

Four pickup trucks are likely to be stationed at the WTP.

SITE

Parking, chemical delivery access, and bulk water pickup areas were discussed in brief. Bulk water deliveries should be easily accommodated. A total of 20 parking spaces should be provided. A light and flagpole are desired.

WATER METERS

If area for a meter shop fits within the overall footprint, then it is to be incorporated. Special measures to incorporate such a shop should not be pursued, however. The Town noted that meter replacement work and related, required workspace might become more necessary in the future, especially in regard to testing meters when rate increases take effect. CDM to determine space requirements for a meter test bench.

ROOFS

CDM made some brief remarks about roofing options. CDM noted that flat roofs are less expensive than pitched roofs, though they typically require more maintenance given the presence of roof drains, scuppers, etc. Flat roofs typically feature a life span of about 20 years, with pitched roofs offering longer life. Galvanized metal roofs can provide 30-40 year lifespan,

CDM noted. Once the building footprint is determined, CDM will get cost data to the Town for these roofing options, as well as advantages/disadvantages of each.

BUILDING MATERIALS

Brick (~$20/sf) and block ($16/sf) require virtually zero maintenance. Cavity wall construction (CMU with insulation and exterior facing) can cost less. The Town does not desire wood construction. CDM mentioned vinyl exterior facing, and will provide a cost for vinyl once the building footprint and height are determined. Metal panels were noted as another option. Stucco over foam insulation is less costly than brick and block – CDM will also provide a cost for this option. Exterior construction materials should be rugged at ground level, at a minimum, to provide durability even if upper reaches of building faces are of an alternate construction material. The Town requested life cycle cost analyses and non-cost factors for all of these options.

Skylights are desirable to the Town, and will likely save on electrical lighting costs.

Gypsum board is acceptable for office spaces.

Block, painted with epoxy, is acceptable for the treatment process areas.

Operable windows are desired.

CONCLUSION / UPCOMING EVENTS

To conclude the meeting, Jeff Diercks narrated highlights of the updated project schedule developed by CDM.

ACTION ITEMS

CDM (Barry Giorgi): After the WTP building footprint is determined, CDM will provide costs for various roofing alternatives, as well as advantages/disadvantages for each.

CDM (Barry Giorgi): After the WTP building footprint and height are determined, CDM will provide a cost for facing building with stucco atop foam. A vinyl facing cost will also be provided. Provide life cycle cost analyses and non-cost factors for all of these options, as well.

ATTACHMENTS

All handouts distributed prior to or at the workshop – questionnaire and project schedule.

CDM

MEETING SUMMARY

TOWN OF EXETER, NEW HAMPSHIRE
FINAL DESIGN OF NEW WATER TREATMENT PLANT

"INFORMAL KICKOFF MEETING"

WORSHOP DATE: March 20, 2003, 8:00 a.m. to 11:00 a.m.

LOCATION: Conference Room, new Public Works office building

ATTENDANCE:

Exeter: Dan Daigle, Victoria Del Greco, Bob Kelly, Keith Noyes, and Jennifer Perry
CDM: Jeff Diercks, Al LeBlanc, and Ed Nazaretian

NOTES PREPARED BY: Al LeBlanc, CDM

DATE OF NOTES: March 24, 2003

DISTRIBUTION: All Workshop attendees

PURPOSE OF MEETING

The purpose of this meeting was to review and discuss the new WTP design project before the final design phase is fully activated. The agenda (copy attached) covered a number of items critical to the overall project.

ENGINEERING AGREEMENT STATUS

The group noted that the successful Town vote on March 11 was followed by the Town's notice to CDM on March 12 to proceed with final design work up to $30,000 until the full contract amendment is executed. CDM handed an envelope to Keith containing 5 copies of "Exhibit C" to the overall engineering contract, which outlines the scope of work for the final design phase. An allowance for bidding phase services is also included therein. The Town is to review and (once any comments or questions are addressed) sign Exhibit C, which will provide CDM full authorization to proceed.

Ed made remarks about the federal grant status. Keith provided a summary of SRF-related conversations he has had with NHDES's Rick Skarinka.

OVERALL SCHEDULE

CDM stated that its subcontracted surveyor will begin field survey next week. CDM indicated it hopes Exeter Sportsman's Club will cooperate (via firing range closure) during the many design-related field activities, such as survey, geotechnical investigation, wetlands flagging, and lead shot sampling.

CDM

CDM presented two versions of the draft final design phase schedule. The first depicted a course of action that would provide a firm bid in hand before Town Meeting in March 2004. The second depicted a project schedule that would provide a 90% complete design, and corresponding opinion of probable project cost, before the March 2004 Town Meeting. The Town attendees indicated that the latter version of the schedule would be the more preferable of the two. Town attendees indicated desire to "do it right" rather than "rush the design". Town indicated that contractors might respond better if they know that the March 2004 voting has already authorized funding construction, rather than having bidders preparing bids for a project for which funding is uncertain. Town indicated that it allows, and is supportive of, pre-qualifying general contractors for the WTP construction project.

Town noted that December 2003 property tax bills will be the first that reflect higher rates caused by March 2003 Town Meeting voting results. Thus, voter reaction to big-ticket items on March 2004 ballot (such as construction of new WTP) may be affected accordingly.

PRELIMINARY DESIGN REPORT ISSUES

Room Programming

CDM and Town noted that staff visited the Keene WTF in February 2003, and gleaned some new ideas on building layout that might be desirable in Exeter's WTP. Keene's WTF, a building of brick/block superstructure built in the 1990s, has a 2-story non-process area, with control room on second floor featuring windows that allow direct viewing of Microfloc treatment modules and the chemical storage/feed area directly aside it. Exeter staff in attendance at Keene felt that it would be desirable to have a similar layout in their new WTP.

After much discussion, attendees agreed that CDM should revisit the layout of the Exeter WTP before preliminary design report is finalized. Attendees agreed that the room program should be operator-friendly. Expandability, to add more treatment modules, was a matter debated among attendees. CDM stressed the need for rapid revision/acceptance so as not to delay the project and to minimize expenditures on this redesign effort.

Discussion included a concept proposed where chemicals were to be placed in a basement level beneath the non-process area, thereby compacting building footprint and bringing treatment modules closer to the operations area. Hatches would possibly be provided in the garage/shop area for tank removal from, or insertion into, the chemical area below.

Vessel Materials

Attendees agreed that the decision to specify the Actifloc modules in stainless steel vs. carbon steel does not have to be made at this time. An alternate bid item could be used for final decision on this matter. CDM has issued a firm-wide e-mail for comment on this general technical issue.

Misc. Architectural Issues

The front face of the building should feature a glass atrium of sorts, perhaps with windows providing natural light "drawing" visitors up the stairway. Town staff asked CDM to, for a reasonable construction cost, design a front face that is "spruced up" from the rest of the building. Use of block on east face of building was debated, after CDM explained it was included to provide durability around heavy activity garage/shop area and secondarily to provide

aesthetic variety/value. Block in this area can be left in design, it was agreed, given nominal additive cost (about 1,150 sf, at $7,000 additive cost). Attendees asked about raising concrete foundation above grade here and at chemical fill area. CDM will examine this at chemical fill area. Bollards still to be used to keep vehicles away from metal building at chemical delivery area and elsewhere. Spare metal building panels should be specified by CDM for use in case of damage to building exterior.

Landscaping

Minimal landscaping should be provided under this design. Town wishes to keep grass away from metal building, to minimize lawn mower and other potentially-damaging traffic. Attendees agreed that a xeriscape design should be provided for the front entrance area, and that design should consider use of cisterns to catch rainwater from roof of WTP.

Residuals Handling

Town wishes CDM to examine residuals holding tank under the WTP, versus the outdoor holding tank provided in lagoon form in the present preliminary design. Town concerned about maintenance issues and appearance of open, dual cell arrangement. Town believes constructing waste flow tank beneath WTP will be more desirable for operators, and noted less impact to wetlands and to potentially lead-contaminated areas. CDM noted added expense associated with under-plant tankage as compared to outdoor, dual cell arrangement. Attendees asked if the lagoons could serve as replicated wetlands, if CDM could provide commentary on maintenance issues associated with outdoor versus enclosed tankage, if mixing (2-speed or other) would be required, and frequency of tank cleanout.

Raw Water Pumping Systems

Town wishes further discussion on raw water pumping systems. Victoria to contact NHDES's Bob Mann to discuss discharge of Skinner Springs flow directly into the Exeter Reservoir, as Town is uncertain if Skinner Springs' 0.1 mgd is worth providing a dedicated pump for. Sizing of pumps at both raw water pumping stations of concern to Town, as well, given near-future demands being significantly less than design year demands. Town concerned that near-future demands will require them to run 1.5-mgd pumps at very slow speeds for the majority of their operating time. Town and CDM to discuss raw water pump sizing further via telephone within next two weeks. Keith indicated the Town wishes to use diesel-driven generators with spill containment pads as needed, in lieu of more costly natural gas or propane-fired generators. CDM is also to examine relocating existing WTP generator to the Exeter River Pumping Station.

PROCUREMENT ISSUE (POTENTIAL PRE-PURCHASE OF PROPRIETARY EQUIPMENT)

CDM and Town will continue to discuss merits of Pre-Purchasing the treatment equipment versus not doing so. A decision is not required immediately on this.

VALUE ENGINEERING STATUS

Jennifer and Town personnel are considering when/if VE review to be performed. Jennifer to contact Lewis Zimmerman & Associates to discuss what specific deliverables might be of use during a future VE review. CDM noted that we all don't want to go too far into the design and then have a VE review performed, as such a review could not recommend major changes to the project without budget and schedule impacts to CDM and the Town.

CDM

REGULAR PROGRESS MEETINGS

Attendees agreed on merit of conducting monthly progress meetings as project proceeds. CDM is to advise Town on when Keith Noyes should be present, as Keith indicated he wishes to be present for major policy decisions and major design issues, but not necessarily for detailed discussions of miscellaneous individual design issues.

FORMAL KICKOFF MEETING IN APRIL

Ed described the need to get started in an organized, focused manner. Ed and Jeff indicated the need to achieve group consensus on design issues and "freeze" elements of the design from which we may move forward. An early means to building lines of communication, as practiced by CDM, is the Project Quality Management workshop. Attendees reviewed handout provided by CDM, and agreed to conduct PQM workshop in April 2003.

ACTION ITEMS

Town (Keith Noyes): Review and (once any comments or questions are addressed) sign Exhibit C, which will provide CDM full authorization to proceed.

CDM (Al LeBlanc): Edit schedule to reflect bidding phase occurring after Town Meeting in March 2004.

CDM (Al LeBlanc and ARCH Dept.): Re-work room programming and WTP's front building face architectural design to reflect Town-stated preferences, with capital cost commentary as needed.

CDM (Al LeBlanc and ARCH Dept.): Examine possible raising of concrete foundation to provide durability in lieu of potentially-more costly CMU.

CDM (Al LeBlanc): Examine placement of residuals holding tank beneath WTP, with capital cost commentary included.

Town (Victoria Del Greco): Call Bob Mann at NHDES regarding feasibility/permitting issues with discharging Skinner Springs' flow into Exeter Reservoir.

Town (Victoria Del Greco) and CDM (A. LeBlanc): By telephone, agree upon raw water pump discharge flow ratings.

ATTACHMENTS

All handouts distributed at the meeting – Agenda, Project Schedules, and PQM description

MEETING SUMMARY

TOWN OF EXETER, NEW HAMPSHIRE
PRELIMINARY AND FINAL DESIGN OF NEW WATER TREATMENT PLANT

"PROGRESS MEETING"

WORSHOP DATE: April 15, 2003, 9:00 a.m. to 11:00 a.m.

LOCATION: Conference Room, new Public Works office building

ATTENDANCE:

Exeter: Tony Calderone, Dan Daigle, Victoria Del Greco, Keith Noyes, and Jennifer Perry
CDM: Jeff Diercks, Barry Giorgi, Al LeBlanc, and Ed Nazaretian

NOTES PREPARED BY: Al LeBlanc, CDM

DATE OF NOTES: April 16, 2003

DISTRIBUTION: All Workshop attendees

PURPOSE OF MEETING

The purpose of this meeting was to review and discuss the issues pertaining to the final design phase, with particular emphasis on finalizing the overall building layout / design scheme in order to finalize the Phase 2 Preliminary Design Report. A copy of the agenda is attached.

ENGINEERING AGREEMENT STATUS

The Town of Exeter provided comments on the engineering agreement since it received the draft version on March 20. At today's meeting, CDM provided a response letter, a copy of "Exhibit C" which depicts the recent changes, and three "clean" copies of the revised Exhibit C which could be signed by all parties if acceptable to the Town. After the meeting, Keith, Ed and Jeff met to review the Exhibit. The edits were approved, and minor additional edits were made and initialed. Keith will forward the Exhibit to the Town Manager for signature, which will provide CDM full authorization to proceed.

FINAL DESIGN – STATUS OF FIELD WORK

Al LeBlanc provided a brief update on final design field work completed to date. Highlights follow:

- The land surveyors are "out of harm's way", in that they have completed all survey work that requires closure of the Sportsman's Club firing and trap ranges. Survey work continues in other portions of the project area.

- Flagging of wetlands is complete, both along the unpaved site access road and at the Exeter River Pumping Station.

- The geotechnical boring field program was completed last week. Rock and groundwater elevations were approximated, which will guide the design of the clearwell among other items in the design. Rock and groundwater were encountered at relatively deep elevations in the area of the proposed WTP. This indicates the project will not be significantly altered by those factors.

- Lead sampling will be performed in the coming weeks, requiring another closure period at the Sportsman's Club. Victoria indicated she'll be attending the Exeter Sportsman's Club's (ESC) next meeting on Monday April 21, 2003. She will inform ESC of findings from the 2002 sampling work, and will indicate the need for another closure period for the further sampling.

"PQM SESSION"

CDM indicated that the Project Quality Management session, or "formal kickoff meeting", will be held in Exeter on April 25, 2003 at 9:00 a.m. The meeting is expected to last until approximately 2:00 p.m., with a working lunch provided during the meeting. The Town requested that CDM e-mail all meeting dates and times to the entire Town project steering committee, to facilitate communication to everyone. A "cc" to Selectman Bill Campbell should also be provided for all project meetings, as Selectman Campbell has indicated an interested in staying abreast and involved in the project and its development. (Selectman Campbell's e-mail address is WCAMPBELL@EXETER.EDU.) CDM is to contact NHDES's Bob Mann to invite him to the April 25 PQM session. Although the Town's recreation department building was mentioned, the Town will confirm the exact meeting room/facility where this meeting will be conducted.

PRELIMINARY DESIGN

CDM authored a letter dated April 10, 2003 that outlined several WTP-related goals established by Exeter personnel in a March 20, 2003 meeting. The group reviewed those goals together, and then discussed the revised layout drawings that were attached to the April 10 letter. Comments on the revised plans included:

- The revised layout is generally acceptable to the Town.

- The layout at laboratory/control room area warrants some further discussion / brainstorming. CDM will present alternate approaches to laying this area out, but this work can be addressed in the final design phase.

- The vestibule at the front entrance should be secured, such that visitors may enter the first set of doors but be restricted from proceeding into the lobby before being admitted by plant personnel.

- Cameras at the entrance, in the chemical storage/feed area, and at the raw water pumping stations are desired. Camera locations will be further discussed as the design is developed.

- Windows on the south building face would be desirable, particularly if a view of the reservoir were possible, but cost should be considered before adding them.

- A pocket door between the conference room and the kitchen is desired.

- CDM is to develop cost information on the glass/glazing system for the Town to evaluate.

- WTP site fencing should be examined during the final design phase. Is all fencing shown in the Preliminary Design necessary? Does the state have a formal position on fencing the site? Can a bid alternate be provided for site fencing?

- Osram / Sylvania may wish to share driveway access with the new WTP. Town wishes to pursue this discussion. Victoria to arrange meeting with Osram/Sylvania.

- Exterior lighting should be minimized to prevent "light pollution" at night. Building mounted lights should be provided for safety/security at night.

- CDM indicated that it did not recommend a concept proposed where chemicals were to be placed in a basement level beneath the non-process area, thereby compacting building footprint and bringing treatment modules closer to the operations area. This arrangement would require stairs for access/egress and hatches for tank removal from, or insertion into, the chemical area below. This arrangement would add significant cost.

- CDM addressed the topic of a possible residuals holding tank under the WTP, versus the outdoor holding tank provided in pond form in the present preliminary design. Town is concerned about maintenance issues and appearance of open, dual cell arrangement. CDM presented estimates of waste flow, required storage volumes, and approximate cost data. Town and CDM agreed to further consider the issue and reconvene in a smaller group to resolve the general approach to waste flow handling.

- CDM will work to complete the Phase 2 Preliminary Design Report based on today's meeting and the results of the upcoming washwater / residuals management discussion.

ACTION ITEMS

Town (Keith Noyes): Coordinate execution of Exhibit C, which will provide CDM full authorization to proceed.

CDM (Jeff Diercks): CDM is to e-mail all meeting dates and times to all Town steering committee members, including a "cc" to Selectman William Campbell. (Completed on April 16.)

CDM (Jeff Diercks): CDM is to contact NHDES's Bob Mann to invite him to the April 25 "Formal Kickoff Meeting". (Note: CDM did this on the morning of April 26. Bob indicated he would likely attend.)

Town (Victoria Del Greco): Confirm meeting location for April 25 "Formal Kickoff Meeting".

CDM (ARCH Dept.): Present alternate layout concepts for the lab/control room area.

CDM (ARCH Dept.): Develop cost information on the glass/glazing system, to enable the Town to fully evaluate the amount of glass that will ultimately be included in the entrance/stair area.

Town (Victoria Del Greco): Arrange meeting with Osram / Sylvania to discuss plant access, easement, and driveway issues.

CDM (Al LeBlanc): Further evaluate solids / washwater management approach and arrange follow-up meeting between CDM and Exeter personnel.

ATTACHMENTS

Agenda

Appendix B

Appendix B

Memorandum Regarding Lead Shot on Proposed WTP Site

CDM

Memorandum

To: *Alan G. LeBlanc, P.E. - CDM*

From: *Jennifer L. Rogers, P.E. - CDM*

Date: *October 3, 2002*

Subject: *Phase 1 Lead Shot Study*
Siting Option "B" Phase 2 WTP Preliminary Design
Exeter, New Hampshire

1.0 Introduction

This memorandum was prepared to assist the Town during evaluation of the Water Treatment Plant (WTP) siting concept (Siting Option "B" of the Phase 2 Preliminary Design). The WTP is proposed to be sited on a parcel currently occupied by the Exeter Sportsman's Club (ESC). Areas of the site have been used for shooting ranges, including the historical use of lead shot, and the presence of lead in soils is a concern for construction of a WTP. This memorandum presents the Phase 1 Lead Shot Study performed by CDM as part of the Phase 2 WTP Preliminary Design.

2.0 Background

2.1 Exeter Sportsman's Club

CDM contacted Mr. Bruce Mongeon, president of the ESC, to review the history of the ESC's use of the site, as well as to schedule soil sampling. The following information presented is based on CDM's conversations and site visit with Mr. Mongeon. Ms. Jennifer Rogers of CDM met with Mr. Mongeon at the site on July 24, 2002.

In 1952 the ESC moved from the current Exeter Country Club location to the parcel now occupied by Osram/Sylvania. The ESC moved again in 1956 to the parcel it currently occupies. The existing rifle and trap ranges have been at the same location since 1974 (approx. 28 years). Photos of the existing rifle and trap ranges, taken during the July 24, 2002 site visit, are presented in Appendix B-1 of this memorandum (Photos 1 and 2). Between 1956 and 1974 (approx. 18 years), another location/orientation of the ranges on the current parcel may have been used. Anecdotal accounts suggest an historical trap range perpendicular to the existing trap range.

Lead shot was used at the trap range until 1986. The ESC currently uses bismuth, steel, and copper alloy shot at the trap range. Lead bullets are still in use at the rifle range. The ESC has historically recovered and recycled lead bullets from the rifle range soil berm (estimated every 6 to 10 years). The last screening of the rifle range soil berm was in 1995. To the best of recollections, the ESC believes the majority of the current rifle range soil berm may have been moved from a previous rifle range location.

According to the Town, the Club is scheduled to move from the site at the end of the year 2002. If conditions allow, the ESC would like to re-use the current berm at their new location.

2.2 Aerial Photographs

In order to gain additional understanding of the history of the site, aerial photographs of the site area were obtained from the Rockingham County Conservation District's Brentwood, New Hampshire office. Aerial photographs for the following years were obtained: 1943, 1952, 1962, 1974, 1985, 1992, and 1999. The aerial photographs appear in Appendix B-2 of this memorandum. For reference, the location of the Exeter Reservoir, Portsmouth Avenue, and the approximate location of the site are indicated on each photo. The aerial photographs indicate the following:

- The site appears wooded in 1943.
- The site is essentially cleared in 1952. As noted above, in 1952 the ESC began using the parcel, now occupied by Osram/Sylvania, adjacent to the site. Although no other documented evidence exists, the portion of the cleared area in the southern portion of the site adjacent to the Exeter Reservoir appears characteristic of a trap range. If this was a former trap range, based on the shape of the clearing, it appears shooting would have occurred in the southeast direction. This orientation is consistent with the verbal descriptions by members of the ESC indicating the existence of an historical trap range that was remembered to be perpendicular to the existing trap range such that shot paths would have crossed.
- The site appears to have experienced revegetation by 1962 (photo clarity poor).
- The current rifle and trap ranges are evident in 1974. This coincides with the year indicated by the ESC that these ranges were established. The 1974 photograph also indicates the newly constructed industry (Osram/Sylvania) to the northwest of the site, as well as the appearance of a plateau area where filling appears to have occurred at the site. At the time of this memorandum, the source of the fill is not known. It is hypothesized the fill may be associated with construction of the Osram/Sylvania facility. The plateau area is now vegetated (see Photo 3 in Appendix B-1 of this memorandum).

- The site remains essentially unchanged in aerial photographs for 1974, 1985, 1992, and 1999, except for increased vegetation.

3.0 Regulations and Guidance

During the Phase 2 WTP Preliminary Design, the New Hampshire Department of Environmental Services (NHDES) contacted the Town of Exeter to discuss the presence of lead at the site of the proposed WTP and to offer guidance. Ms. Victoria Del Greco, Exeter Water/Sewer Superintendent, and CDM personnel, Mr. Alan LeBlanc and Ms. Jennifer Rogers, met with Mr. John Liptak, NHDES, on August 15, 2002. The minutes of the meeting are presented in a Meeting Summary, dated August 19, 2002, which is included in Appendix B-3 of this memorandum.

As suggested by Mr. Liptak during the August 15, 2002 meeting, CDM reviewed NHDES guidance on Activity and Use Restrictions (AUR)- deed restriction- and, the Best Management Practices for Lead at Outdoor Shooting Ranges manual from the Environmental Protection Agency (EPA) Region 2 (EPA-902-B-01-001, January 2001). CDM also reviewed the NHDES Risk Characterization and Management Policy (RCMP).

In addition, CDM spoke with both Mr. John Keating and Ms. Elizabeth Callahan of the Massachusetts Department of Environmental Protection (MADEP), Mr. Richard Patterson, Executive Director of the National Shooting Sports Foundation (NSSF), and Mr. Steve Hill, Program Advisor for the Small Arms Firing Range Remediation Team of the Interstate Technology Regulatory Council (ITRC). Mr. Keating and Ms. Callahan discussed lead shot initiatives in Massachusetts and provided insight on EPA regulations; Mr. Patterson identified potential resources for lead reclaimers/recyclers; and, Mr. Hill provided CDM access to a draft of the technical/regulatory guidance document, "Characterization & Remediation of Soils at Small Arms Firing Ranges," which will be issued by ITRC. Mr. Hill also noted that free Internet training on the ITRC document is scheduled to be available in two months. CDM reviewed these identified sources and other related documents.

The following paragraphs summarize information in key documents:

3.1 New Hampshire Risk Characterization and Management Policy (RCMP)

Background and Method 1 soil standards for lead provided in the NHDES RCMP were used as benchmarks or reference points for evaluating the analytical results. The RCMP provides standards and protocol for the cleanup of sites contaminated with oil and/or hazardous materials. Method 1 of the RCMP provides tables of conservative risk-based soil standards that incorporate both the potential risk of harm resulting from direct exposure to contaminants in soil and the potential impacts to groundwater. Typically there are three categories of soils (S-1, S-2, and S-3) and an associated numerical standard tied to an

anticipated exposure potential. The applicable soil category becomes important when reviewing the potential for Activity and Use Restrictions at a site.

Activity and Use Restrictions (AUR)
AURs are required at sites where the restriction of activities and uses is needed in order to achieve or maintain protection of human health and/or the environment. According to RCMP guidance, AUR is applicable to sites where the risk characterization is based on Method 1 soil standards and the exposure point concentration of contaminants exceeds the S-1 standards but meets applicable S-2 and S-3 standards. However, for lead, the Method 1, S-1, S-2, and S-3 soil standards are all set at 400 milligrams per kilogram (mg/kg). According to the RCMP, the screening level of 400 mg/kg has been set for lead based on the Environmental Protection Agency's (EPA) "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities" (USEPA, 1984). EPA has since adopted this value as acceptable for unrestricted use, such as residential areas where children may play.

3.2 Best Management Practices for Lead at Outdoor Shooting Ranges

The Best Management Practices for Lead at Outdoor Shooting Ranges manual from the EPA Region 2 (EPA-902-B-01-001, January 2001), which is now considered national guidance, is intended for use by outdoor shooting ranges. The manual describes the practices that ranges can adopt for the safe management of lead shot and bullets. One of the best management practices (BMPs), lead reclamation, may be a potential method for remediating select areas of the Exeter site. With respect to reclaiming lead, the manual states:

- Removal contractors or reclaimers should apply standard best management practices to separate lead from soil. The soil, if then placed back on the range, is exempt from RCRA. However, if the soil is to be removed off-site, then it would require testing to determine if it is a RCRA hazardous waste.

- Lead, if recycled or reused, is considered a scrap metal and is, therefore, excluded from RCRA.

The reclamation approach would particularly apply to bermed areas containing spent bullets.

Other BMPs specific to preventing lead migration include the following:

- Monitoring and adjusting soil pH, which includes recommended annual soil pH monitoring and addition of lime as required.

- Immobilizing lead, which includes phosphate addition to bind the lead particles.

- Controlling runoff, which includes vegetative ground cover, which already exists at the site.

3.3 Massachusetts Lead Shot Initiative

As suggested by the NHDES, to gain a perspective on other states' approaches to lead shot management, CDM spoke with DEP personnel from neighboring State of Massachusetts.

The Massachusetts lead shot initiative is a program primarily developed to assist active shooting ranges with best management practices (BMPs) for lead shot.

According to the MADEP, few ranges in Massachusetts have been remediated, most remain active and implement BMPs. This is primarily because there are currently no regulations that require remediation of an active shooting range since the range is still serving its intended use. In addition, the costs for remediation can be substantial and most sportsmen's clubs do not have the financial resources available to remediate a range. Therefore, it is financially more beneficial for a shooting range to remain active and operate using best management practices then to close. As soon as a shooting range closes, the site is subject to federal regulations identifying the site as a hazardous waste site and requiring remediation. It is important to distinguish between an active range that should use BMPs such as reclamation, and a closed range requiring remediation, although reclamation is a potential method for remediation.

Under this guidance, the MADEP suggested CDM recommend that the Town consider, if possible, the potential for limited continued use of the site as a rifle shooting range for the Town's police department. As an active shooting range, remediation of the site would not be required under the regulations, and the Town may be able to develop an approach to reuse of the site that would be less costly than complete remediation. For example, as an active range, the soils of the existing rifle range soil berm could be sifted for reclamation of lead, and reused as a rifle range berm in a more appropriate location of the parcel, away from WTP activities. In addition, soils contaminated with lead from the existing trap range can also be excavated, sifted for reclamation of lead, and reused to construct a rifle range berm in a more appropriate location of the parcel. BMPs would need to be developed for the site to prevent migration of lead to the Exeter Reservoir; and safety issues would need to be addressed. However, this alternative may minimize or even eliminate any off-site disposal of soil as a hazardous waste; only reclaimed lead would need to be taken off-site at a fraction of the cost of hazardous waste disposal. As noted above, reclaimed lead is not considered a hazardous waste and excluded from RCRA.

As a potential alternative similar to the one noted above, since the ESC has expressed interest in reusing the existing rifle range berm at their new location, the Town may consider being pro-active with NHDES and EPA Region 1 to allow transport of soils, which will need to be sifted for reclamation prior to transport, from the site, as a construction material, as opposed to a hazardous waste material. Although not specifically allowed under the current regulations, according to the MADEP and the ITRC, the EPA has expressed the potential for

this type of soil transport, although this will likely need to be considered by the EPA on a case-by-case basis and may or may not be approved.

3.4 Characterization & Remediation of Soils at Small Arms Firing Ranges

The "Characterization & Remediation of Soils at Small Arms Firing Ranges" draft document by the Small Arms Firing Range Remediation Team of the Interstate Technology Regulatory Council (ITRC), presents a decision matrix for determining how best to remediate lead and lead contaminated soils at small arms firing ranges. The decision tree defines the primary decision points and provides characteristics used to evaluate various lead soil remediation techniques. The first step on the decision tree is to determine the post remediation land use, which, for the Exeter site, is the proposed WTP. The second step on the decision tree is to determine site soil cleanup goals such as those noted in the NH RCMP.

CDM has performed a general review of many resources available for guidance on remediating the existing shooting ranges. Based on this review, and the results of the field investigation presented below, if the Town decides to proceed with siting of the WTP as proposed, CDM recommends the Town take a proactive approach with the NHDES and EPA Region 1 for determining acceptable remediation/ reclamation/ AUR strategies. Rather than solely using bulk soil removal to remediate the site, some combination of reclamation, limited reuse, implementation of best management practices, removal or on site capping and containment may be an appropriate response.

4.0 Field Investigation

To examine the extent of lead in the soils at the site, CDM performed soil sampling and analysis. The Town also performed surface water sampling of the Exeter Reservoir adjacent to the ESC.

4.1 Soil Sampling

To determine the approximate aerial and vertical extent of lead in soils, sampling areas were selected as follows:

- Sampling on a grid in the area of the existing trap range (PR-1 through PR-14);
- Three samples (B-1, B-2, B-3) from the existing rifle range soil berm;
- Two samples (WTL-1, WTL-2) from a downgradient wetland associated with the Exeter Reservoir in the southeastern corner of the site; and,
- Samples from specific areas where WTP-related construction is proposed (WTP-1 through WTP-5).

In addition, prior to sampling, CDM personnel performed a site reconnaissance in an effort to locate the historical trap range. CDM personnel searched for distinguishing features of this type of range, including old pavement potentially indicating a target shooting platform, marker poles indicating the limits of shooting, and piles of broken clay pigeons typically located near the marker poles. Photo 4 presented in Appendix B-1 of this memorandum depicts a marker pole and associated pile of broken clay pigeons at one of the far corners of the existing trap range. The only potential evidence of the historic range that surfaced during site reconnaissance was a small area of pavement, mostly buried with surficial soils and grass, on the north side of the existing rifle range.

The attached Lead Sampling Location Plan, Figure 1 (see Appendix B-4 of this memorandum), presents the approximate sample locations with respect to various site features and proposed locations for WTP structures.

To examine the vertical extent of lead in the areas of the existing trap range and proposed WTP structures, soil samples were collected from predetermined depth intervals at select locations. Samples were collected from the following depth intervals: 0 to 3 inches below ground surface (bgs); 3 to 9 inches bgs; 9 to 15 inches bgs; and, 15 to 27 inches bgs. For samples representing the 0- to 3-inch depth, sample IDs are followed by '0', for example PR-1-0; for samples representing the 3- to 9-inch depth, sample IDs are followed by '3', for example PR-1-3; and so forth.

Soil sampling was performed by CDM on August 6 and 11, 2002. Samples were collected using a shovel and sampling spoon. Sampling tools were cleaned and decontaminated between each sample collection using distilled water. Care was taken to minimize cross contamination between various sample locations, as well as samples collected at depth.

Select photographs depicting sample locations of interest are presented in Appendix B-1 of this memorandum as follows:

- Photo 5 depicts sampling location B-2 from the existing rifle range soil berm.
- Photo 6 depicts sampling location WTL-2 from the wetland area associated with the Exeter Reservoir located in the southeastern corner of the site.
- Photo 7 depicts old (white/gray) broken clay pigeons that were found beneath surface soils at sampling location PR-1. The layer of broken clay pigeons was found from approximately 4 inches to 15 inches below the ground surface.
- Photo 8 depicts newer (orange) broken clay pigeons in the area of sampling location PR-5. Sample location PR-5 was located approximately 50 feet behind the pile of broken clay

pigeons depicted in Photo 4. A 6-inch layer of broken clay pigeons existed on the surface at location PR-5.

- Photo 9 depicts sampling location PR-6. At this location there was no evidence of broken clay pigeons.

- Photo 10 depicts sampling location PR-13. Scattered newer (orange) broken clay pigeons were found on the ground surface in the area of PR-13.

4.2 Soil Sample Analysis

All soil samples collected were analyzed for percent moisture and lead, using EPA approved Methods D2216 and SW-846-3051/6010, respectively. Based on these test results, four samples were selected for additional lead analysis using the Toxicity Characteristic Leaching Procedure (TCLP), EPA approved Method SW-1311/6010B. The TCLP is used to identify whether or not a waste is classified as a hazardous waste. This classification would become applicable if the soil were to be removed for off-site disposal or reuse.

CDM contracted with AMRO Environmental Laboratories Corp. of Merrimack, New Hampshire, to perform the laboratory analyses. The analytical results are summarized in Tables 1 and 2a-d. The tables are included in Appendix B-5 of this memorandum. The laboratory reports are included in Appendix B-6 of this memorandum. Copies of the Chain of Custody forms are also included with the laboratory reports.

4.3 Surface Water Sampling

The Town collected surface water samples from the Exeter Reservoir, adjacent to the ESC. One sample was collected on each of the following three days: September 16, 18, and 20, 2002. Samples were analyzed using EPA Method 3113B. Seacoast Analytical Services of Durham, New Hampshire analyzed the surface water samples. A copy of the sample results is included in Appendix B-6 of this memorandum.

5.0 Results

Table 1 summarizes all analytical results. A total of 38 samples (including those at depth) were collected from the area of the existing trap range (PR-1 through PR-14), three samples were collected from the rifle range soil berm (B-1, B-2, B-3), two samples were collected from a downgradient wetland associated with the Reservoir (WTL-1, WTL-2), and ten samples (including those at depth) were collected from select areas where WTP structures are proposed (WTP-1 through WTP-5). The sample results provide the range of lead concentrations present with depth but do not fully indicate the horizontal extent as described below.

Tables 2a through 2d summarize the analytical results with respect to depth for the areas of the existing trap range and proposed WTP structures (i.e., Table 2a represents analytical results for those samples collected at the 0- to 3-inch depth, Table 2b represents analytical results for those samples collected at the 3- to 9-inch depth, etc.). Of the 38 samples collected from the area of the existing trap range: 12 samples were at the 0- to 3-inch depth, 13 samples were at the 3- to 9-inch depth, 12 samples were at the 9- to 15-inch depth, and one sample was at the 15- to 27-inch depth. A total of 10 samples were collected from areas where WTP structures are proposed, with 5 samples at the 0- to 3-inch depth and 5 samples at the 3- to 9-inch depth. Figures 2a through 2d depict the analytical results on the site plan with respect to depth (i.e. Figure 2a represents analytical results for those samples collected at the 0 to 3 inch depth, Figure 2b represents analytical results for those samples collected at the 3 to 9 inch depth, etc.). Figure 2a also depicts the approximate location of the surface water samples collected by the Town.

The analytical results for lead were compared to the NHDES RCMP background concentration for lead in soil of 51 mg/kg, and the NHDES RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg.

5.1 Rifle Range Soil Berm

As presented in Table 1 for samples collected from the rifle range soil berm (samples B-1, B-2, and B-3):

- All three of the samples have lead concentrations above 51 mg/kg, with two of the samples having lead concentrations above 400 mg/kg (B-2 and B-3).

5.2 Wetlands

As presented in Table 1 for the samples collected from a downgradient wetland associated with the Reservoir located in the southeastern corner of the site (WTL-1, WTL-2):

- Both of the samples have lead concentrations above 400 mg/kg.

5.3 Existing Trap Range

As presented in Tables 2a through 2d for samples collected from the area of the existing trap range (samples PR-1 through PR-14):

- Of the 12 samples collected at the 0- to 3-inch depth, all of the samples, except one (PR-8), have lead concentrations above 51 mg/kg, with 6 of those samples having lead concentrations above 400 mg/kg (PR-5, 6, 11, 12, 13, and 14).

- Of the 13 samples collected at the 3- to 9-inch depth, 6 samples have lead concentrations above 51 mg/kg (PR-1, 4, 5, 11, 12, 13), with only one sample having a lead concentration above 400 mg/kg (PR-12).

- Of the 12 samples collected at the 9- to 15-inch depth, two samples have lead concentrations above 51 mg/kg (PR-1 and 12), with only one sample having a lead concentration above 400 mg/kg (PR-1).

- The lead concentration in the sample (PR-1) collected at the 15- to 27-inch depth is 4.7 mg/kg, well below the general background threshold value.

- Most of the samples were found to have lead concentrations less than 4,000 mg/kg, however, three samples had higher lead concentrations ranging from 230,000 to 280,000 mg/kg. Lead concentrations ranging from 230,000 to 280,000 mg/kg represent samples that are composed of 23 to 28 *percent* lead.

At all sample locations with lead concentrations equal to or above 400 mg/kg, except for PR-14, a sample was collected from the next sampling depth interval. A ground beehive prevented further sampling at the PR-14 location.

5.4 Proposed WTP Structure Areas

As presented in Tables 2a through 2d for samples collected from select proposed WTP structure areas (samples WTP-1 through WTP-5):

- None of the 10 samples collected have lead concentrations above 400 mg/kg.

- Of the 5 samples collected at the 0- to 3-inch depth, two of the samples have lead concentrations above 51 mg/kg.

- None of the 5 samples collected at the 3- to 9-inch depth have lead concentrations above 51 mg/kg.

5.5 TCLP Lead

Based on the analytical results for lead using EPA Method 3051, four samples (B-2, PR-6-0, PR-14-0, and WTL-2) were selected for analysis of lead using TCLP, EPA Method 1311. According to the NHDES RCMP, the regulatory level for TCLP-lead is 5.0 milligrams per liter (mg/L). Any materials having a TCLP-lead result at or above 5 mg/L that are brought off-site would need to be transported as hazardous materials.

Two of the four samples analyzed using TCLP for lead are above the regulatory level (B-2 at 680 mg/L and PR-6-0 at 460 mg/L). The TCLP results indicate that the soils of the rifle range soil berm appear to exhibit a greater toxicity characteristic leaching concentration of lead than

other comparable soils at the site. For example, when comparing B-2 sample results 1,600 mg/kg and 680 mg/L to PR-6-0 sample results 9,700 mg/kg and 460 mg/L, it might be expected that PR-6-0 would have a higher TCLP lead than B-2, however that is not the case. It should be noted that this is a limited data set and chunks of particulate lead may result in inconsistent concentration data between total and TCLP leachable lead.

The TCLP results for the soils of the rifle range berm may complicate the feasibility of moving this soil berm to a new off-site location. According to the regulations, if the soil berm is moved off-site, given the results of the TCLP for lead, the soil would be considered a hazardous waste. Off-site and/or on-site reuse considerations will need to be discussed with NHDES and EPA Region 1.

5.6 Surface Water of Exeter Reservoir

The analytical results for all three surface water samples collected from the Exeter Reservoir in September 2002 were all below the laboratory detection limit of 0.005 mg/L. The EPA Action Level for lead in drinking water is 0.015 mg/L. The lead contamination does not appear to be impacting surface water.

6.0 Conclusion

As expected, soil lead contamination is concentrated in the shooting areas. Concentrations vary widely and as expected, lead is concentrated near the surface. While surface waters do not appear to be impacted, wetland soils have been impacted and the full extent has yet to be determined.

Therefore, soil lead contamination will be an issue during evaluation of the WTP siting concept (Siting Option "B" of the Phase 2 Preliminary Design). A location specific summary is provided below.

- *Contaminant Occurrence – Soils of Present-Day Trap Range.*
  The following summarizes the results of the soil sampling in the area of the existing trap range. Eleven of the twelve soil samples collected at the 0 to 3 inch depth had lead concentrations above the NHDES RCMP background concentration for lead in soil of 51 mg/kg. Six of those samples had lead concentrations exceeding the NHDES RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg (ranging from 420 mg/kg to 280,000 mg/kg). Below the top 3 inches of soil, concentrations of lead generally appear to decrease quickly with depth, indicating lead contamination is primarily surficial, occurring within the top 9 inches of the soil. Two of the samples were also analyzed for lead using the TCLP. One of the two TCLP-lead results (460 mg/L) significantly exceeds the NHDES RCMP maximum allowable concentration for lead of 5.0 mg/L. The TCLP results also indicate that, in areas of high contamination, the lead in the soil is relatively leachable , impacting remediation costs.

- *Contaminant Occurrence – Soils of Historical Trap Range.*
  Based on the buried layer of broken clay pigeons found at sampling location PR-1 and the elevated concentration of lead found within the buried layer of broken clay pigeons (1,900 mg/kg), it is possible the PR-1 sampling location is an indicator of an historical trap range oriented from west to east along the Exeter Reservoir, as may be hypothesized from the 1952 aerial photo and anecdotal accounts from members of the ESC. Surface soils at this location are below the NHDES RCMP Method 1 Soil Standard NH S-1 for lead, although above NHDES RCMP background concentration for lead in soil. The proposed WTP access road, which originally traveled through this area, has been re-routed given the findings of this study. Construction of the access road in this area would have likely disturbed these subsurface contaminated soils.

- *Contaminant Occurrence – Soils of Rifle Range Soil Berm.*
  The following summarizes the results of the rifle range soil berm soil sampling. All three of the soil samples collected from the soil berm had lead concentrations above the NHDES RCMP background concentration for lead in soil of 51 mg/kg. Two of those samples had lead concentrations exceeding the NHDES RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg (610 mg/kg and 1,600 mg/kg). One of the soil samples was collected from the side of the berm opposite the current rifle range, indicating the lead contamination in the berm is not localized to the area directly behind targets. One of the samples was also analyzed for lead using the TCLP. The TCLP-lead result (680 mg/L) significantly exceeds the NHDES RCMP maximum allowable concentration for lead. The TCLP result also indicates the lead in the soil is potentially mobile. Based on the TCLP result, if the soil is excavated for off-site disposal, the soil would be classified as a hazardous waste.

- *Contaminant Occurrence – Soils of Proposed WTP Structures.*
  The following summarizes the results of the soil sampling in the area of proposed WTP structures. Only two of the ten soil samples collected had lead concentrations above the NHDES RCMP background concentration for lead in soil of 51 mg/kg (both 110 mg/kg). None of the samples had lead concentrations exceeding the NHDES RCMP Method 1 Soil Standard NH S-1 for lead. It is not anticipated that lead concentrations in soils will be a consideration for the proposed WTP structures.

- *Contaminant Occurrence – Wetland Sediments.*
  Significant concentrations of lead were detected in samples collected from the wetland in the southeast corner of the site indicating significant contaminant migration to this wetland. One of the samples was also analyzed for lead using the TCLP. The TCLP result was below the NHDES RCMP maximum allowable concentration for lead.

- *Contaminant Occurrence –Surface Water of Exeter Reservoir.*
  Surface water sampling indicates no impact at this time.

- *NHDES Guidance.*
  At this time, based on conversations with Mr. Liptak of NHDES, it is CDM's understanding that the NHDES will request remediation of all surficial soils associated with the existing trap range, all subsurface soils associated with the historical trap range, and the soils of the rifle range soil berm, having lead concentrations above the NHDES RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg.

- *Other Guidance.*
  Varied sources exist for guidance on BMPs for shooting ranges and remediation of closed ranges. Rather than solely using bulk soil removal to remediate the site, some combination of reclamation, limited reuse, implementation of best management practices, removal or on site capping and containment may be an appropriate response.

6.0 Recommendations

In consideration of the above investigations and information concerning the proposed site of the new Exeter WTP, CDM's recommendations are as follows:

- If the Town decides to proceed with siting of the WTP as proposed, it is clear that some level of remediation will be required in the area of the existing/historical ranges. The associated costs may be significant. Therefore, CDM recommends additional consideration and review of available resources (those listed above and any others) and consideration of shooting range remediation approaches adopted by other states/regulators: then take a proactive approach with the NHDES and EPA Region 1 for determining acceptable remediation, reclamation, Best Management Practices, or AUR strategies for reuse of the site for the WTP. Capping, reclamation, soil stabilization, isolation, risk based corrective action, and/or deed restrictions may be an appropriate response and less costly than treatment, excavation and off site disposal. For instance, other states allow for risk based corrective action approaches that would allow lead to be left in place in concentrations in excess of 1,000 mg/kg up to as high as 6,000 mg/kg.

- CDM recommends that a Phase 2 soil sampling program for lead be conducted within the limits of work for construction of the WTP. The purpose of such a program would be to minimize the potential for the discovery of lead contamination during construction. This will reduce the potential for costly change orders or unwitting removal of regulated material to an off site location.

- If the NHDES presses for remediation of the wetland area in the southeastern corner of the site, additional investigation would be recommended to determine the extent of contamination and examine the feasibility of remediation.

- If the NHDES presses for remediation of the buried historical trap range (only possible evidence is sample location PR-1), additional testing would be recommended to determine the extents of the subsurface contamination and examine the feasibility of remediation/ reclamation.

7.0 Costs for Remediation/Reclamation

Table 3, presented in Appendix B-5 of this memorandum, summarizes the opinion of probable costs for remediation of the rifle range soil berm and trap range. The opinion of probable remediation cost was developed by estimating the costs associated with the following:

- All surface soils with lead concentrations greater than 400 mg/kg are remediated;
- The area of the existing trap range to be remediated is approximately 0.8 acres;
- The 0.8 acre area of the existing trap range to be remediated will be cleared, without grubbing (grubbing would cause significant dispersal of contaminated soils);
- Removal and off-site disposal as a hazardous waste of the top 12 inches of soil in the 0.8-acre area of the existing trap range to be remediated;
- Removal and off-site disposal as a hazardous waste of the entire rifle range soil berm; and,
- Provision and placement of 4 inches of common fill and 8 inches of topsoil and seeding in the remediated areas.

As presented in Table 3, the opinion of probable cost for remediation of the rifle range soil berm and the existing trap range is approximately $450,000. This is an estimate for planning purposes only, since the horizontal limits of the lead contamination in the area of the existing trap range have not been established.

The following costs are not included:

- Remediation, if required, of the buried historical trap range. It is anticipated that the costs to remediate a buried historical trap range would be similarly costly as remediation/ reclamation of the existing trap range.
- Remediation of the wetland in the southeastern corner of the site.
- Additional sampling programs associated with the WTP construction area, wetland area, or historical trap range area.

An allowance of $1.0 million is also included in Table 3. This allowance represents potential remediation costs should remediation of the buried historical trap range and wetland in the southeastern corner of the site be required in addition to remediation of the rifle range soil berm and existing trap range.

The costs associated with removal and disposal of all lead contaminated soils at the site are substantial and the horizontal extent is not fully delineated. Reclamation exists as a possibility and although sending soils off-site for reclamation is typically cheaper than disposal (may be as little as $55/ton for reclamation compared to $140/ton for disposal), costs will depend on the concentrations of lead in the material to be reclaimed and the value of lead at the time of reclamation. It is recommended that reclamation be considered as an alternative to disposal once the extent of required remediation at the site has been determined.

cc: Mr. William Swanson – CDM

Appendix B-1

Site Photos

Photo 1 – Existing Rifle Range and Associated Soil Berm (looking east)

Photo 2 – Existing Trap Range (looking east)

Photo 3 – Plateau Area

Photo 4 – Marker Pole and Pile of Broken Clay Pigeons (SE corner existing trap range)

Photo 5 – Existing Rifle Range Soil Berm (Sample Location B-2)

Photo 6 – Sample Location WTL-2

Photo 7 – Old Broken Clay Pigeons Beneath Surface Soils (Sample Location PR-1)

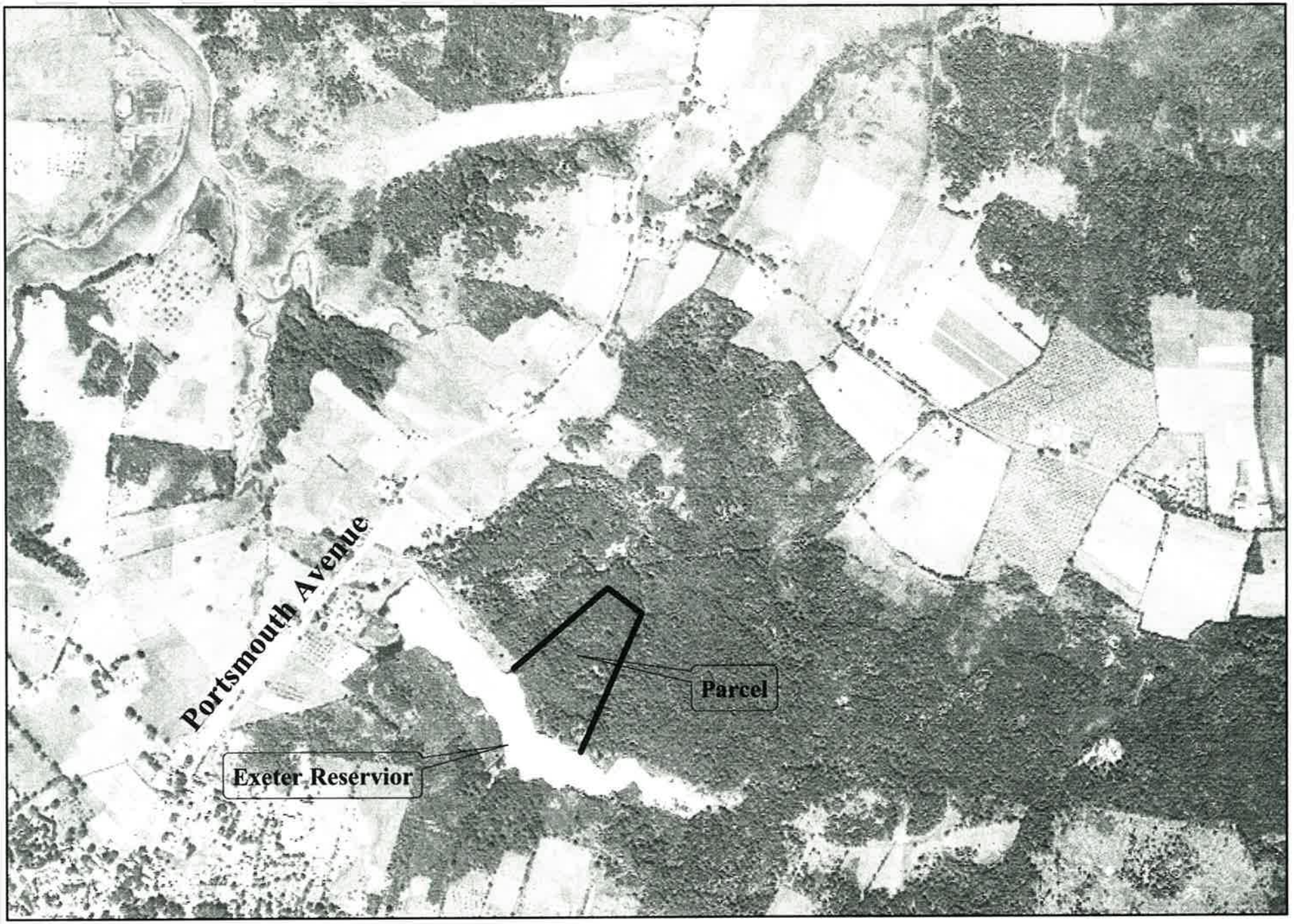
Photo 8 – Sample Location PR-5

Photo 9 – Sample Location PR-6

Photo 10 – Sample Location PR-13

Appendix B-2

Aerial Photos

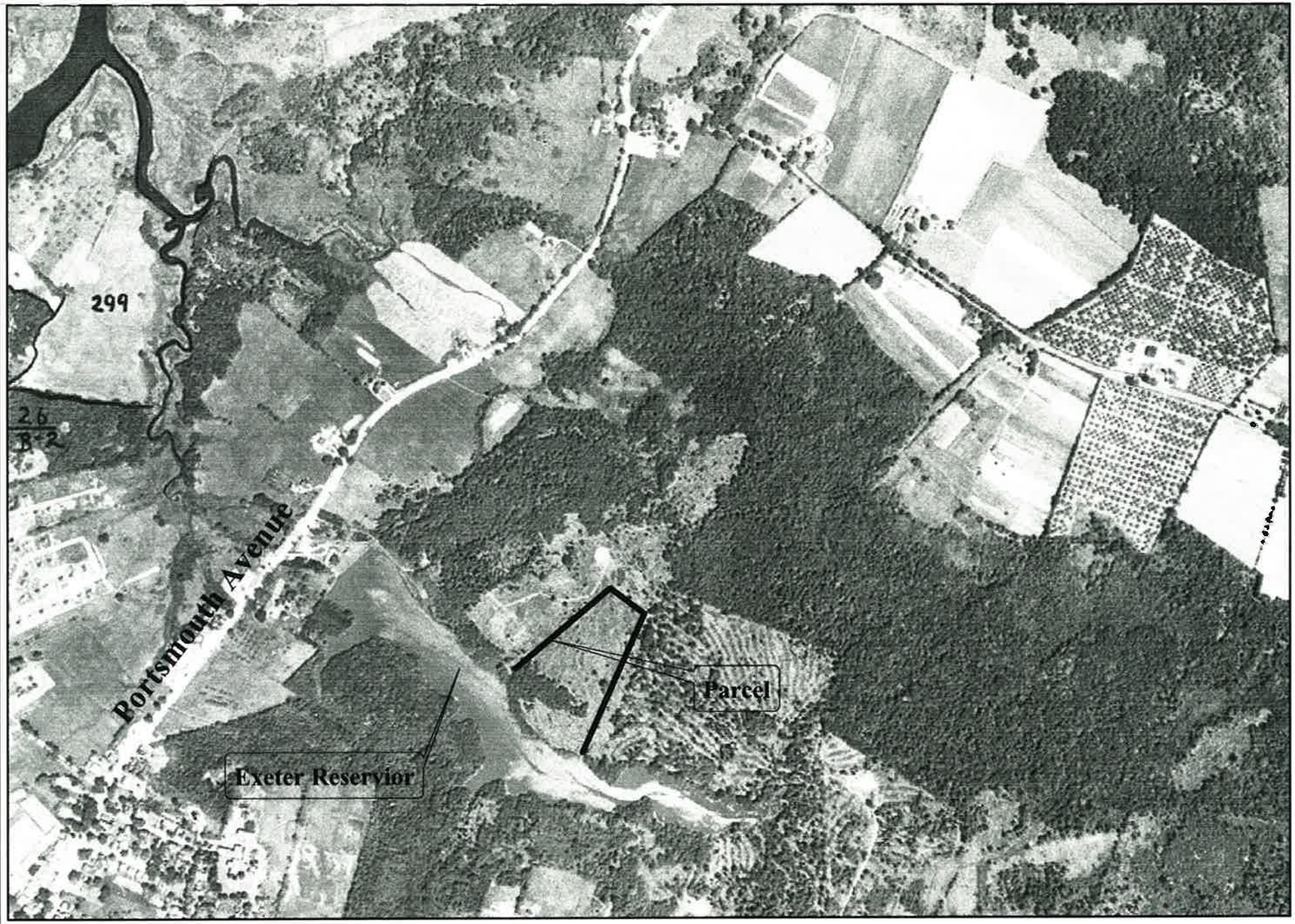


CDM

N

Approximate Scale
1 Inch = 1100 Feet

Aerial Photograph
1943



CDM

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Approximate Scale
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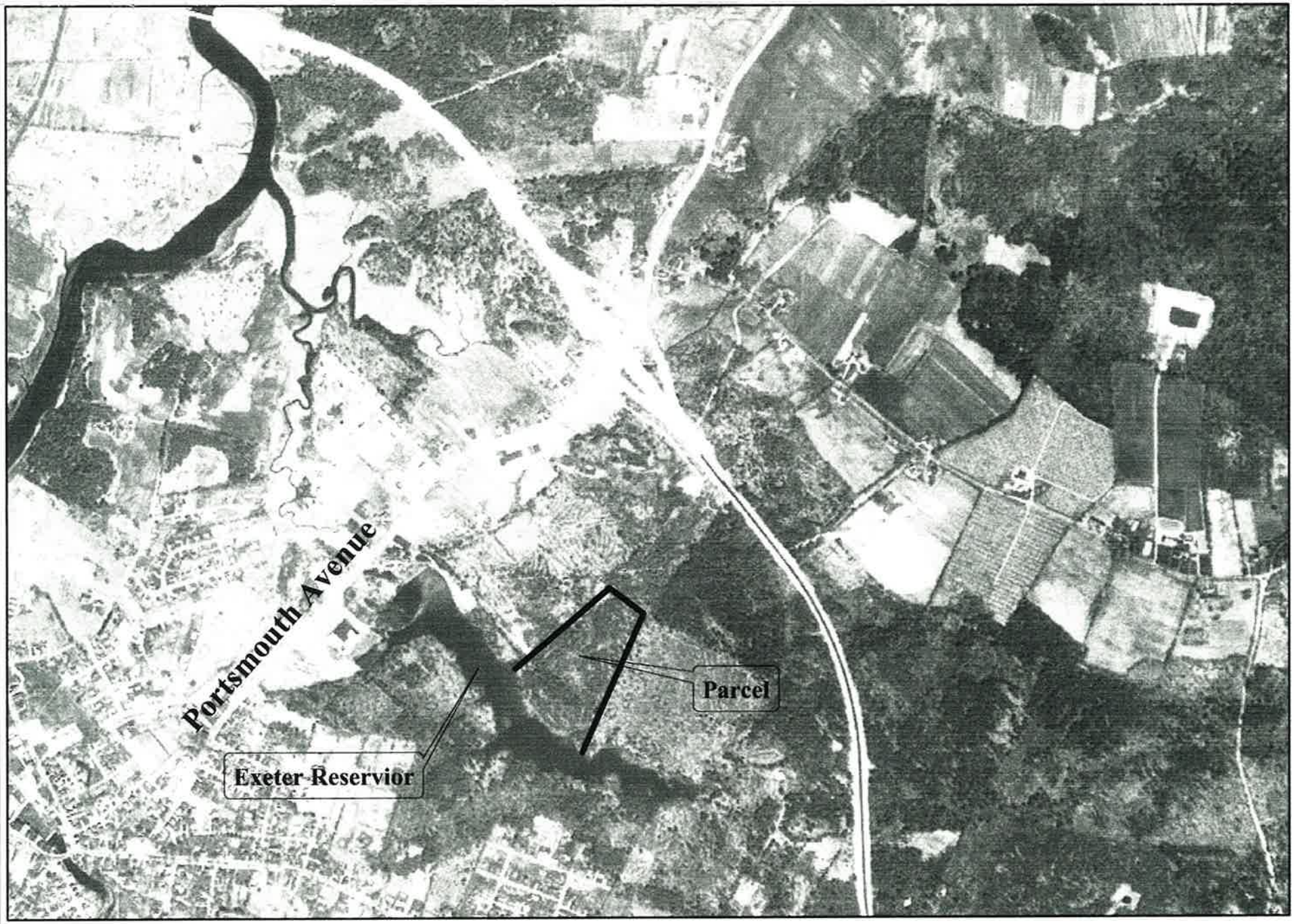
Aerial Photograph
1952



CDM

Approximate Scale
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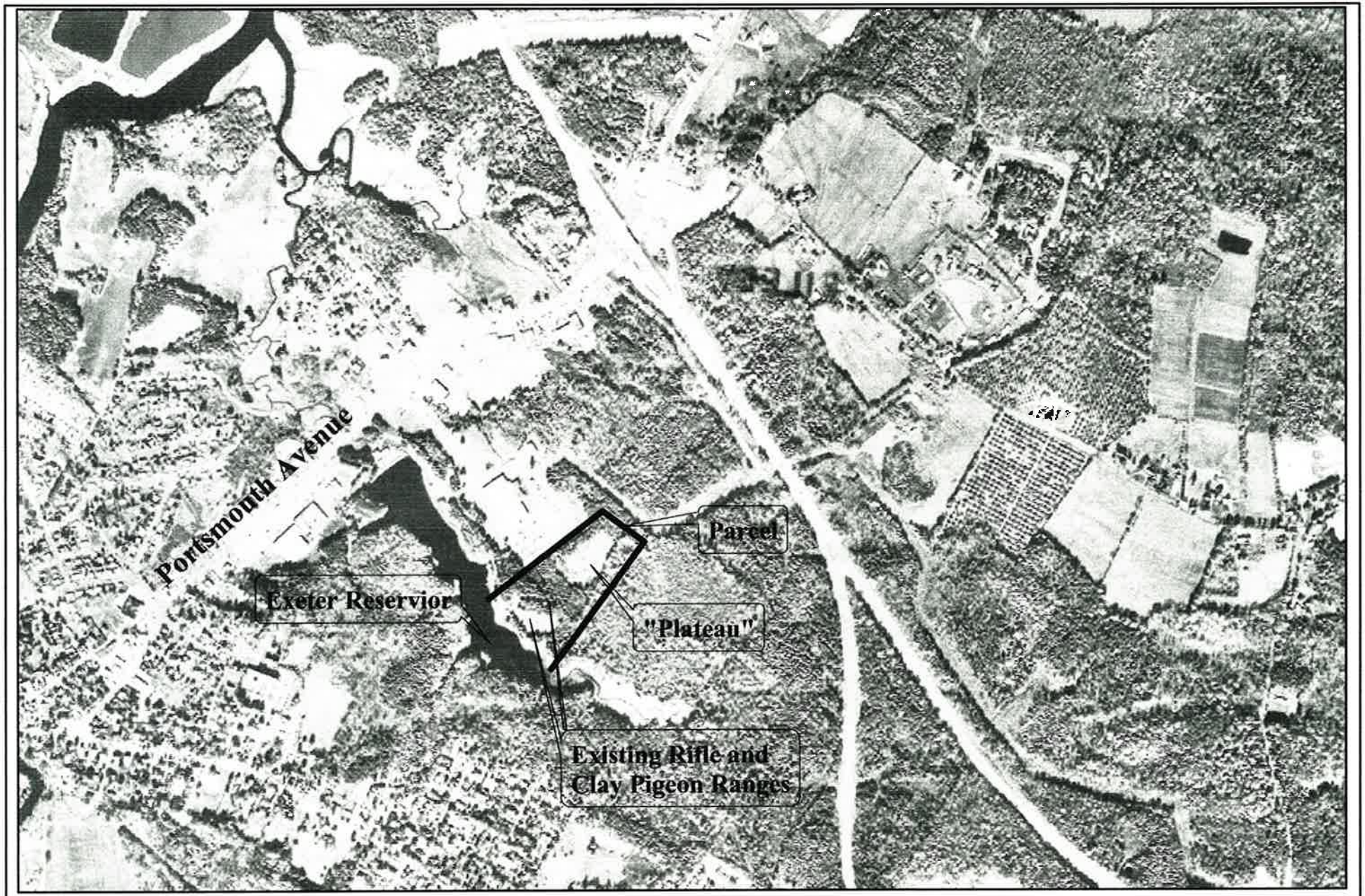
Aerial Photograph
1962



CDM

N

Approximate Scale
1 Inch = 1100 Feet

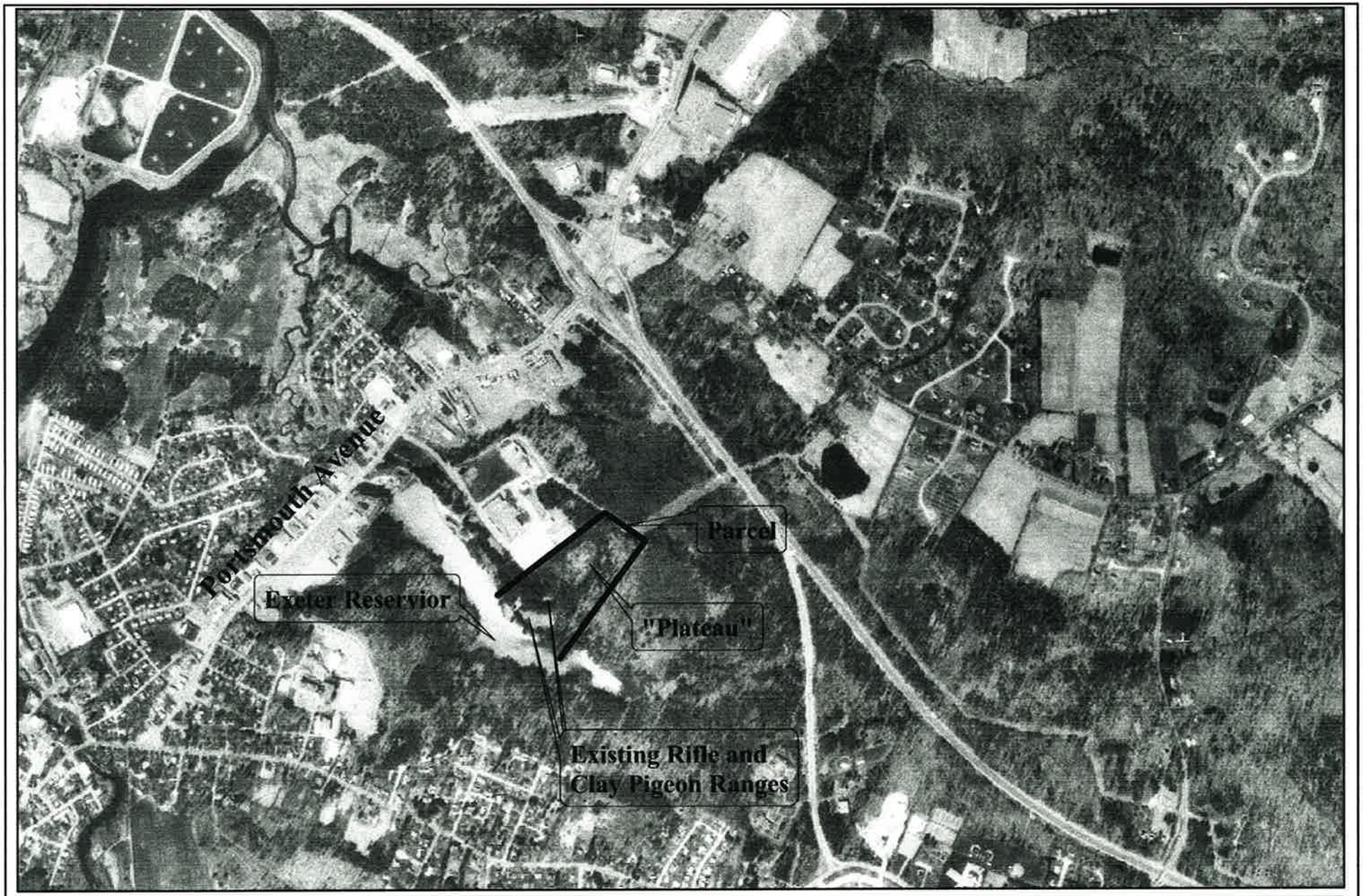
Aerial Photograph
1974

CDM

N

Approximate Scale
1 Inch = 1100 Feet

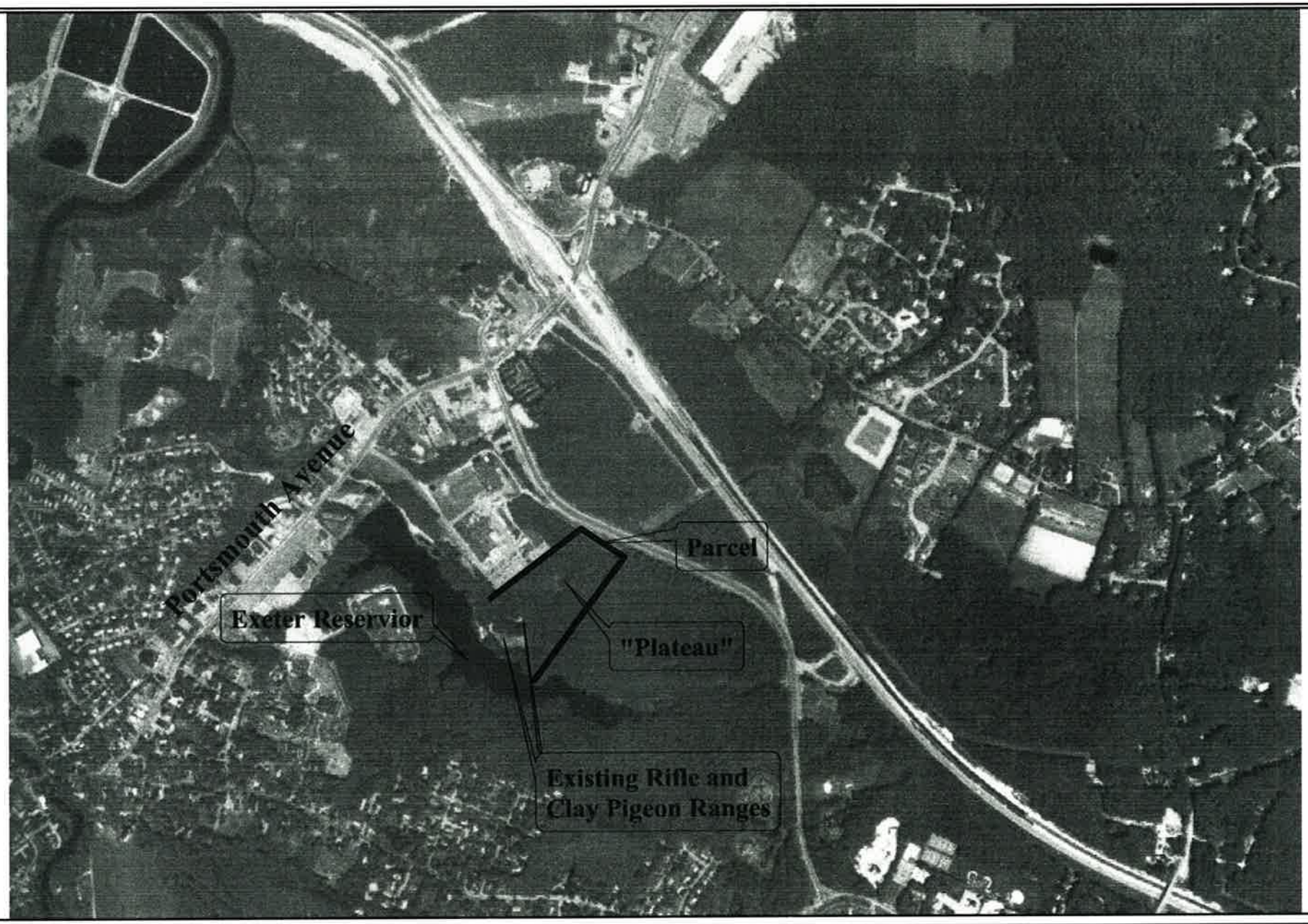
Aerial Photograph
1985



CDM

Approximate Scale
1 Inch = 1100 Feet

Aerial Photograph
1992



CDM

N

Approximate Scale
1 Inch = 1100 Feet

Aerial Photograph
1999

Appendix B-3

August 15, 2002 Meeting Summary

CDM

MEETING SUMMARY

TOWN OF EXETER, NEW HAMPSHIRE
PHASE 2 PRELIMINARY DESIGN OF NEW WATER TREATMENT PLANT

NHDES LEAD SHOT MEETING

MEETING DATE: August 15, 2002, 1:30 p.m. to 3:00 p.m.

LOCATION: NHDES, 6 Hazen Drive, Concord, NH

ATTENDANCE:

Exeter: Victoria Del Greco (Water/Sewer Superintendent)

NHDES: John F. Liptak

CDM: Al LeBlanc and Jennifer Rogers

NOTES PREPARED BY: Al LeBlanc, CDM

DATE OF NOTES: August 19, 2002

DISTRIBUTION: Victoria Del Greco (Exeter) and Jeff Diercks, Ed Nazaretian, Jennifer Rogers, Julie Simonton, and William Swanson (CDM)

PURPOSE OF MEETING

The purpose of this meeting was to present the WTP siting concept (Alternative 2 from Phase 1 Preliminary Design) directly to NHDES staff. As a WTP is proposed on the present-day site of the Exeter Sportsman's Club, the presence of lead shot is of concern to all. Upon seeing newspaper coverage of this aspect of the WTP project, NHDES contacted Exeter to suggest a meeting be held to discuss the topic.

DISCUSSION

Victoria introduced the overall project, the significance to the Town, and the project schedule. She indicated test pits would likely be dug "late next week". Victoria explained that soil samples had been taken by CDM recently, though the analytical test results (for lead concentration) were not yet in hand. CDM and the Town showed NHDES a plan which depicted the soil sampling locations.

CDM shared a brief overview of the site history, based on informal interviews with various parties. In general terms, the Club began using the site in the 1950s, and reportedly stopped using lead shot on the skeet range in approximately 1982. CDM stated that the Club indicated it recovers and recycles lead, and is likely to "take the rifle range berm with them" upon their departure from the site at the end of 2002.

NHDES urged CDM and the Town to obtain a copy of USEPA Region 2's Publication No. 902-B-01-001, "Best Management Practices for Lead at Outdoor Shooting Ranges", dated January 2001.

NHDES urged CDM and the Town to take surface water samples at the shoreline of the reservoir, in the ravine in the southeast corner of the site, and (if possible) in the marshy area in the center of the parcel. During test pit excavation, groundwater (if encountered) samples should also be collected. The samples should be analyzed for pH and lead.

NHDES advised the Town and CDM that worker exposure is likely to be an issue during WTP (and associated pipeline, ancillary facility, and roadway) construction. The Town and CDM noted that they have been discussing this matter for some time now.

NHDES advised the Town (if the Exeter Sportsman's Club does not remove the rifle range berm) to consider demolishing the berm, as children on bicycles would be attracted to it. Such bicycle activity would be considered a direct exposure hazard.

NHDES stated that if it is found that the lead is not mobile (i.e., not leaching out), but is still a direct exposure hazard, then the Town could consider writing up an "Activity and Use Restriction", for which NHDES has a sample format. This document would ultimately be attached to the property title for the reference of present and future owners of the subject parcel.

The group discussed methods to removing the lead from the site. On-site sifting of the berm materials could be performed, with the lead being hauled off and the remaining soil (if containing sufficiently low concentrations of lead) could remain on site.

NHDES indicated it knows of Massachusetts-based contractors who recycle lead, but it has not worked with any such New Hampshire-based firms.

CONCLUSION / UPCOMING EVENTS

To conclude the meeting, NHDES indicated that the Town and CDM appear to be proceeding appropriately. The soil sampling and analysis plan appear to be "quite adequate" at this stage, NHDES stated.

ACTION ITEMS

Exeter (Victoria Del Greco): Forward to John Liptak copies of the three recent newspaper articles from the Exeter News-Letter.

Exeter (Victoria Del Greco): Coordinate sampling and analysis of surface water along reservoir shoreline, in ravine, and in marshy area in the center of the parcel.

Exeter (Victoria Del Greco): When surface water and ground water analytical results are received, provide copies of results and sampling locations to NHDES and CDM.

CDM

Exeter (Victoria Del Greco): When soil analytical results are received, provide copies of results and sampling locations to NHDES.

NHDES (John Liptak): Forward to Exeter the names of Massachusetts lead recycling firms.

CDM or Exeter: When next speaking with Exeter Sportsman's Club representatives, ask when the practice of lead shot recovery and recycling began.

CDM: During test pit excavation, collect groundwater samples (if groundwater is encountered) from test pits. Samples shall be provided to Town for laboratory analysis.

CDM: Obtain a copy of USEPA Region 2's Publication No. 902-B-01-001, "Best Management Practices for Lead at Outdoor Shooting Ranges", dated January 2001.

ATTACHMENTS

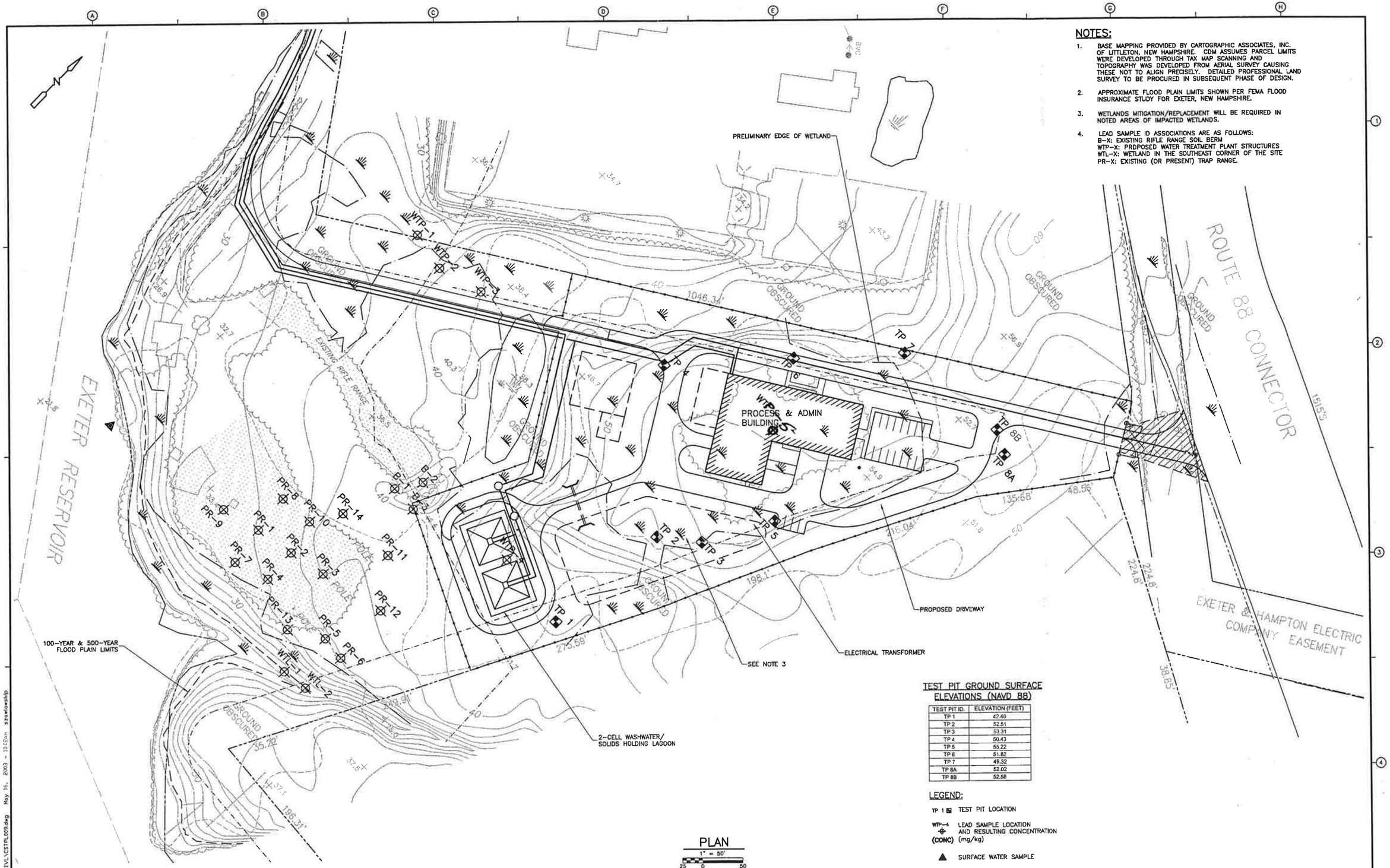
None.

Appendix B-4

Figures

NOTES:

1. BASE MAPPING PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. CDM ASSUMES PARCEL LIMITS WERE DEVELOPED THROUGH TAX MAP SCANNING AND TOPOGRAPHY WAS DEVELOPED FROM AERIAL SURVEY CAUSING THESE NOT TO ALIGN PRECISELY. DETAILED PROFESSIONAL LAND SURVEY TO BE PROCURED IN SUBSEQUENT PHASE OF DESIGN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUDY FOR EXETER, NEW HAMPSHIRE.
3. WETLANDS MITIGATION/REPLACEMENT WILL BE REQUIRED IN NOTED AREAS OF IMPACTED WETLANDS.
4. LEAD SAMPLE ID ASSOCIATIONS ARE AS FOLLOWS:
   B-X: EXISTING RIFLE RANGE SOIL BERM
   WTP-X: PROPOSED WATER TREATMENT PLANT STRUCTURES
   WTL-X: WETLAND IN THE SOUTHEAST CORNER OF THE SITE
   PR-X: EXISTING (OR PRESENT) TRAP RANGE.



PLAN
1" = 50'
25 0 50

TEST PIT GROUND SURFACE ELEVATIONS (NAVD 88)

TEST PIT ID.	ELEVATION (FEET)
TP 1	42.40
TP 2	52.51
TP 3	53.31
TP 4	50.43
TP 5	55.22
TP 6	51.82
TP 7	49.32
TP 8A	52.02
TP 8B	52.58

LEGEND:

- TP 1 ⊠ TEST PIT LOCATION
- WTP-4 ⊕ (CONC) LEAD SAMPLE LOCATION AND RESULTING CONCENTRATION (mg/kg)
- ▲ SURFACE WATER SAMPLE

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: N.CAMPBELL
SHEET CHK'D BY: A. LEBLANC
CROSS CHK'D BY: J.DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

LEAD SAMPLING AND TEST PITS
LOCATION PLAN

PROJECT NO. 0280-36493
FILE NAME: \CIVL\CSTPL009
FIGURE NO. 1
0280-XXXXX

C:\Projects\0280\36493\CIVL\CSTPL009.dwg May 06, 2003 - 10:02am szaniewskip

NOTES:

1. BASE MAPPING PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. COM ASSUMES PARCEL LIMITS WERE OEVELOPEO THROUGH TAX MAP SCANNING ANO TOPOGRAPHY WAS OEVELOPED FROM AERIAL SURVEY CAUSING THESE NOT TO ALIGN PRECISELY. DETAILEO PROFESSIONAL LAND SURVEY TO BE PROCUREO IN SUBSEQUENT PHASE OF DESIGN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUOY FOR EXETER, NEW HAMPSHIRE.
3. WETLANOS MITIGATION/REPLACEMENT WILL BE REQUIREO IN NOTEO AREAS OF IMPACTEO WETLANDS.
4. LEAD SAMPLE IO ASSOCIATIONS ARE AS FOLLOWS:
   B-X: EXISTING RIFLE RANGE SOIL BERM
   WTP-X: PROPOSED WATER TREATMENT PLANT STRUCTURES
   WTL-X: WETLAND IN THE SOUTHEAST CORNER OF THE SITE
   PR-X: EXISTING (OR PRESENT) TRAP RANGE.

PRELIMINARY EDGE OF WETLAND

WTP-1 (12)
WTP-2 (22)
WTP-3 (110)
WTP-4 (110)
WTP-5 (11)
PROCESS & ADMIN BUILDING
WTL-1 (420)
WTL-2 (2,800) (3,300)
B-1 (1,600)
B-2 (61)
B-3 (610)
PR-1 (53)
PR-2 (130)
PR-3 (270)
PR-4 (NA)
PR-5 (280,000)
PR-6 (9,700)
PR-7 (63)
PR-8 (15)
PR-9
PR-10 (160)
PR-11 (1,400)
PR-12 (230,000)
PR-13
PR-14 (970)
TP 1
TP 2
TP 3
TP 4
TP 5
TP 6
TP 7
TP 8A
TP 8B
GROUND OBSCURED
EXISTING RIFLE RANGE
POLE
1046.34'
135.68'
48.56'
216.04'
198.1'
224.8'
275.58'
196.31'
35.20'
38.65'
ROUTE 88 CONNECTOR
EXETER RESERVOIR
EXETER & HAMPTON ELECTRIC COMPANY EASEMENT
PROPOSED DRIVEWAY
ELECTRICAL TRANSFORMER
SEE NOTE 3
2-CELL WASHWATER/ SOLIDS HOLDING LAGOON
100-YEAR & 500-YEAR FLOOD PLAIN LIMITS

TEST PIT GROUND SURFACE ELEVATIONS (NAVD 88)

TEST PIT ID.	ELEVATION (FEET)
TP 1	42.40
TP 2	52.51
TP 3	53.31
TP 4	50.43
TP 5	55.22
TP 6	51.82
TP 7	49.32
TP 8A	52.02
TP 8B	52.58

LEGEND:

- TP 1 ⊠ TEST PIT LOCATION
- WTP-4 ⊕ LEAD SAMPLE LOCATION AND RESULTING CONCENTRATION (CONC) (mg/kg)
- ▲ SURFACE WATER SAMPLE

PLAN

APPROXIMATE SCALE 1"=113'

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: N. CAMPBELL
SHEET CHK'D BY: A. LEBLANC
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

LEAD SAMPLING RESULTS
0-3 INCH SAMPLE DEPTH

PROJECT NO. 0260-36493
FILE NAME: \CIVL\CSTPLD10
FIGURE NO. 2A
0260-XXXXX

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NOTES:

1. BASE MAPPINC PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. CDM ASSUMES PARCEL LIMITS WERE DEVELOPED THROUGH TAX MAP SCANNING AND TOPOGRAPHY WAS DEVELOPED FROM AERIAL SURVEY CAUSINC THESE NOT TO ALIGN PRECISELY. OETAILED PROFESSIONAL LAND SURVEY TO BE PROCURED IN SUBSEQUENT PHASE OF DESICN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUOY FOR EXETER, NEW HAMPSHIRE.
3. WETLANDS MITIGATION/REPLACEMENT WILL BE REQUIRED IN NOTED AREAS OF IMPACTED WETLANDS.
4. LEAD SAMPLE ID ASSOCIATIONS ARE AS FOLLOWS:
   B-X: EXISTINC RIFLE RANGE SOIL BERM
   WTP-X: PROPOSEO WATER TREATMENT PLANT STRUCTURES
   WTL-X: WETLANO IN THE SOUTHEAST CORNER OF THE SITE
   PR-X: EXISTING (OR PRESENT) TRAP RANCE.

PRELIMINARY EDGE OF WETLAND

EXETER RESERVOIR

ROUTE 88 CONNECTOR

EXISTING RIFLE RANGE

CONTROL & ADMIN BUILDING

WTP-1 (6)
WTP-2 (13)
WTP-3 (43)
WTP-4 (20)
WTP-5 (8)

PR-1 (330)
PR-2 (19)
PR-3 (19)
PR-4 (21)
PR-5 (250)
PR-6 (20)
PR-7 (89)
PR-8 (37)
PR-9
PR-10 (18)
PR-11 (140)
PR-12 (260,000)
PR-13 (175)
PR-14 (6)

WTL-1
WTL-2

TP 1
TP 2
TP 3
TP 5
TP 6
TP 7
TP 8A
TP 8B

GROUND OBSCURED

1046.34'
275.59'
198.1'
216.04'
135.68'
46.55'
224.8'
38.85'
196.31'
35.22'

100-YEAR & 500-YEAR FLOOD PLAIN LIMITS

PROPOSED DRIVEWAY

ELECTRICAL TRANSFORMER

SEE NOTE 3

2-CELL WASHWATER/ SOLIDS HOLDING LAGOON

EXETER & HAMPTON ELECTRIC COMPANY EASEMENT

TEST PIT GROUND SURFACE ELEVATIONS (NAVD 88)

TEST PIT ID.	ELEVATION (FEET)
TP 1	42.40
TP 2	52.51
TP 3	53.31
TP 4	50.43
TP 5	55.22
TP 6	51.82
TP 7	49.32
TP 8A	52.02
TP 8B	52.58

LEGEND:

TP 1 ⊠ TEST PIT LOCATION

WTP-4 ⊕ LEAD SAMPLE LOCATION AND RESULTING CONCENTRATION (CONC) (mg/kg)

PLAN
1" = 50'
25 0 50

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: N. CAMPBELL
SHEET CHK'D BY: A. LEBLANC
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

LEAD SAMPLING RESULTS
3-9 INCH SAMPLE DEPTH

PROJECT NO. 0260-36493
FILE NAME: \CIVL\CSTPL01

FIGURE NO.
2B
0260-XXXXX

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NOTES:

1. BASE MAPPING PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. CDM ASSUMES PARCEL LIMITS WERE DEVELOPED THROUGH TAX MAP SCANNING AND TOPOGRAPHY WAS DEVELOPED FROM AERIAL SURVEY CAUSING THESE NOT TO ALIGN PREGISELY. DETAILED PROFESSIONAL LAND SURVEY TO BE PROCURED IN SUBSEQUENT PHASE OF DESIGN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUDY FOR EXETER, NEW HAMPSHIRE.
3. WETLANDS MITIGATION/REPLACEMENT WILL BE REQUIRED IN NOTED AREAS OF IMPACTED WETLANDS.
4. LEAD SAMPLE ID ASSOCIATIONS ARE AS FOLLOWS:
   B-X: EXISTING RIFLE RANGE SOIL BERM
   WTP-X: PROPOSED WATER TREATMENT PLANT STRUCTURES
   WTL-X: WETLAND IN THE SOUTHEAST CORNER OF THE SITE
   PR-X: EXISTING (OR PRESENT) TRAP RANGE.

PRELIMINARY EDGE OF WETLAND
WTP-1
WTP-2
WTP-3
WTP-4
WTP-5
CONTROL & ADMIN BUILDING
EXISTING RIFLE RANGE
GROUND OBSCURED
TP 1
TP 2
TP 3
TP 5
TP 6
TP 7
TP 8A
TP 8B
B-1
B-2
B-3
PR-1 (1,900)
PR-2 (27)
PR-3 (ND)
PR-4 (12)
PR-5 (30)
PR-6 (32)
PR-7 (9)
PR-8 (ND)
PR-9
PR-10 (15)
PR-11 (27)
PR-12 (200)
PR-13 (25)
PR-14
WTL-1
WTL-2
1046.3'
275.58'
198.1'
216.04'
135.68'
48.58'
224.8'
36.85'
196.31'
PROPOSED DRIVEWAY
ELECTRICAL TRANSFORMER
SEE NOTE 3
2-CELL WASHWATER/ SOLIDS HOLDING LAGOON
100-YEAR & 500-YEAR FLOOD PLAIN LIMITS
EXETER RESERVOIR
ROUTE 88 CONNECTOR
EXETER & HAMPTON ELECTRIC COMPANY EASEMENT

TEST PIT GROUND SURFACE ELEVATIONS (NAVD 88)

TEST PIT ID.	ELEVATION (FEET)
TP 1	42.40
TP 2	52.51
TP 3	53.31
TP 4	50.43
TP 5	55.22
TP 6	51.82
TP 7	49.32
TP 8A	52.02
TP 8B	52.58

LEGEND:

TP 1 — TEST PIT LOCATION

WTP-4 (CONC) — LEAD SAMPLE LOCATION AND RESULTING CONCENTRATION (mg/kg)

PLAN
1" = 50'
25 0 50

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: N. CAMPBELL
SHEET CHK'D BY: A. LEBLANC
CROSS CHK'D BY: J. DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

LEAD SAMPLING RESULTS
9-15 INCH SAMPLE DEPTH

PROJECT NO. 0260-36493
FILE NAME: \CM\CSTPLD12

FIGURE NO.
2C
0260-XXXXX

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Appendix B-5

Tables

Table 1
Lead Shot Sample Results Summary

Sample ID	Date Collected	Date Analyzed	Percent Moisture (wt%)	Lead (mg/kg-dry)	TCLP-Lead (mg/L)
B-1	08/06/02	08/13/02	5.9	61	na
B-2	08/06/02	08/13/02	9.4	**1,600**	**680**
B-3	08/06/02	08/16/02	6.1	**610**	na
Wtl-1	08/06/02	08/13/02	79	**2,800**	na
Wtl-2	08/06/02	08/13/02	74.8	**3,300**	**3.2**
PR-1-0	08/06/02	08/15/02	1.3	53	na
PR-1-3	08/06/02	08/15/02	5.2	330	na
PR-1-9	08/06/02	08/12/02	25.6	**1,900**	na
PR-1-15	08/06/02	08/15/02	11.9	4.7	na
PR-2-0	08/06/02	08/16/02	4.1	130	na
PR-2-3	08/06/02	08/16/02	4.6	19	na
PR-2-9	08/06/02	08/15/02	10.1	27	na
PR-3-0	08/06/02	08/15/02	3.3	270	na
PR-3-3	08/06/02	08/16/02	4.5	19	na
PR-3-9	08/06/02	08/16/02	5.8	ND	na
PR-4-3	08/06/02	08/16/02	21.7	89	na
PR-4-9	08/06/02	08/16/02	21.9	12	na
PR-5-0	08/06/02	08/13/02	16	**280,000**	na
PR-5-3	08/06/02	08/13/02	12.1	250	na
PR-5-9	08/06/02	08/13/02	11.7	30	na
PR-6-0	08/06/02	08/13/02	21.3	**9,700**	**460**
PR-6-3	08/06/02	08/13/02	20.3	20	na
PR-6-9	08/06/02	08/13/02	12.8	32	na
PR-7-0	08/06/02	08/15/02	12.1	63	na
PR-7-3	08/06/02	08/15/02	15.1	21	na
PR-7-9	08/06/02	08/15/02	10.6	9.3	na
PR-8-0	08/06/02	08/16/02	2.2	15	na
PR-8-3	08/06/02	08/16/02	4.3	5.6	na
PR-8-9	08/06/02	08/16/02	6.9	ND	na
PR-9-3	08/06/02	08/16/02	9.1	37	na
PR-10-0	08/06/02	08/15/02	4	160	na
PR-10-3	08/06/02	08/16/02	2	18	na
PR-10-9	08/06/02	08/16/02	12.6	15	na
PR-11-0	08/06/02	08/14/02	17	**1,400**	na
PR-11-3	08/06/02	08/15/02	9.3	140	na
PR-11-9	08/06/02	08/14/02	7.4	27	na
PR-12-0	08/06/02	08/14/02	16.2	**230,000**	na
PR-12-3	08/06/02	08/14/02	15.9	**260,000**	na
PR-12-9	08/06/02	08/14/02	9.5	200	na
PR-13-0	08/06/02	08/14/02	13.2	**420**	na
PR-13-3	08/06/02	08/15/02	8.6	170	na
PR-13-9	08/06/02	08/14/02	8	25	na
PR-14-0	08/06/02	08/12/02	14.9	**970**	**1.1**
WTP-1-0	08/06/02	08/14/02	6.3	12	na
WTP-1-3	08/06/02	08/14/02	3.9	5.9	na
WTP-2-0	08/06/02	08/14/02	16.2	22	na
WTP-2-3	08/06/02	08/14/02	13.5	13	na
WTP-3-0	08/06/02	08/14/02	17.8	110	na
WTP-3-3	08/06/02	08/13/02	17.2	43	na
WTP-4-0	08/11/02	08/15/02	1.8	110	na
WTP-4-3	08/11/02	08/16/02	5.8	20	na
WTP-5-0	08/11/02	08/16/02	6.8	11	na
WTP-5-3	08/11/02	08/16/02	5.5	8.4	na

NOTES:
na = not analyzed
Light shading indicates values greater than or equal to RCMP background concentration for lead in soil of 51 mg/kg
Dark shading indicates values greater than or equal to RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg

Table 2a
Lead Shot Sample Results
(0 to 3 inch sample depth)

Sample ID	Date Collected	Date Analyzed	Percent Moisture (wt%)	Lead (mg/kg-dry)	TCLP-Lead (mg/L)
PR-1-0	08/06/02	08/15/02	1.3	53	na
PR-2-0	08/06/02	08/16/02	4.1	130	na
PR-3-0	08/06/02	08/15/02	3.3	270	na
PR-5-0	08/06/02	08/13/02	16.0	**280,000**	na
PR-6-0	08/06/02	08/13/02	21.3	**9,700**	**460**
PR-7-0	08/06/02	08/15/02	12.1	63	na
PR-8-0	08/06/02	08/16/02	2.2	15	na
PR-10-0	08/06/02	08/15/02	4.0	160	na
PR-11-0	08/06/02	08/14/02	17.0	**1,400**	na
PR-12-0	08/06/02	08/14/02	16.2	**230,000**	na
PR-13-0	08/06/02	08/14/02	13.2	**420**	na
PR-14-0	08/06/02	08/12/02	14.9	**970**	**1.1**
WTP-1-0	08/06/02	08/14/02	6.3	12	na
WTP-2-0	08/06/02	08/14/02	16.2	22	na
WTP-3-0	08/06/02	08/14/02	17.8	110	na
WTP-4-0	08/11/02	08/15/02	1.8	110	na
WTP-5-0	08/11/02	08/16/02	6.8	11	na

NOTES:

na = not analyzed

Light shading indicates values greater than or equal to RCMP background concentration for lead in soil of 51 mg/kg

Dark shading indicates values greater than or equal to RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg

Table 2b
Lead Shot Sample Results
(3 to 9 inch sample depth)

Sample ID	Date Collected	Date Analyzed	Percent Moisture (wt%)	Lead (mg/kg-dry)	TCLP-Lead (mg/L)
PR-1-3	08/06/02	08/15/02	5.2	330	na
PR-2-3	08/06/02	08/16/02	4.6	19	na
PR-3-3	08/06/02	08/16/02	4.5	19	na
PR-4-3	08/06/02	08/16/02	21.7	89	na
PR-5-3	08/06/02	08/13/02	12.1	250	na
PR-6-3	08/06/02	08/13/02	20.3	20	na
PR-7-3	08/06/02	08/15/02	15.1	21	na
PR-8-3	08/06/02	08/16/02	4.3	5.6	na
PR-9-3	08/06/02	08/16/02	9.1	37	na
PR-10-3	08/06/02	08/16/02	2	18	na
PR-11-3	08/06/02	08/15/02	9.3	140	na
PR-12-3	08/06/02	08/14/02	15.9	260,000	na
PR-13-3	08/06/02	08/15/02	8.6	170	na
WTP-1-3	08/06/02	08/14/02	3.9	5.9	na
WTP-2-3	08/06/02	08/14/02	13.5	13	na
WTP-3-3	08/06/02	08/13/02	17.2	43	na
WTP-4-3	08/11/02	08/16/02	5.8	20	na
WTP-5-3	08/11/02	08/16/02	5.5	8.4	na

NOTES:

na = not analyzed

Light shading indicates values greater than or equal to RCMP background concentration for lead in soil of 51 mg/kg

Dark shading indicates values greater than or equal to RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg

Table 2c
Lead Shot Sample Results
(9 to 15 inch sample depth)

Sample ID	Date Collected	Date Analyzed	Percent Moisture (wt%)	Lead (mg/kg-dry)	TCLP-Lead (mg/L)
PR-1-9	08/06/02	08/12/02	25.6	1,900	na
PR-2-9	08/06/02	08/15/02	10.1	27	na
PR-3-9	08/06/02	08/16/02	5.8	ND	na
PR-4-9	08/06/02	08/16/02	21.9	12	na
PR-5-9	08/06/02	08/13/02	11.7	30	na
PR-6-9	08/06/02	08/13/02	12.8	32	na
PR-7-9	08/06/02	08/15/02	10.6	9.3	na
PR-8-9	08/06/02	08/16/02	6.9	ND	na
PR-10-9	08/06/02	08/16/02	12.6	15	na
PR-11-9	08/06/02	08/14/02	7.4	27	na
PR-12-9	08/06/02	08/14/02	9.5	200	na
PR-13-9	08/06/02	08/14/02	8	25	na

NOTES:

na = not analyzed

Light shading indicates values greater than or equal to RCMP background concentration for lead in soil of 51 mg/kg

Dark shading indicates values greater than or equal to RCMP Method 1 Soil Standard NH S-1 for lead of 400 mg/kg

Table 2d
Lead Shot Sample Results
(15 to 27 inch sample depth)

Sample ID	Date Collected	Date Analyzed	Percent Moisture (wt%)	Lead (mg/kg-dry)	TCLP-Lead (mg/L)
PR-1-15	08/06/02	08/15/02	11.9	4.7	na

Table 3
Preliminary Opinion of Probable Cost for Remediation
Exeter, New Hampshire

Item	Unit	Unit Cost	Quantity	Cost
Disposal of Rifle Range Soil Berm as RCRA Waste	tons	$140	560	$78,400
Disposal of Clay Pigeon Range Topsoil as RCRA Waste	tons	$140	820	$114,800
Clearing (area of clay pigeon range prior to soil removal)	acres	$2,500	0.85	$2,125
Erosion and Sedimentation Control	lin.ft.	$6	300	$1,800
Excavation, Stockpiling, Prep for Off-site Disposal	cu.yd.	$20	1,345	$26,900
Allowance for Testing	allowance	$10,000	1	$10,000
Topsoil and Seeding	sq.yd.	$6	4,600	$27,600
		SubTotal:	-	$261,625
Mobilization	LS	5% proj. cost	-	$13,081
			SubTotal:	**$274,706**
			Contingency (25%)	$68,677
			SubTotal Construction Cost (September 2002 ENR Index = 6588)	**$343,383**
			Construction Costs at Midpoint of Construction (4% per year)	$13,735
			SubTotal Escalated Construction Cost	**$357,118**
			Engineering and Implementation Allowance (25%)	$89,280
			Preliminary Opinion of Probable Cost for Remediation [1,2]:	**$450,000**
			Allowance for Remediation [3]:	**$1,000,000**

NOTES:

1. The opinion of probable remediation cost was developed by estimating the costs associated with the following:
   - All surface soils with lead concentrations greater than 400 mg/kg are remediated;
   - The area of the existing trap range to be remediated is approximately 0.8 acres;
   - The 0.8 acre area of the existing trap range to be remediated will be cleared, without grubbing;
   - Removal and off-site disposal as a hazardous waste of the top 12 inches of soil in the 0.8 acre area of the existing trap range to be remediated;
   - Removal and off-site disposal as a hazardous waste of the entire rifle range soil berm; and,
   - Provision and placement of 4 inches of common fill and 8 inches of topsoil and seeding in the remediated areas.
2. The following costs are not included:
   - Remediation, if required, of the buried historical trap range. It is anticipated that the costs to remediate a buried historical trap range would be similarly costly as remediation/ reclamation of the existing trap range.
   - Remediation of the wetland in the southeastern corner of the site.
   - Additional sampling programs associated with the WTP construction area, wetland area, or historical trap range area.
3. This allowance represents potential remediation costs should remediation of the buried historical trap range and wetland in the southeastern corner of the site be required in addition to remediation of the rifle range soil berm and existing trap range.

Appendix B-6

Laboratory Reports

SEACOAST ANALYTICAL SERVICES
2 Woodside Drive
Durham, New Hampshire 03824
Tel/Fax 603-868-1457

SERVICE QUALITY & SERVICE SINCE 1989

WATER TEST RESULTS

Date: September 23, 2002

Reference #: S 09202J

Client: Exeter Water Dept (Tony Calderoni)
10 Front Street
Exeter, NH 03833

Water location: D arborne Reservoir
E xeter, NH
(I ehind gun club)

Test Method	ANALYTE (mg/L) = milligrams per liter	EPA MAXIMUM recommended concentration	YOUR WATER'S VALUE < means less than	Exceeds Primary Standard	Exceeds Secondary Standard
SM 3113B	Lead (mg/L)				
	9/16/02 8:40am	0.015	< 0.005	-	-
	9/18/02 8:16am	0.015	< 0.005	-	-
	9/20/02 8:05am	0.015	< 0.005	-	-

THE TESTED PARAMETERS MEET FEDERAL PRIMARY DRINKING WATER STANDARDS. Secondary standards measure the aesthetic quality of the water and if exceeded should not affect health by individuals. Analytes which exceed the recommended concentration or range are indicated with an X under the primary or secondary column above.

Date received: 9/20/02
EPA 150.1, EPA 300.0 analysis: n/a
SM3111B, SM3113B analysis: 9/23/02

THIS REPORT IS CONFIDENTIAL
IF YOU RECEIVE THIS INFORMATION
IN ERROR, PLEASE CALL 603-868-1457

SEACOAST ANALYTICAL SERVICES is a NELAP Accredited Laboratory (#1733) for the analysis of fluoride, chloride, nitrite-N, nitrate-N, pH, sodium, calcium, magnesium, total hardness, iron, manganese, lead, arsenic, copper, turbidity, conductivity, sulfate, total coliform bacteria and E. coli bacteria by Colilert and Colisure. This sample was received and analyzed in compliance with the National Environmental Laboratory Accreditation Conference (NELAC) requirements. Please call with questions regarding this analysis, or anytime that we might be of service.

Walt Mosley, Laboratory Director

AMRO Environmental Laboratories Corporation

111 Herrick Street, Merrimack, NH 03054
TEL: (603) 424-2022 · FAX: (603) 429-8496

September 06, 2002

Jennifer Rogers
Camp Dresser & McKee Inc.
1001 Elm Street - Second Floor
Manchester, NH 031011845
TEL: (603) 222-8374
FAX: (603) 645-6891

RE: 36493 Exeter Lead Shot Study Workorder No.: 0208066

Dear Jennifer Rogers:

AMRO Environmental Laboratories Corp. received 49 samples on 8/7/02 for the analyses presented in the following report.

AMRO operates a Quality Assurance Program which meets or exceeds National Environmental Laboratory Accreditation Conference (NELAC), state, and EPA requirements. A copy of the appropriate state and/or NELAC Certificate is attached.

The enclosed Sample Receipt Checklist details the condition of your sample(s) upon receipt. Please be advised that any unused sample volume and sample extracts will be stored for a period of 60 days from sample receipt date (90 days for samples from New York). After this time, AMRO will properly dispose of the remaining sample(s). If you require further analysis, or need the samples held for a longer period, please contact us immediately.

This report consists of a total of 43 pages. This letter is an integral part of your data report. All results in this project relate only to the sample(s) as received by the laboratory and documented in the Chain-of-Custody. This report shall not be reproduced except in full, without the written approval of the laboratory. If you have any questions regarding this project in the future, please refer to the Workorder Number above.

Sincerely,

Nancy Stewart
Vice President/LabDirector

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study
Lab Order: 0208066
Date Received: 8/7/02

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date
0208066-01A	PR-6-9	8/6/02
0208066-02A	PR-6-0	8/6/02
0208066-03A	B-1	8/6/02
0208066-04A	PR-6-3	8/6/02
0208066-05A	PR-5-0	8/6/02
0208066-06A	PR-5-9	8/6/02
0208066-07A	Wtl-1	8/6/02
0208066-08A	PR-5-3	8/6/02
0208066-09A	Wtl-2	8/6/02
0208066-10A	B-2	8/6/02
0208066-11A	WP-3-3	8/6/02
0208066-12A	WP-1-3	8/6/02
0208066-13A	WP-1-0	8/6/02
0208066-14A	WP-3-0	8/6/02
0208066-15A	PR-12-9	8/6/02
0208066-16A	PR-11-9	8/6/02
0208066-17A	WP-2-3	8/6/02
0208066-18A	WP-2-0	8/6/02
0208066-19A	PR-12-3	8/6/02
0208066-20A	PR-12-0	8/6/02
0208066-21A	PR-14-0	8/6/02
0208066-22A	PR-13-9	8/6/02
0208066-23A	PR-13-0	8/6/02
0208066-24A	PR-11-0	8/6/02
0208066-25A	PR-11-3	8/6/02
0208066-26A	PR-13-3	8/6/02
0208066-27A	PR-10-0	8/6/02
0208066-28A	PR-7-9	8/6/02
0208066-29A	PR-1-15	8/6/02
0208066-30A	PR-1-9	8/6/02
0208066-31A	PR-7-3	8/6/02
0208066-32A	PR-7-0	8/6/02
0208066-33A	PR-1-0	8/6/02
0208066-34A	PR-1-3	8/6/02
0208066-35A	PR-3-0	8/6/02
0208066-36A	PR-2-9	8/6/02
0208066-37A	PR-2-0	8/6/02

CLIENT:	Camp Dresser & McKee Inc.
Project:	36493 Exeter Lead Shot Study
Lab Order:	0208066
Date Received:	8/7/02

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date
0208066-38A	PR-3-3	8/6/02
0208066-39A	PR-3-9	8/6/02
0208066-40A	PR-2-3	8/6/02
0208066-41A	PR-8-9	8/6/02
0208066-42A	PR-4-9	8/6/02
0208066-43A	PR-4-3	8/6/02
0208066-44A	B-3	8/6/02
0208066-45A	PR-8-3	8/6/02
0208066-46A	PR-10-9	8/6/02
0208066-47A	PR-9-3	8/6/02
0208066-48A	PR-10-3	8/6/02
0208066-49A	PR-8-0	8/6/02

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208066
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208066-01A	PR-6-9	8/6/02	Soil	ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-02A	PR-6-0			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-03A	B-1			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-04A	PR-6-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-05A	PR-5-0			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				ICP METALS, 3051/6010		8/10/02	8/16/02	7548
				ICP METALS, 3051/6010		8/10/02	8/19/02	7548
				Percent Moisture			8/13/02	R15129
0208066-06A	PR-5-9			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-07A	Wtl-1			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-08A	PR-5-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-09A	Wtl-2			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-10A	B-2			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-11A	WP-3-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/13/02	R15129
0208066-12A	WP-1-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-13A	WP-1-0			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208066
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208066-14A	WP-3-0	8/6/02	Soil	ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-15A	PR-12-9			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-16A	PR-11-9			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-17A	WP-2-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-18A	WP-2-0			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				Percent Moisture			8/14/02	R15146
0208066-19A	PR-12-3			ICP METALS, 3051/6010		8/10/02	8/13/02	7548
				ICP METALS, 3051/6010		8/10/02	8/16/02	7548
				ICP METALS, 3051/6010		8/10/02	8/19/02	7548
				Percent Moisture			8/14/02	R15146
0208066-20A	PR-12-0			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/14/02	R15146
0208066-21A	PR-14-0			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/14/02	R15146
0208066-22A	PR-13-9			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				ICP METALS, 3051/6010		8/12/02	8/20/02	7555
				Percent Moisture			8/14/02	R15146
0208066-23A	PR-13-0			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/14/02	R15146
0208066-24A	PR-11-0			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/14/02	R15146
0208066-25A	PR-11-3			ICP METALS, 3051/6010		8/12/02	8/12/02	7555

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208066
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208066-25A	PR-11-3	8/6/02	Soil	Percent Moisture			8/15/02	R15161
0208066-26A	PR-13-3			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-27A	PR-10-0			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-28A	PR-7-9			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/16/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-29A	PR-1-15			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/16/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-30A	PR-1-9			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-31A	PR-7-3			ICP METALS, 3051/6010		8/12/02	8/16/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				Percent Moisture			8/15/02	R15161
0208066-32A	PR-7-0			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-33A	PR-1-0			ICP METALS, 3051/6010		8/12/02	8/13/02	7555
				ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-34A	PR-1-3			ICP METALS, 3051/6010		8/12/02	8/12/02	7555
				Percent Moisture			8/15/02	R15161
0208066-35A	PR-3-0			ICP METALS, 3051/6010		8/12/02	8/12/02	7555

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208066
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208066-35A	PR-3-0	8/6/02	Soil	Percent Moisture			8/15/02	R15161
0208066-36A	PR-2-9			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/15/02	R15161
0208066-37A	PR-2-0			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/15/02	R15161
0208066-38A	PR-3-3			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/16/02	R15182
0208066-39A	PR-3-9			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/16/02	R15182
0208066-40A	PR-2-3			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/16/02	R15182
0208066-41A	PR-8-9			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/16/02	R15182
0208066-42A	PR-4-9			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/15/02	R15182
0208066-43A	PR-4-3			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/15/02	R15182
0208066-44A	B-3			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/15/02	R15182
0208066-45A	PR-8-3			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/15/02	R15182
0208066-46A	PR-10-9			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/15/02	R15182
0208066-47A	PR-9-3			ICP METALS, 3051/6010		8/14/02	8/15/02	7572
				Percent Moisture			8/16/02	R15182
0208066-48A	PR-10-3			ICP METALS, 3051/6010		8/14/02	8/16/02	7572
				Percent Moisture			8/16/02	R15182
0208066-49A	PR-8-0			ICP METALS, 3051/6010		8/14/02	8/16/02	7572

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208066
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208066-49A	PR-8-0	8/6/02	Soil	Percent Moisture			8/16/02	R15182

AMRO Environmental Laboratories Corporation
111 Herrick Street
Merrimack, NH 03054

CHAIN-OF-CUSTODY RECORD

41927

Office: (603) 424-2022
Fax: (603) 429-8496

Project No.: 36493	Project Name: Exeter Lead Shot Study	Project Manager: Al LeBlanc	Samplers (Signature): Sarah Haight	AMRO Project No.: 020806
	Project State: New Hampshire			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead	Remarks
PR-6-9	8/6 11:31	S	1G/8oz		X	X	
PR-6-0	8/6 11:20	S	1G/8oz		X	X	
B-1	8/6 12:12	S	1G/8oz		X	X	
PR-6-3	8/6 11:28	S	1G/8oz		X	X	
PR-5-0	8/6 11:00	S	1G/8oz		X	X	
PR-5-9	8/6 11:15	S	1G/8oz		X	X	
Wtl-1	8/6 11:40	S	1G/8oz		X	X	
PR-5-3	8/6 11:05	S	1G/8oz		X	X	
Wtl-2	8/6 11:45	S	1G/8oz		X	X	
B-2	8/6 12:10	S	1G/8oz		X	X	
Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other							
Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other							

Send Results To: Jennifer Koger CDM	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* GW-2 GW-3
1001 Elm St Second Floor				MCP Level Needed:
Manchester, NH 03101		Results Needed By:		*= May require additional cost

Relinquished By	Date/ Time	Received By
Sarah Haight	8/7/02 4:11	[illegible]
[illegible]	8/8/02 [illegible]	[illegible]

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc;
Some samples w/ ID's ending in '0' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

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AMI ıviro tal L ıtori :pora
111 Herrick Street
Merrimack, NH 03054

CHAIN-OF-CUSTODY RECORD

4 of 28

ce: (6..) .24-2..
Fax: (603) 429-8496

Project No.: 36493	Project Name: Exeter Lead Shot Study	Project Manager: AlleBlanc	Samplers (Signature): Sarah Haight	AMRO Project No.: 02080 66
	Project State:			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead												Remarks
WP-3-3	8/6 5:40	S	1G/8oz		X	X												
WP-1-3	8/6 5:15	S	1G/8oz		X	X												
WP-1-6	8/6 5:10	S	1G/8oz		X	X												
WP-3-0	8/6 5:35	S	1G/8oz		X	X												
PR-12-9	8/6 4:30	S	1G/8oz		X	X												
PR-11-9	8/6 4:05	S	1G/8oz		X	X												
WP-2-3	8/6 5:25	S	1G/8oz		X	X												
WP-2-0	8/6 5:29	S	1G/8oz		X	X												
PR-12-3	8/6 4:25	S	1G/8oz		X	X												
PR-12-0	8/6 4:20	S	1G/8oz		X	X												
Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other																		
Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other																		

Send Results To: Jennifer Rogers CDM 1001 Elm St 2nd Floor Manchester, NH 03101	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* ___ GW-2 ___ GW-3 ___ MCP Level Needed: ___ *= May require additional cost
		Results Needed By:		

Relinquished By	Date/ Time	Received By
Sarah Haight	8/7/02 4:11	[illegible]
[illegible]	8/7/02 [illegible]	[illegible] Searles

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc;
Some samples w/ I.D's endingin "0" or "3" may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy SHEET OF

10

AMRO Environmental Laboratories Corporation
111 Herrick Street
Merrimack, NH 03054

CHAIN-OF-CUSTODY RECORD

41929

Office: (603) 424-2022
Fax: (603) 429-8496

Project No.: 36493	Project Name: Exeter Lead Shot Study	Project Manager: Al LeBlanc	Samplers (Signature): Sarah Haight	AMRO Project No.: 0208066
	Project State:			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required	Remarks
PR-14-0	8/6 4:55	S	1G/8oz		X	X	
PR-13-9	8/6 4:05	S	1G/8oz		X	X	
PR-13-6	8/6 4:30	S	1G/8oz		X	X	
PR-11-0	8/6 3:55	S	1G/8oz		X	X	
PR-11-3	8/6 4:00	S	1G/8oz		X	X	
PR-13-3	8/6 4:40	S	1G/8oz		X	X	
PR-10-0	8/6 3:30	S	1G/8oz		X	X	
PR-7-9	8/6 2:50	S	1G/8oz		X	X	
PR-1-15	8/6 2:20	S	1G/8oz		X	X	
PR-1-9	8/6 2:15	S	1G/8oz		X	X	

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To: Jennifer Rogers CDM 1001 Elm St 2nd Floor Manchester, NH 03101	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* GW-2 GW-3 MCP Level Needed: *= May require additional cost
		Results Needed By:		

Relinquished By	Date/ Time	Received By
Sarah Haight	8/6/11 4:11	[illegible]
[illegible]	8/6/11 [illegible]	[illegible]

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc:
Some samples ending in '0' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy

SHEET OF

AMRO Environmental Laboratories Corporation
111 Herrick Street
Merrimack, NH 03054

CHAIN-OF-CUSTODY RECORD

4 1930

Fax: (603) 429-8496

Project No.: 36493	Project Name: Exeter Lead Shot Study	Project Manager: Al LeBlanc	Samplers (Signature):	AMRO Project No.: 0208066
	Project State:			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead	Remarks
PR-7-3	8/6 2:40	S	1G/8oz		X	X	
PR-7-0	8/6 2:45	S	1G/8oz		X	X	
PR-1-0	8/6 2:05	S	1G/8oz		X	X	
PR-1-3	8/6 2:08	S	1G/8oz		X	X	
PR-3-0	8/6 1:25	S	1G/8oz		X	X	
PR-2-9	8/6 1:55	S	1G/8oz		X	X	
PR-2-0	8/6 1:45	S	1G/8oz		X	X	
PR-3-3	8/6 1:29	S	1G/8oz		X	X	
PR-3-9	8/6 1:40	S	1G/8oz		X	X	
PR-2-3	8/6 1:50	S	1G/8oz		X	X	

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To:	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* GW-2 GW-3
Jennifer Rogers CDM 1001 Elm St 2nd Floor Manchester NH 03101		Results Needed By:		MCP Level Needed: *= May require additional cost

Relinquished By	Date/ Time	Received By
Sarah Hazlett	8/7/02 4:11	
	8/8/02 10:40	C Cowley

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc;

Some samples ending in '0' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy SHEET OF

AMRO Environmental Laboratories Corporation
111 Herrick Street
Merrimack, NH 03054

CHAIN-OF-CUSTODY RECORD

41931

Office: (603) 424-2022
Fax: (603) 429-8496

Project No.: 36493	Project Name: Exeter Lead Shot Study	Project Manager: A LeBlanc	Samplers (Signature):	AMRO Project No.: 0208066
	Project State:			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead	Remarks
PR-8-9	8/6 3:10	S	1G/8oz		X	X	
PR-4-9	8/6 12:00	S	1G/8oz		X	X	
PR-4-3	8/6 11:55	S	1G/8oz		X	X	
B-3	8/6 12:15	S	1G/8oz		X	X	
PR-8-3	8/6 3:15	S	1G/8oz		X	X	
PR-10-9	8/6 3:40	S	1G/8oz		X	X	
PR-9-3	8/6 3:20	S	1G/8oz		X	X	
PR-10-3	8/6 3:35	S	1G/8oz		X	X	
PR-8-0	8/6 3:00	S	1G/8oz		X	X	
		S	1G/8oz		X	X	

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To: Jennifer Rogers CDM 1001 Elm St 2nd Floor Manchester, NH 03101	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* ___ GW-2 ___ GW-3 ___ MCP Level Needed: ___ *= May require additional cost
		Results Needed By:		

Relinquished By	Date/ Time	Received By
[signature]	8/7/96 9:11	[signature]
[signature]	8/7/96	[signature]

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc;
Some samples from main 'O' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy

SHEET OF

3

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
(603) 424-2022

Client: CDM
Project Name: EXETER LEAD SHOT STUDY
Ship via: (circle one) Fed Ex., UPS (AMRO Courier)
Hand Del., Other Courier, Other:

AMRO ID: 0208066
Date Rec.: 8-7-02
Date Due: 8-19-02

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?			✓	
2. Custody Seals present?	–		✓	
3. Custody Seals intact?			✓	
4. Air Bill included in folder if received?			✓	
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 2°				
Samples rec. with ice ✓ ice packs ___ neither ___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?			✓	
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:			✓	
What samples sent:				
Where sent:				
Date:				
Analysis:				
TAT:				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?	✓			
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: CC Date: 8-7-02 Logged in By: CC Date: 8-9-02
Labeled By: CC Date: 8-9-02 Checked By: CC

State of New Hampshire
Environmental Laboratory Accreditation Program

Awards Primary Accreditation to

AMRO Environmental Laboratories Corporation
of
Merrimack, NH

For the analyses listed on the attached page(s) in accordance with the provisions of the NELAC Standards and Env-C 300.

Certificate Number: 100102

Date of Issue: July 20, 2002

Expiration Date: July 19, 2003

Charles W. Myers
Program Manager

Continuing accreditation status is dependent on successful ongoing participation in the program.
Customers may verify the laboratory's current status by calling (603) 271-2991 or (603) 271-2998.

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 1 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

DRINKING WATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 200.9
Arsenic:	EPA 200.7
Arsenic:	EPA 200.9
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Boron:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.9
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.9
Silver:	EPA 200.7
Sodium:	EPA 200.7
Thallium:	EPA 200.9
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity	SM 2330 B
Chloride	EPA 300.0
Chloride	EPA 325.3
Chlorine, Free Residual:	SM 4500-Cl G
Conductivity	EPA 120.1
Cyanide, Total:	SM 4500-CN E
Fluoride	EPA 300.0
Fluoride	EPA 340.2
Hardness by Calculation:	EPA 200.7
Magnesium:	EPA 200.7
Nitrate:	EPA 300.0
Nitrate-N:	EPA 353.2
Nitrite:	EPA 353.2
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potassium:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS (Cont.)

Sulfate	EPA 300.0
Sulfate:	EPA 375.4
Total Filt. Residue (TDS):	EPA 160.1
Total Filt. Residue (TDS):	SM 2540C
Turbidity:	EPA 180.1

INDIVIDUAL DRINKING WATER ORGANIC CONTAMINANTS

DBCP:	EPA 504.1
EDB:	EPA 504.1

WASTEWATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 204.2
Arsenic:	EPA 200.7
Arsenic:	EPA 206.2
Arsenic:	D2972-93C
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Cobalt:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.7
Lead:	EPA 239.2
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.7
Selenium:	EPA 270.2
Silver:	EPA 200.7
Thallium:	EPA 279.2
Tin	EPA 200.7
Titanium	EPA 200.7
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

This certificate supercedes all previously issued certificates.

Program Manager

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 2 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

WASTEWATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity:	EPA 310.2
Ammonia-N:	EPA 350.2
BOD:	EPA 405.1
Chloride:	EPA 300.0
Chloride:	EPA 325.3
COD:	EPA 410.4
COD:	HACH 8000
Conductivity (Spec. Cond.):	EPA 120.1
Cyanide, Total:	EPA 335.2
Fluoride:	EPA 300.0
Hardness by Calculation:	EPA 200.7
Magnesium:	EPA 200.7
Nitrate-N:	EPA 300.0
Nitrate-Nitrite, Total:	EPA 353.2
Oil & Grease:	EPA 413.1
Orthophosphate:	EPA 300.0
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potassium:	EPA 200.7
Residue, Filterable (TDS):	EPA 160.1
Residue, Non-Filt.	EPA 160.2
Residue, Total:	EPA 160.3
Sodium:	EPA 200.7
Sulfate:	EPA 300.0
Sulfate:	EPA 375.4
TKN:	EPA 351.1
TKN:	EPA 351.3
Total Phosphorus:	EPA 365.2
Total Phenolics:	EPA 420.1

PCBs IN WASTEWATER

PCB-Aroclor 1016:	EPA 608
PCB-Aroclor 1221:	EPA 608
PCB-Aroclor 1232:	EPA 608
PCB-Aroclor 1242:	EPA 608
PCB-Aroclor 1248:	EPA 608
PCB-Aroclor 1254:	EPA 608
PCB-Aroclor 1260:	EPA 608

PESTICIDES IN WASTEWATER

Aldrin:	EPA 608

PESTICIDES IN WASTEWATER (Cont.)

a-BHC:	EPA 608
b-BHC:	EPA 608
d-BHC	EPA 608
g-BHC (Lindane):	EPA 608
Chlordene:	EPA 608
4,4-DDD:	EPA 608
4,4'-DDT:	EPA 608
Dieldrin:	EPA 608
Endosulfan I:	EPA 608
Endosulfan Sulfate:	EPA 608
Endrin:	EPA 608
Endrin Aldehyde:	EPA 608
Heptachlor:	EPA 608
Heptachlor Epoxide:	EPA 608
Methoxychlor:	EPA 608
Toxaphene:	EPA 608

VOLATILE ORGANICS IN WASTEWATER

1,1,1 Trichloroethane:	EPA 624
1,1,2,2-Tetrachloroethane:	EPA 624
1,1,2-Trichloroethane:	EPA 624
1,1-Dichloroethane:	EPA 624
1,1-Dichloroethene:	EPA 624
1,2 Dichloroethane:	EPA 624
1,2-Dichlorobenzene:	EPA 624
1,2-Dichloropropane:	EPA 624
1,3-Dichlorobenzene:	EPA 624
1,4-Dichlorobenzene	EPA 624
2-Chloroethylvinyl ether:	EPA 624
Acrolein:	EPA 624
Acrylonitrile:	EPA 624
Benzene:	EPA 624
Bromodichloromethane:	EPA 624
Bromoform:	EPA 624
Bromomethane:	EPA 624
Carbon Tetrachloride:	EPA 624
Chlorobenzene	EPA 624
Chloroethane:	EPA 624
Chloroform:	EPA 624
Chloromethane:	EPA 624
c-1,3-Dichloropropene:	EPA 624
Dibromochloromethane:	EPA 624
Dichlorodifluoromethane:	EPA 624

This certificate supercedes all previously issued certificates.

Program Manager

ACCREDITING nelap AUTHORITY

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 1 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

DRINKING WATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 200.9
Arsenic:	EPA 200.7
Arsenic:	EPA 200.9
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Boron:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.9
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.9
Silver:	EPA 200.7
Sodium:	EPA 200.7
Thallium:	EPA 200.9
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity	SM 2330 B
Chloride	EPA 300.0
Chloride	EPA 325.3
Chlorine, Free Residual:	SM 4500-Cl G
Conductivity	EPA 120.1
Cyanide, Total:	SM 4500-CN E
Fluoride	EPA 300.0
Fluoride	EPA 340.2
Hardness by Calculation:	EPA 200.7
Magnesium:	EPA 200.7
Nitrate:	EPA 300.0
Nitrate-N:	EPA 353.2
Nitrite:	EPA 353.2
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potassium:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS (Cont.)

Sulfate	EPA 300.0
Sulfate:	EPA 375.4
Total Filt. Residue (TDS):	EPA 160.1
Total Filt. Residue (TDS):	SM 2540C
Turbidity:	EPA 180.1

INDIVIDUAL DRINKING WATER ORGANIC CONTAMINANTS

DBCP:	EPA 504.1
EDB:	EPA 504.1

WASTEWATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 204.2
Arsenic:	EPA 200.7
Arsenic:	EPA 206.2
Arsenic:	D2972-93C
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Cobalt:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.7
Lead:	EPA 239.2
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.7
Selenium:	EPA 270.2
Silver:	EPA 200.7
Thallium:	EPA 279.2
Tin	EPA 200.7
Titanium	EPA 200.7
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

This certificate supercedes all previously issued certificates.

Program Manager

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 3 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

VOLATILE ORGANICS IN WASTEWATER (Cont.)

Ethylbenzene:	EPA 624
Methylene Chloride:	EPA 624
t-1,2-Dichloroethene:	EPA 624
t-1,3-Dichloropropene:	EPA 624
Tetrachloroethene:	EPA 624
Toluene:	EPA 624
Trichloroethene:	EPA 624
Trichlorofluoromethane:	EPA 624
Vinyl Chloride:	EPA 624

WASTEWATER SEMIVOLATILE ORGANICS

1,2,4-Trichlorobenzene:	EPA 625
2,4,5-Trichlorophenol:	EPA 625
2,4,6-Trichlorophenol:	EPA 625
2,4-Dichlorophenol:	EPA 625
2,4-Dimethylphenol:	EPA 625
2,4-Dinitrophenol:	EPA 625
2,4-Dinitrotoluene:	EPA 625
2,6-Dinitrotoluene:	EPA 625
2-Chloronaphthalene:	EPA 625
2-Chlorophenol:	EPA 625
2-Methyl-4,6-dinitrophenol:	EPA 625
2-Nitrophenol:	EPA 625
3,3-Dichlorobenzidine:	EPA 625
4-Bromophenyl phenyl ether:	EPA 625
4-Chloro-3-methylphenol:	EPA 625
4-Chlorophenyl phenyl ether:	EPA 625
4-Nitrophenol:	EPA 625
Acenaphthene:	EPA 625
Anthracene:	EPA 625
Benzidine:	EPA 625
Benzo(a)anthracene:	EPA 625
Benzo(a)pyrene:	EPA 625
Benzo(a,h)anthracene:	EPA 625
Benzo(b)fuoranthene:	EPA 625
Benzo(g,h,i)perylene:	EPA 625
Benzo(k)fuoranthene:	EPA 625
Benzyl butyl phthalate:	EPA 625
Bis(2-chloroethoxy) methane:	EPA 625
Bis(2-chloroethyl) ether:	EPA 625
Bis(2-chloroisopropyl) ether:	EPA 625
Bis(2-ethylhexyl) phthalate:	EPA 625
Chrysene:	EPA 625

WASTEWATER SEMIVOLATILE ORGANICS (Cont.)

Diethyl phthalate:	EPA 625
Dimethyl phthalate:	EPA 625
Di-n-butyl phthalate:	EPA 625
Di-n-octyl phthalate:	EPA 625
Fluoranthene:	EPA 625
Fluorene:	EPA 625
Hexachlorobenzene:	EPA 625
Hexachlorobutadiene:	EPA 625
Hexachlorocyclopentadiene:	EPA 625
Hexachloroethane:	EPA 625
Indeno(1,2,3-c,d)pyrene:	EPA 625
Isophorone:	EPA 625
Naphthalene	EPA 625
Nitrobenzene:	EPA 625
n-Nitrosodi-n-propylamine:	EPA 625
n-Nitrosodiphenylamine:	EPA 625
Pentachlorophenol:	EPA 625
Phenanthrene:	EPA 625
Phenol:	EPA 625
Pyrene:	EPA 625

This certificate supercedes all previously issued certificates.

Charles G. Hyer
Program Manager

ACCREDITING AUTHORITY helap

CASE NARRATIVE
0208066

GENERAL

1. No QC deviations were observed.

TRACE METALS
SOIL

1. No QC deviations were observed.

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study
Lab Order: 0208066

Lab ID: 0208066-01 **Collection Date:** 8/6/02
Client Sample ID: PR-6-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	32	3.6		mg/Kg-dry	1	8/13/02 5:14:03 PM

Lab ID: 0208066-02 **Collection Date:** 8/6/02
Client Sample ID: PR-6-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	9,700	3.8		mg/Kg-dry	1	8/13/02 5:47:08 PM

Lab ID: 0208066-03 **Collection Date:** 8/6/02
Client Sample ID: B-1 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	61	3.3		mg/Kg-dry	1	8/13/02 5:51:50 PM

Lab ID: 0208066-04 **Collection Date:** 8/6/02
Client Sample ID: PR-6-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	20	3.9		mg/Kg-dry	1	8/13/02 5:56:36 PM

Lab ID: 0208066-05 **Collection Date:** 8/6/02
Client Sample ID: PR-5-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	280,000	180		mg/Kg-dry	50	8/19/02 1:16:59 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-06 **Collection Date:** 8/6/02
Client Sample ID: PR-5-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	30	3.5		mg/Kg-dry	1	8/13/02 6:06:10 PM

Lab ID: 0208066-07 **Collection Date:** 8/6/02
Client Sample ID: Wtl-1 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	2,800	15		mg/Kg-dry	1	8/13/02 6:11:09 PM

Lab ID: 0208066-08 **Collection Date:** 8/6/02
Client Sample ID: PR-5-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	250	3.5		mg/Kg-dry	1	8/13/02 6:15:53 PM

Lab ID: 0208066-09 **Collection Date:** 8/6/02
Client Sample ID: Wtl-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	3,300	12		mg/Kg-dry	1	8/13/02 6:28:34 PM

Lab ID: 0208066-10 **Collection Date:** 8/6/02
Client Sample ID: B-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	1,600	3.4		mg/Kg-dry	1	8/13/02 6:33:23 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-11 **Collection Date:** 8/6/02
Client Sample ID: WP-3-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	43	3.7		mg/Kg-dry	1	8/13/02 6:38:16 PM

Lab ID: 0208066-12 **Collection Date:** 8/6/02
Client Sample ID: WP-1-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	5.9	3.2		mg/Kg-dry	1	8/13/02 6:43:05 PM

Lab ID: 0208066-13 **Collection Date:** 8/6/02
Client Sample ID: WP-1-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	12	3.3		mg/Kg-dry	1	8/13/02 6:47:55 PM

Lab ID: 0208066-14 **Collection Date:** 8/6/02
Client Sample ID: WP-3-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	110	3.7		mg/Kg-dry	1	8/13/02 6:52:43 PM

Lab ID: 0208066-15 **Collection Date:** 8/6/02
Client Sample ID: PR-12-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	200	3.4		mg/Kg-dry	1	8/13/02 6:57:31 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-16 **Collection Date:** 8/6/02
Client Sample ID: PR-11-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	27	3.4		mg/Kg-dry	1	8/13/02 7:02:22 PM

Lab ID: 0208066-17 **Collection Date:** 8/6/02
Client Sample ID: WP-2-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	13	3.6		mg/Kg-dry	1	8/13/02 7:07:05 PM

Lab ID: 0208066-18 **Collection Date:** 8/6/02
Client Sample ID: WP-2-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	22	3.7		mg/Kg-dry	1	8/13/02 7:11:51 PM

Lab ID: 0208066-19 **Collection Date:** 8/6/02
Client Sample ID: PR-12-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	260,000	180		mg/Kg-dry	50	8/19/02 1:22:15 PM

Lab ID: 0208066-20 **Collection Date:** 8/6/02
Client Sample ID: PR-12-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	230,000	71		mg/Kg-dry	20	8/13/02 7:29:31 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-21 **Collection Date:** 8/6/02
Client Sample ID: PR-14-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	970	3.6		mg/Kg-dry	1	8/12/02 6:48:46 PM

Lab ID: 0208066-22 **Collection Date:** 8/6/02
Client Sample ID: PR-13-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	25	3.2		mg/Kg-dry	1	8/20/02 5:39:34 PM

Lab ID: 0208066-23 **Collection Date:** 8/6/02
Client Sample ID: PR-13-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	420	3.4		mg/Kg-dry	1	8/12/02 6:58:27 PM

Lab ID: 0208066-24 **Collection Date:** 8/6/02
Client Sample ID: PR-11-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	1,400	3.7		mg/Kg-dry	1	8/12/02 7:11:22 PM

Lab ID: 0208066-25 **Collection Date:** 8/6/02
Client Sample ID: PR-11-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	140	3.4		mg/Kg-dry	1	8/12/02 7:16:11 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-26 **Collection Date:** 8/6/02
Client Sample ID: PR-13-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	170	3.2		mg/Kg-dry	1	8/12/02 7:21:01 PM

Lab ID: 0208066-27 **Collection Date:** 8/6/02
Client Sample ID: PR-10-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	160	3.1		mg/Kg-dry	1	8/12/02 7:25:54 PM

Lab ID: 0208066-28 **Collection Date:** 8/6/02
Client Sample ID: PR-7-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	9.3	3.3		mg/Kg-dry	1	8/16/02 4:00:07 PM

Lab ID: 0208066-29 **Collection Date:** 8/6/02
Client Sample ID: PR-1-15 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	4.7	3.5		mg/Kg-dry	1	8/16/02 4:05:11 PM

Lab ID: 0208066-30 **Collection Date:** 8/6/02
Client Sample ID: PR-1-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	1,900	3.9		mg/Kg-dry	1	8/12/02 7:40:49 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study
Lab Order: 0208066

Lab ID: 0208066-31 **Collection Date:** 8/6/02
Client Sample ID: PR-7-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	21	3.5		mg/Kg-dry	1	8/16/02 4:10:12 PM

Lab ID: 0208066-32 **Collection Date:** 8/6/02
Client Sample ID: PR-7-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	63	3.4		mg/Kg-dry	1	8/13/02 7:53:37 PM

Lab ID: 0208066-33 **Collection Date:** 8/6/02
Client Sample ID: PR-1-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	53	3.2		mg/Kg-dry	1	8/13/02 7:58:31 PM

Lab ID: 0208066-34 **Collection Date:** 8/6/02
Client Sample ID: PR-1-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	330	3.1		mg/Kg-dry	1	8/12/02 8:08:09 PM

Lab ID: 0208066-35 **Collection Date:** 8/6/02
Client Sample ID: PR-3-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	270	3.2		mg/Kg-dry	1	8/12/02 8:13:57 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-36 **Collection Date:** 8/6/02
Client Sample ID: PR-2-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	27	3.3		mg/Kg-dry	1	8/16/02 2:41:35 PM

Lab ID: 0208066-37 **Collection Date:** 8/6/02
Client Sample ID: PR-2-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	130	3.2		mg/Kg-dry	1	8/16/02 2:46:39 PM

Lab ID: 0208066-38 **Collection Date:** 8/6/02
Client Sample ID: PR-3-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	19	3.2		mg/Kg-dry	1	8/16/02 2:51:46 PM

Lab ID: 0208066-39 **Collection Date:** 8/6/02
Client Sample ID: PR-3-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	0.86	3.3	J	mg/Kg-dry	1	8/16/02 2:56:53 PM

Lab ID: 0208066-40 **Collection Date:** 8/6/02
Client Sample ID: PR-2-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	19	3.2		mg/Kg-dry	1	8/16/02 3:01:54 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-41 **Collection Date:** 8/6/02
Client Sample ID: PR-8-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	2.8	3.3	J	mg/Kg-dry	1	8/16/02 3:06:54 PM

Lab ID: 0208066-42 **Collection Date:** 8/6/02
Client Sample ID: PR-4-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	12	3.9		mg/Kg-dry	1	8/16/02 3:11:48 PM

Lab ID: 0208066-43 **Collection Date:** 8/6/02
Client Sample ID: PR-4-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	89	3.8		mg/Kg-dry	1	8/16/02 3:16:48 PM

Lab ID: 0208066-44 **Collection Date:** 8/6/02
Client Sample ID: B-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	610	3.1		mg/Kg-dry	1	8/16/02 3:30:04 PM

Lab ID: 0208066-45 **Collection Date:** 8/6/02
Client Sample ID: PR-8-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	5.6	3.1		mg/Kg-dry	1	8/16/02 3:35:03 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-46 **Collection Date:** 8/6/02
Client Sample ID: PR-10-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	15	3.4		mg/Kg-dry	1	8/16/02 3:39:59 PM

Lab ID: 0208066-47 **Collection Date:** 8/6/02
Client Sample ID: PR-9-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	37	3.3		mg/Kg-dry	1	8/16/02 3:44:58 PM

Lab ID: 0208066-48 **Collection Date:** 8/6/02
Client Sample ID: PR-10-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	18	3.0		mg/Kg-dry	1	8/16/02 3:49:59 PM

Lab ID: 0208066-49 **Collection Date:** 8/6/02
Client Sample ID: PR-8-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	15	3.1		mg/Kg-dry	1	8/16/02 3:55:03 PM

Qualifiers:

ND - Not Deteeted at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-01 **Collection Date:** 8/6/02
Client Sample ID: PR-6-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	12.8	0		wt%	1	8/13/02

Lab ID: 0208066-02 **Collection Date:** 8/6/02
Client Sample ID: PR-6-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	21.3	0		wt%	1	8/13/02

Lab ID: 0208066-03 **Collection Date:** 8/6/02
Client Sample ID: B-1 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	5.9	0		wt%	1	8/13/02

Lab ID: 0208066-04 **Collection Date:** 8/6/02
Client Sample ID: PR-6-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	20.3	0		wt%	1	8/13/02

Lab ID: 0208066-05 **Collection Date:** 8/6/02
Client Sample ID: PR-5-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	16.0	0		wt%	1	8/13/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-06 **Collection Date:** 8/6/02
Client Sample ID: PR-5-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	11.7	0		wt%	1	8/13/02

Lab ID: 0208066-07 **Collection Date:** 8/6/02
Client Sample ID: Wtl-1 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	79.0	0		wt%	1	8/13/02

Lab ID: 0208066-08 **Collection Date:** 8/6/02
Client Sample ID: PR-5-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	12.1	0		wt%	1	8/13/02

Lab ID: 0208066-09 **Collection Date:** 8/6/02
Client Sample ID: Wtl-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	74.8	0		wt%	1	8/13/02

Lab ID: 0208066-10 **Collection Date:** 8/6/02
Client Sample ID: B-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	9.4	0		wt%	1	8/13/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-11 **Collection Date:** 8/6/02
Client Sample ID: WP-3-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	17.2	0		wt%	1	8/13/02

Lab ID: 0208066-12 **Collection Date:** 8/6/02
Client Sample ID: WP-1-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	3.9	0		wt%	1	8/14/02

Lab ID: 0208066-13 **Collection Date:** 8/6/02
Client Sample ID: WP-1-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	6.3	0		wt%	1	8/14/02

Lab ID: 0208066-14 **Collection Date:** 8/6/02
Client Sample ID: WP-3-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	17.8	0		wt%	1	8/14/02

Lab ID: 0208066-15 **Collection Date:** 8/6/02
Client Sample ID: PR-12-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	9.5	0		wt%	1	8/14/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-16 **Collection Date:** 8/6/02
Client Sample ID: PR-11-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	7.4	0		wt%	1	8/14/02

Lab ID: 0208066-17 **Collection Date:** 8/6/02
Client Sample ID: WP-2-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	13.5	0		wt%	1	8/14/02

Lab ID: 0208066-18 **Collection Date:** 8/6/02
Client Sample ID: WP-2-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	16.2	0		wt%	1	8/14/02

Lab ID: 0208066-19 **Collection Date:** 8/6/02
Client Sample ID: PR-12-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	15.9	0		wt%	1	8/14/02

Lab ID: 0208066-20 **Collection Date:** 8/6/02
Client Sample ID: PR-12-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	16.2	0		wt%	1	8/14/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-21 **Collection Date:** 8/6/02
Client Sample ID: PR-14-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	14.9	0		wt%	1	8/14/02

Lab ID: 0208066-22 **Collection Date:** 8/6/02
Client Sample ID: PR-13-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	8.0	0		wt%	1	8/14/02

Lab ID: 0208066-23 **Collection Date:** 8/6/02
Client Sample ID: PR-13-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	13.2	0		wt%	1	8/14/02

Lab ID: 0208066-24 **Collection Date:** 8/6/02
Client Sample ID: PR-11-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	17.0	0		wt%	1	8/14/02

Lab ID: 0208066-25 **Collection Date:** 8/6/02
Client Sample ID: PR-11-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	9.3	0		wt%	1	8/15/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-26 **Collection Date:** 8/6/02
Client Sample ID: PR-13-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE	D2216					Analyst: JEK
Percent Moisture	8.6	0		wt%	1	8/15/02

Lab ID: 0208066-27 **Collection Date:** 8/6/02
Client Sample ID: PR-10-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE	D2216					Analyst: JEK
Percent Moisture	4.0	0		wt%	1	8/15/02

Lab ID: 0208066-28 **Collection Date:** 8/6/02
Client Sample ID: PR-7-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE	D2216					Analyst: JEK
Percent Moisture	10.6	0		wt%	1	8/15/02

Lab ID: 0208066-29 **Collection Date:** 8/6/02
Client Sample ID: PR-1-15 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE	D2216					Analyst: JEK
Percent Moisture	11.9	0		wt%	1	8/15/02

Lab ID: 0208066-30 **Collection Date:** 8/6/02
Client Sample ID: PR-1-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE	D2216					Analyst: JEK
Percent Moisture	25.6	0		wt%	1	8/15/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study
Lab Order: 0208066

Lab ID: 0208066-31 **Collection Date:** 8/6/02
Client Sample ID: PR-7-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	15.1	0		wt%	1	8/15/02

Lab ID: 0208066-32 **Collection Date:** 8/6/02
Client Sample ID: PR-7-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	12.1	0		wt%	1	8/15/02

Lab ID: 0208066-33 **Collection Date:** 8/6/02
Client Sample ID: PR-1-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	1.3	0		wt%	1	8/15/02

Lab ID: 0208066-34 **Collection Date:** 8/6/02
Client Sample ID: PR-1-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	5.2	0		wt%	1	8/15/02

Lab ID: 0208066-35 **Collection Date:** 8/6/02
Client Sample ID: PR-3-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	3.3	0		wt%	1	8/15/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-36 **Collection Date:** 8/6/02
Client Sample ID: PR-2-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	10.1	0		wt%	1	8/15/02

Lab ID: 0208066-37 **Collection Date:** 8/6/02
Client Sample ID: PR-2-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	4.1	0		wt%	1	8/15/02

Lab ID: 0208066-38 **Collection Date:** 8/6/02
Client Sample ID: PR-3-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	4.5	0		wt%	1	8/16/02

Lab ID: 0208066-39 **Collection Date:** 8/6/02
Client Sample ID: PR-3-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	5.8	0		wt%	1	8/16/02

Lab ID: 0208066-40 **Collection Date:** 8/6/02
Client Sample ID: PR-2-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	4.6	0		wt%	1	8/16/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-41 **Collection Date:** 8/6/02
Client Sample ID: PR-8-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		D2216				Analyst: JEK
Percent Moisture	6.9	0		wt%	1	8/16/02

Lab ID: 0208066-42 **Collection Date:** 8/6/02
Client Sample ID: PR-4-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		D2216				Analyst: JEK
Percent Moisture	21.9	0		wt%	1	8/16/02

Lab ID: 0208066-43 **Collection Date:** 8/6/02
Client Sample ID: PR-4-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		D2216				Analyst: JEK
Percent Moisture	21.7	0		wt%	1	8/16/02

Lab ID: 0208066-44 **Collection Date:** 8/6/02
Client Sample ID: B-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		D2216				Analyst: JEK
Percent Moisture	6.1	0		wt%	1	8/16/02

Lab ID: 0208066-45 **Collection Date:** 8/6/02
Client Sample ID: PR-8-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		D2216				Analyst: JEK
Percent Moisture	4.3	0		wt%	1	8/16/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208066
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208066-46 **Collection Date:** 8/6/02
Client Sample ID: PR-10-9 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	12.6	0		wt%	1	8/16/02

Lab ID: 0208066-47 **Collection Date:** 8/6/02
Client Sample ID: PR-9-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	9.1	0		wt%	1	8/16/02

Lab ID: 0208066-48 **Collection Date:** 8/6/02
Client Sample ID: PR-10-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	2.0	0		wt%	1	8/16/02

Lab ID: 0208066-49 **Collection Date:** 8/6/02
Client Sample ID: PR-8-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	2.2	0		wt%	1	8/16/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *05-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208066
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Method Blank

Sample ID **MB-7555** Batch ID: **7555** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/12/02 6:20:25 PM** Prep Date **8/12/02**
Client ID: Run ID: **ICP-OPTIMA_020812B** SeqNo: **236556**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	1.168	2.5	mg/Kg									J

Sample ID **MB-7548** Batch ID: **7548** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/13/02 5:06:12 PM** Prep Date **8/10/02**
Client ID: Run ID: **ICP-OPTIMA_020813B** SeqNo: **237095**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	1.195	2.5	mg/Kg									J

Sample ID **MB-7572** Batch ID: **7572** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/16/02 1:39:39 PM** Prep Date **8/14/02**
Client ID: Run ID: **ICP-OPTIMA_020816B** SeqNo: **237874**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	ND	2.5	mg/Kg									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *05-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208066
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID **0208066-35AMS** Batch ID: **7555** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/12/02 8:28:27 PM** Prep Date **8/12/02**
Client ID: **PR-3-0** Run ID: **ICP-OPTIMA_020812B** SeqNo: **236583**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	502.4	3.0	mg/Kg-dry	243.3	270.2	95.4	75	125	0			

Sample ID **0208066-35AMSD** Batch ID: **7555** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/12/02 8:33:27 PM** Prep Date **8/12/02**
Client ID: **PR-3-0** Run ID: **ICP-OPTIMA_020812B** SeqNo: **236584**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	529.2	3.1	mg/Kg-dry	251.6	270.2	103	75	125	502.4	5.2	20	

Sample ID **0208066-01AMS** Batch ID: **7548** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/13/02 5:37:07 PM** Prep Date **8/10/02**
Client ID: **PR-6-9** Run ID: **ICP-OPTIMA_020813B** SeqNo: **237102**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	314	3.6	mg/Kg-dry	284.6	32.29	99	75	125	0			

Sample ID **0208066-01AMSD** Batch ID: **7548** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/13/02 5:42:11 PM** Prep Date **8/10/02**
Client ID: **PR-6-9** Run ID: **ICP-OPTIMA_020813B** SeqNo: **237103**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	307.3	3.6	mg/Kg-dry	285.3	32.29	96.4	75	125	314	2.16	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *05-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208066
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID **0208100-09AMS** Batch ID: **7572** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/16/02 2:02:50 PM** Prep Date **8/14/02**
Client ID: Run ID: **ICP-OPTIMA_020816B** SeqNo: **237879**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	710.8	3.2	mg/Kg-dry	259.9	453.2	99.1	75	125	0			

Sample ID **0208100-09AMSD** Batch ID: **7572** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/16/02 2:08:01 PM** Prep Date **8/14/02**
Client ID: Run ID: **ICP-OPTIMA_020816B** SeqNo: **237880**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	756.1	3.3	mg/Kg-dry	267.1	453.2	113	75	125	710.8	6.18	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *05-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208066
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID **LCS-7555** Batch ID: **7555** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/12/02 6:23:33 PM** Prep Date **8/12/02**
Client ID: Run ID: **ICP-OPTIMA_020812B** SeqNo: **236557**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	205.6	2.5	mg/Kg	200	1.168	102	80	120	0			

Sample ID **LCS-7548** Batch ID: **7548** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/13/02 5:09:09 PM** Prep Date **8/10/02**
Client ID: Run ID: **ICP-OPTIMA_020813B** SeqNo: **237096**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	202.8	2.5	mg/Kg	200	1.195	101	80	120	0			

Sample ID **LCS-7572** Batch ID: **7572** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/16/02 1:42:46 PM** Prep Date **8/14/02**
Client ID: Run ID: **ICP-OPTIMA_020816B** SeqNo: **237875**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	197.4	2.5	mg/Kg	200	0	98.7	80	120	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corporation

111 Herrick Street, Merrimack, NH 03054
TEL: (603) 424-2022 · FAX: (603) 429-8496

September 04, 2002

Jennifer Rogers
Camp Dresser & McKee Inc.
1001 Elm Street - Second Floor
Manchester, NH 031011845
TEL: (603) 222-8374
FAX: (603) 645-6891

RE: Exeter WTP Workorder No.: 0208088

Dear Jennifer Rogers:

AMRO Environmental Laboratories Corp. received 4 samples on 8/12/02 for the analyses presented in the following report.

AMRO operates a Quality Assurance Program which meets or exceeds National Environmental Laboratory Accreditation Conference (NELAC), state, and EPA requirements. A copy of the appropriate state and/or NELAC Certificate is attached.

The enclosed Sample Receipt Checklist details the condition of your sample(s) upon receipt. Please be advised that any unused sample volume and sample extracts will be stored for a period of 60 days from sample receipt date (90 days for samples from New York). After this time, AMRO will properly dispose of the remaining sample(s). If you require further analysis, or need the samples held for a longer period, please contact us immediately.

This report consists of a total of 15 pages. This letter is an integral part of your data report. All results in this project relate only to the sample(s) as received by the laboratory and documented in the Chain-of-Custody. This report shall not be reproduced except in full, without the written approval of the laboratory. If you have any questions regarding this project in the future, please refer to the Workorder Number above.

Sincerely,

Nancy Stewart
Vice President/LabDirector

AMRO Environmental Laboratories Corp.

Date: *21-Aug-02*

CLIENT: Camp Dresser & McKee Inc.
Project: Exeter WTP
Lab Order: 0208088
Date Received: 8/12/02

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date
0208088-01A	WTP-4-0	8/11/02
0208088-02A	WTP-4-3	8/11/02
0208088-03A	WTP-5-0	8/11/02
0208088-04A	WTP-5-3	8/11/02

AMRO Environmental Laboratories Corp.

21-Aug-02

Lab Order: 0208088
Client: Camp Dresser & McKee Inc.
Project: Exeter WTP

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208088-01A	WTP-4-0	8/11/02	Soil	ICP METALS, 3051/6010		8/15/02	8/15/02	7581
				Percent Moisture			8/16/02	R15182
0208088-02A	WTP-4-3			ICP METALS, 3051/6010		8/15/02	8/15/02	7581
				ICP METALS, 3051/6010		8/15/02	8/16/02	7581
				Percent Moisture			8/16/02	R15182
0208088-03A	WTP-5-0			ICP METALS, 3051/6010		8/15/02	8/15/02	7581
				ICP METALS, 3051/6010		8/15/02	8/16/02	7581
				Percent Moisture			8/16/02	R15182
0208088-04A	WTP-5-3			ICP METALS, 3051/6010		8/15/02	8/15/02	7581
				ICP METALS, 3051/6010		8/15/02	8/16/02	7581
				Percent Moisture			8/16/02	R15182

AM Environmental Laboratory Corporation
111 Herrick Street
Merrimack, NH 03054

CHAIN OF CUSTODY RECORD

4c236

Office: 424
Fax: (603) 429-8496

Project No.: Exeter	Project Name: Exeter WTP	Project Manager: ALTech	Samplers (Signature):	AMRO Project No.:
	Project State:			

Sample ID	Date/Time Sampled	Matrix (A= Air, S= Soil, GW= Ground W., WW= Waste W., DW= Drinking W., O= Oil, Other= Specify)	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead	Remarks
WTP-4-0	12:00	S	1G/8oz		X	X	
WTP-4-3	12:05	S	1G/8oz		X	X	
WTP-5-0	12:15	S	1G/8oz		X	X	
WTP-5-3	12:20	S	1G/8oz		X	X	

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To:	FAX No.:	Seal Intact? Yes No N/A	P.O. No:	GW-1* GW-2 GW-3
Jennifer Rogers 1011 Elm St Second Floor Manchester, NH 03104		Results Needed By:		MCP Level Needed: *= May require additional cost

Relinquished By	Date/ Time	Received By
	8/2/02 9:30A	

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. _____ BY: _____

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc;

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy

SHEET OF

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
(603) 424-2022

Client: COM
Project Name: Exeter WTP
Ship via: (circle one) Fed Ex., UPS, ~~AMRO Courier~~,
Hand Del., Other Courier, Other:

AMRO ID: 0208088
Date Rec.: 8/12/02
Date Due: 8/22/02

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?			✓	
2. Custody Seals present?			✓	
3. Custody Seals Intact?			✓	
4. Air Bill included in folder if received?			✓	
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 3°				
Samples rec. with ice ✓ ice packs___ neither___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓	✓		NO Date on ~~fax~~
10. Does the info on the COC match the samples?	✓	✓		Date on Sample 8/11/02
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?			✓	
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?			✓	
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:			✓	
What samples sent:				
Where sent:				
Date:				
Analysis:				
TAT:				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?	✓		~~✓~~ GG	
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: GG Date: 8-12-02 Logged in By: CC Date: 8-13-02
Labeled By: CC Date: 8-13-02 Checked By: MG Date: 8-13-02

NA= Not Applicable

State of New Hampshire
Environmental Laboratory Accreditation Program

Awards Primary Accreditation to

AMRO Environmental Laboratories Corporation
of
Merrimack, NH

For the analyses listed on the attached page(s) in accordance with the provisions of the NELAC Standards and Env-C 300.

Certificate Number: 100102

Date of Issue: July 20, 2002

Expiration Date: July 19, 2003

Charles M. Shyer
Program Manager

Continuing accreditation status is dependent on successful ongoing participation in the program.
Customers may verify the laboratory's current status by calling (603) 271-2991 or (603) 271-2998.

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 1 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

DRINKING WATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 200.9
Arsenic:	EPA 200.7
Arsenic:	EPA 200.9
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Boron:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.9
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.9
Silver:	EPA 200.7
Sodium:	EPA 200.7
Thallium:	EPA 200.9
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity	SM 2330 B
Chloride	EPA 300.0
Chloride	EPA 325.3
Chlorine, Free Residual:	SM 4500-Cl G
Conductivity	EPA 120.1
Cyanide, Total:	SM 4500-CN E
Fluoride	EPA 300.0
Fluoride	EPA 340.2
Hardness by Calculation:	EPA 200.7
Magnesium:	EPA 200.7
Nitrate:	EPA 300.0
Nitrate-N:	EPA 353.2
Nitrite:	EPA 353.2
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potassium:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS (Cont.)

Sulfate	EPA 300.0
Sulfate:	EPA 375.4
Total Filt. Residue (TDS):	EPA 160.1
Total Filt. Residue (TDS):	SM 2540C
Turbidity:	EPA 180.1

INDIVIDUAL DRINKING WATER ORGANIC CONTAMINANTS

DBCP:	EPA 504.1
EDB:	EPA 504.1

WASTEWATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 204.2
Arsenic:	EPA 200.7
Arsenic:	EPA 206.2
Arsenic:	D2972-93C
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Cobalt:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.7
Lead:	EPA 239.2
Manganese:	EPA 200.7
Mercury:	EPA 245.1
Molybdenum:	EPA 200.7
Nickel:	EPA 200.7
Selenium:	EPA 200.7
Selenium:	EPA 270.2
Silver:	EPA 200.7
Thallium:	EPA 279.2
Tin	EPA 200.7
Titanium	EPA 200.7
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

This certificate supercedes all previously issued certificates.

Program Manager

ACCREDITING nelap AUTHORITY

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

WASTEWATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity:	EPA 310.2
Ammonia-N:	EPA 350.2
BOD:	EPA 405.1
Chloride:	EPA 300.0
Chloride:	EPA 325.3
COD:	EPA 410.4
COD:	HACH 8000
Conductivity (Spec. Cond.):	EPA 120.1
Cyanide, Total:	EPA 335.2
Fluoride:	EPA 300.0
Hardness by Calculation:	EPA 200.7
Magnesium:	EPA 200.7
Nitrate-N:	EPA 300.0
Nitrate-Nitrite, Total:	EPA 353.2
Oil & Grease:	EPA 413.1
Orthophosphate:	EPA 300.0
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potassium:	EPA 200.7
Residue, Filterable (TDS):	EPA 160.1
Residue, Non-Filt.	EPA 160.2
Residue, Total:	EPA 160.3
Sodium:	EPA 200.7
Sulfate:	EPA 300.0
Sulfate:	EPA 375.4
TKN:	EPA 351.1
TKN:	EPA 351.3
Total Phosphorus:	EPA 365.2
Total Phenolics:	EPA 420.1

PCBs IN WASTEWATER

PCB-Aroclor 1016:	EPA 608
PCB-Aroclor 1221:	EPA 608
PCB-Aroclor 1232:	EPA 608
PCB-Aroclor 1242:	EPA 608
PCB-Aroclor 1248:	EPA 608
PCB-Aroclor 1254:	EPA 608
PCB-Aroclor 1260:	EPA 608

PESTICIDES IN WASTEWATER

Aldrin:	EPA 608

PESTICIDES IN WASTEWATER (Cont.)

a-BHC:	EPA 608
b-BHC:	EPA 608
d-BHC	EPA 608
g-BHC (Lindane):	EPA 608
Chlordane:	EPA 608
4,4-DDD:	EPA 608
4,4'-DDT:	EPA 608
Dieldrin:	EPA 608
Endosulfan I:	EPA 608
Endosulfan Sulfate:	EPA 608
Endrin:	EPA 608
Endrin Aldehyde:	EPA 608
Heptachlor:	EPA 608
Heptachlor Epoxide:	EPA 608
Methoxychlor:	EPA 608
Toxaphene:	EPA 608

VOLATILE ORGANICS IN WASTEWATER

1,1,1 Trichloroethane:	EPA 624
1,1,2,2-Tetrachloroethane:	EPA 624
1,1,2-Trichloroethane:	EPA 624
1,1-Dichloroethane:	EPA 624
1,1-Dichloroethene:	EPA 624
1,2 Dichloroethane:	EPA 624
1,2-Dichlorobenzene:	EPA 624
1,2-Dichloropropane:	EPA 624
1,3-Dichlorobenzene:	EPA 624
1,4-Dichlorobenzene	EPA 624
2-Chloroethylvinyl ether:	EPA 624
Acrolein:	EPA 624
Acrylonitrile:	EPA 624
Benzene:	EPA 624
Bromodichloromethane:	EPA 624
Bromoform:	EPA 624
Bromomethane:	EPA 624
Carbon Tetrachloride:	EPA 624
Chlorobenzene	EPA 624
Chloroethane:	EPA 624
Chloroform:	EPA 624
Chloromethane:	EPA 624
c-1,3-Dichloropropene:	EPA 624
Dibromochloromethane:	EPA 624
Dichlorodifluoromethane:	EPA 624

This certificate supercedes all previously issued certificates.

Program Manager

ACCREDITING nelap AUTHORITY

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 3 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

VOLATILE ORGANICS IN WASTEWATER (Cont.)

Ethylbenzene:	EPA 624
Methylene Chloride:	EPA 624
t-1,2-Dichloroethene:	EPA 624
t-1,3-Dichloropropene:	EPA 624
Tetrachloroethene:	EPA 624
Toluene:	EPA 624
Trichloroethene:	EPA 624
Trichlorofluoromethane:	EPA 624
Vinyl Chloride:	EPA 624

WASTEWATER SEMIVOLATILE ORGANICS

1,2,4-Trichlorobenzene:	EPA 625
2,4,5-Trichlorophenol:	EPA 625
2,4,6-Trichlorophenol:	EPA 625
2,4-Dichlorophenol:	EPA 625
2,4-Dimethylphenol:	EPA 625
2,4-Dinitrophenol:	EPA 625
2,4-Dinitrotoluene:	EPA 625
2,6-Dinitrotoluene:	EPA 625
2-Chloronaphthalene:	EPA 625
2-Chlorophenol:	EPA 625
2-Methyl-4,6-dinitrophenol:	EPA 625
2-Nitrophenol:	EPA 625
3,3-Dichlorobenzidine:	EPA 625
4-Bromophenyl phenyl ether:	EPA 625
4-Chloro-3-methylphenol:	EPA 625
4-Chlorophenyl phenyl ether:	EPA 625
4-Nitrophenol:	EPA 625
Acenaphthene:	EPA 625
Anthracene:	EPA 625
Benzidine:	EPA 625
Benzo(a)anthracene:	EPA 625
Benzo(a)pyrene:	EPA 625
Benzo(a,h)anthracene:	EPA 625
Benzo(b)fuoranthene:	EPA 625
Benzo(g,h,i)perylene:	EPA 625
Benzo(k)fuoranthene:	EPA 625
Benzyl butyl phthalate:	EPA 625
Bis(2-chloroethoxy) methane:	EPA 625
Bis(2-chloroethyl) ether:	EPA 625
Bis(2-chloroisopropyl) ether:	EPA 625
Bis(2-ethylhexyl) phthalate:	EPA 625
Chrysene:	EPA 625

WASTEWATER SEMIVOLATILE ORGANICS (Cont.)

Diethyl phthalate:	EPA 625
Dimethyl phthalate:	EPA 625
Di-n-butyl phthalate:	EPA 625
Di-n-octyl phthalate:	EPA 625
Fluoranthene:	EPA 625
Fluorene:	EPA 625
Hexachlorobenzene:	EPA 625
Hexachlorobutadiene:	EPA 625
Hexachlorocyclopentadiene:	EPA 625
Hexachloroethane:	EPA 625
Indeno(1,2,3-c,d)pyrene:	EPA 625
Isophorone:	EPA 625
Naphthalene	EPA 625
Nitrobenzene:	EPA 625
n-Nitrosodi-n-propylamine:	EPA 625
n-Nitrosodiphenylamine:	EPA 625
Pentachlorophenol:	EPA 625
Phenanthrene:	EPA 625
Phenol:	EPA 625
Pyrene:	EPA 625

This certificate supercedes all previously issued certificates.

Program Manager

CASE NARRATIVE
0208088

GENERAL

1. No QC deviations were observed.

TRACE METALS
SOIL

1. No QC deviations were observed.

AMRO Environmental Laboratories Corp.

Date: *04-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Project: Exeter WTP
Lab Order: 0208088

Lab ID: 0208088-01 **Collection Date:** 8/11/02
Client Sample ID: WTP-4-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	110	3.1		mg/Kg-dry	1	8/15/02 7:10:06 PM
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	1.8	0		wt%	1	8/16/02

Lab ID: 0208088-02 **Collection Date:** 8/11/02
Client Sample ID: WTP-4-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	20	3.3		mg/Kg-dry	1	8/16/02 11:18:21 AM
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	5.8	0		wt%	1	8/16/02

Lab ID: 0208088-03 **Collection Date:** 8/11/02
Client Sample ID: WTP-5-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	11	3.1		mg/Kg-dry	1	8/16/02 11:23:22 AM
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	6.8	0		wt%	1	8/16/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *04-Sep-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208088
Project: Exeter WTP

Lab ID: 0208088-04 **Collection Date:** 8/11/02
Client Sample ID: WTP-5-3 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS TOTAL SW-846 - 3051/6010		**SW6010B**				Analyst: **SJK**
Lead	8.4	3.1		mg/Kg-dry	1	8/16/02 11:28:22 AM
PERCENT MOISTURE		**D2216**				Analyst: **JEK**
Percent Moisture	5.5	0		wt%	1	8/16/02

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *04-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208088
Project: Exeter WTP

QC SUMMARY REPORT
Method Blank

Sample ID **MB-7581** Batch ID: **7581** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/15/02 5:58:57 PM** Prep Date **8/15/02**
Client ID: Run ID: **ICP-OPTIMA_020815A** SeqNo: **237580**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	ND	2.5	mg/Kg									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *04-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208088
Project: Exeter WTP

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID **0208092-01BMS** Batch ID: **7581** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/15/02 6:32:31 PM** Prep Date **8/15/02**
Client ID: Run ID: **ICP-OPTIMA_020815A** SeqNo: **237587**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	303.2	3.6	mg/Kg-dry	231.2	25.51	95.2	75	125	0			

Sample ID **0208092-01BMSD** Batch ID: **7581** Test Code: **SW6010B** Units: **mg/Kg-dry** Analysis Date **8/15/02 6:37:56 PM** Prep Date **8/15/02**
Client ID: Run ID: **ICP-OPTIMA_020815A** SeqNo: **237588**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	286.7	3.4	mg/Kg-dry	231.2	25.51	95.2	75	125	262.2	5.57	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *04-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208088
Project: Exeter WTP

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID **LCS-7581** Batch ID: **7581** Test Code: **SW6010B** Units: **mg/Kg** Analysis Date **8/15/02 6:02:16 PM** Prep Date **8/15/02**
Client ID: Run ID: **ICP-OPTIMA_020815A** SeqNo: **237581**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	192.7	2.5	mg/Kg	200	0	96.4	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corporation

111 Herrick Street, Merrimack, NH 03054
TEL: (603) 424-2022 · FAX: (603) 429-8496

September 11, 2002

Jennifer Rogers
Camp Dresser & McKee Inc.
1001 Elm Street - Second Floor
Manchester, NH 031011845
TEL: (603) 222-8374
FAX: (603) 645-6891

RE: 36493 Exeter Lead Shot Study

Workorder No.: 0208204

Dear Jennifer Rogers:

AMRO Environmental Laboratories Corp. received 4 samples on 8/26/02 for the analyses presented in the following report.

AMRO operates a Quality Assurance Program which meets or exceeds National Environmental Laboratory Accreditation Conference (NELAC), state, and EPA requirements. A copy of the appropriate state and/or NELAC Certificate is attached.

The enclosed Sample Receipt Checklist details the condition of your sample(s) upon receipt. Please be advised that any unused sample volume and sample extracts will be stored for a period of 60 days from sample receipt date (90 days for samples from New York). After this time, AMRO will properly dispose of the remaining sample(s). If you require further analysis, or need the samples held for a longer period, please contact us immediately.

This report consists of a total of 16 pages. This letter is an integral part of your data report. All results in this project relate only to the sample(s) as received by the laboratory and documented in the Chain-of-Custody. This report shall not be reproduced except in full, without the written approval of the laboratory. If you have any questions regarding this project in the future, please refer to the Workorder Number above.

Sincerely,

Nancy Stewart
Vice President/LabDirector

AMRO Environmental Laboratories Corp.

Date: *30-Aug-02*

CLIENT:	Camp Dresser & McKee Inc.
Project:	36493 Exeter Lead Shot Study
Lab Order:	0208204
Date Received:	8/26/02

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date
0208204-01A	PR-6-0	8/6/02
0208204-02A	Wtl-2	8/6/02
0208204-03A	B-2	8/6/02
0208204-04A	PR-14-0	8/6/02

AMRO Environmental Laboratories Corp.

30-Aug-02

Lab Order: 0208204
Client: Camp Dresser & McKee Inc.
Project: 36493 Exeter Lead Shot Study

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0208204-01A	PR-6-0	8/6/02	Soil	ICP METALS, TCLP	8/28/02	8/29/02	8/30/02	7653
0208204-02A	Wtl-2			ICP METALS, TCLP	8/28/02	8/29/02	8/30/02	7653
0208204-03A	B-2			ICP METALS, TCLP	8/28/02	8/29/02	8/30/02	7653
0208204-04A	PR-14-0			ICP METALS, TCLP	8/28/02	8/29/02	8/30/02	7653

Merrimack, NH 03054

Fax: (603) 429-8496

Project No.: 36453	Project Name: Exeter Lead Shot Study			Project Manager: Al LeBlanc	Samplers (Signature): [illegible] / Sarah Haight	AMRO Project No.: 0208066
	Project State: New Hampshire					

Sample ID	Date/Time Sampled	Matrix A= Air S= Soil GW= Ground W. WW= Waste W. DW= Drinking W. O= Oil Other= Specify	Total # of Cont. & Size	Comp	Grab	Lead	TCLP Lead	Remarks
PR-6-9	8/6 11:34	S	1G 8oz		X	X		Additional analyses for TCLP Lead
PR-6-0	8/6 11:20	S	1G 8oz		X	X	X	
B-1	8/6 12:12	S	1G 8oz		X	X		
PR-6-3	8/6 11:28	S	1G 8oz		X	X		
PR-5-6	8/6 11:00	S	1G 8oz		X	X		
PR-5-9	8/6 11:15	S	1G 8oz		X	X		
WH-1	8/6 11:40	S	1G 8oz		X	X		
PR-5-3	8/6 11:05	S	1G 8oz		X	X		
WH-2	8/6 11:45	S	1G 8oz		X	X	X	
B-2	8/6 12:10	S	1G 8oz		X	X	X	

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To: Jennifer Rogers
CDM
1001 Elm St, Second Floor
Manchester, NH 03101

FAX No.:

Seal Intact? Yes No N/A

P.O. No:

GW-1* ____ GW-2 ____ GW-3 ____

MCP Level Needed:

Results Needed By:

*= May require additional cost

Relinquished By	Date/Time	Received By
Sarah Haight	8/7/02 4:1[illegible]	[signature]
[signature]	[illegible]	C Coakley

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded **AUTHORIZATION NUMBER.**

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. ____________ BY: ____________

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc:
Some samples w/ ID's ending in '0' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy SHEET ____ OF ____

Ferri... ...et
Merrimack, NH 03054

Project No.: 36493	Project Name: Exeter Lead Shot Study					Project Manager: Al LeBlanc	Samplers (Signature):	AMRO Project No.: 0208066
	Project State:							
Sample ID	Date/Time Sampled	Matrix A= Air S= Soil GW= Ground W. WW= Waste W. DW= Drinking W. O= Oil Other= Specify	Total # of Cont. & Size	Comp	Grab	Analysis Required: Lead	TCLP-Lead	Remarks
PR-14-0	8/6 4:55	S	16/8oz		X	X	X	additional analysis for TCLP lead
PR-13-9	8/6 4:45	S	16/8oz		X	X		
PR-12-0	8/6 4:30	S	16/8oz		X	X		
PR-11-0	8/6 3:55	S	16/8oz		X	X		
PR-11-3	8/6 4:00	S	16/8oz		X	X		
PR-13-3	8/6 4:40	S	16/8oz		X	X		
PR-10-0	8/6 3:35	S	16/8oz		X	X		
PR-7-9	8/6 2:50	S	16/8oz		X	X		
PR-1-15	8/6 2:20	S	16/8oz		X	X		
PR-1-9	8/6 2:15	S	16/8oz		X	X		

Preservative: Cl-HCl, MeOH, N-HN03, S-H2SO4, Na-NaOH, O- Other

Container Type: P- Plastic, G-Glass, V-Vial, T- Teflon, O-Other

Send Results To: Jennifer Rogers, CDM, 1001 Elm St 2nd Floor, Manchester NH 03101

FAX No.:

Seal Intact? Yes No N/A

P.O. No:

GW-1* GW-2 GW-3

MCP Level Needed:

*= May require additional cost

Results Needed By:

Relinquished By	Date/Time	Received By
Sarah Haight	8/7/02 4:11	[signature]
[signature]	8/8/02 10:40	C Cearley

PRIORITY TURNAROUND TIME AUTHORIZATION

Before submitting samples for expedited TAT, you must have requested in advance and received a coded AUTHORIZATION NUMBER.

Samples arriving after 12:00 noon will be tracked and billed as received on the following day.

AUTHORIZATION No. BY:

Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved.

NOTES: Preservatives, Special reporting limits, Known Contamination, etc: Some samples ending in '0' or '3' may have high levels of lead

AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.

White: Lab Copy Yellow: Accompanies Report Pink: Client Copy SHEET OF

qc/qcmemos/forms/amrococ/Rev.2 04/01/02

CDM Fax

CDM

1001 Elm Street, Second Floor
Manchester, New Hampshire 03101-1845
phone (general): (603) 222-8300
fax (general): (603) 645-6891

To:	Denise	**From:**	Jennifer Rogers
Organization:	Amro Environmental	**Date:**	August 23, 2002
Fax No.:	603-429-8496	**Time:**	11:30AM
Re:	Additional Analyses	**Job #:**	
# of Pages: (including cover sheet)	3		

Message:

Denise,
Please see attached copies of COC for Exeter, NH project. The COCs indicate the addition of TCLP-Lead for sample IDs: PR-14-0, PR-6-0, Wtl-2, and B-2. Standard turn-around time. Please let me know if you have any questions !

Thank you.

Jen Rogers

Also, Please continue to hold all of the soil samples. Once we are sure we have selected all analyses we will be requesting the soil samples back. Thank you!

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
(603) 424-2022

Client: CDM
Project Name: EXETER LEAD SHOT STUDY
Ship via: (circle one) Fed Ex., UPS (AMRO Courier)
Hand Del., Other Courier, Other:

AMRO ID: 0208066
Date Rec.: 8-7-02
Date Due: 8-19-02

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?			✓	
2. Custody Seals present?			✓	
3. Custody Seals Intact?			✓	
4. Air Bill included in folder if received?			✓	
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 2°				
Samples rec. with ice ✓ ice packs ___ neither ___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?			✓	
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:			✓	
What samples sent:				
Where sent:				
Date:				
Analysis:				
TAT:				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?	✓			
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: CC Date: 8-7-02 Logged in By: CC Date: 8-9-02
Labeled By: CC Date: 8-7-02

State of New Hampshire
Environmental Laboratory Accreditation Program

Awards Primary Accreditation to

AMRO Environmental Laboratories Corporation
of
Merrimack, NH

For the analyses listed on the attached page(s) in accordance with the provisions of the NELAC Standards and Env-C 300.

Certificate Number: 100102

Date of Issue: July 20, 2002

Expiration Date: July 19, 2003

Program Manager

Continuing accreditation status is dependent on successful ongoing participation in the program.
Customers may verify the laboratory's current status by calling (603) 271-2991 or (603) 271-2998.

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 1 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

DRINKING WATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 200.9
Arsenic:	EPA 200.7
Arsenic:	EPA 200.9
Barium:	EPA 200.7
Beryllium:	EPA 200.7
Boron:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Copper:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.9
Manganese:	EPA 200.7
Marcury:	EPA 245.1
Molybdanum:	EPA 200.7
Nickel:	EPA 200.7
Salanium:	EPA 200.9
Silvar:	EPA 200.7
Sodium:	EPA 200.7
Thallium:	EPA 200.9
Venadium:	EPA 200.7
Zinc:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkelinity	SM 2330 B
Chloride	EPA 300.0
Chloride	EPA 325.3
Chlorine, Free Residuel:	SM 4500-Cl G
Conductivity	EPA 120.1
Cyanide, Totel:	SM 4500-CN E
Fluorida	EPA 300.0
Fluorida	EPA 340.2
Herdnass by Celculetion:	EPA 200.7
Magnasium:	EPA 200.7
Nitrata:	EPA 300.0
Nitreta-N:	EPA 353.2
Nitrite:	EPA 353.2
Orthophosphata:	EPA 365.2
pH:	EPA 150.1
Potessium:	EPA 200.7

DRINKING WATER INORGANIC CONTAMINANTS (Cont.)

Sulfate	EPA 300.0
Sulfata:	EPA 375.4
Total Filt. Rasidue (TDS):	EPA 160.1
Total Filt. Rasidua (TDS):	SM 2540C
Turbidity:	EPA 180.1

INDIVIDUAL DRINKING WATER ORGANIC CONTAMINANTS

DBCP:	EPA 504.1
EDB:	EPA 504.1

WASTEWATER METALS

Aluminum:	EPA 200.7
Antimony:	EPA 200.7
Antimony:	EPA 204.2
Arsanic:	EPA 200.7
Arsanic:	EPA 206.2
Arsenic:	D2972-93C
Barium:	EPA 200.7
Baryllium:	EPA 200.7
Cadmium:	EPA 200.7
Calcium:	EPA 200.7
Chromium:	EPA 200.7
Cobalt:	EPA 200.7
Coppar:	EPA 200.7
Iron:	EPA 200.7
Lead:	EPA 200.7
Laad:	EPA 239.2
Manganesa:	EPA 200.7
Mercury:	EPA 245.1
Molybdanum:	EPA 200.7
Nickal:	EPA 200.7
Selenium:	EPA 200.7
Selenium:	EPA 270.2
Silver:	EPA 200.7
Thallium:	EPA 279.2
Tin	EPA 200.7
Titanium	EPA 200.7
Vanadium:	EPA 200.7
Zinc:	EPA 200.7

This certificate supercedes all praviously issuad certificatas.

Program Managar

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 2 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

WASTEWATER INORGANIC CONTAMINANTS

Alkalinity:	EPA 310.1
Alkalinity:	EPA 310.2
Ammonia-N:	EPA 350.2
BOD:	EPA 405.1
Chloride:	EPA 300.0
Chloride:	EPA 325.3
COD:	EPA 410.4
COD:	HACH 8000
Conductivity (Spec. Cond.):	EPA 120.1
Cyanide, Total:	EPA 335.2
Fluoride:	EPA 300.0
Herdness by Calculetion:	EPA 200.7
Magnesium:	EPA 200.7
Nitrete-N:	EPA 300.0
Nitrete-Nitrite, Totel:	EPA 353.2
Oil & Greese:	EPA 413.1
Orthophosphate:	EPA 300.0
Orthophosphate:	EPA 365.2
pH:	EPA 150.1
Potessium:	EPA 200.7
Residue, Filterable (TDS):	EPA 160.1
Residue, Non-Filt.	EPA 160.2
Residue, Total:	EPA 160.3
Sodium:	EPA 200.7
Sulfate:	EPA 300.0
Sulfete:	EPA 375.4
TKN:	EPA 351.1
TKN:	EPA 351.3
Total Phosphorus:	EPA 365.2
Total Phenolics:	EPA 420.1

PCBs IN WASTEWATER

PCB-Aroclor 1016:	EPA 608
PCB-Aroclor 1221:	EPA 608
PCB-Aroclor 1232:	EPA 608
PCB-Aroclor 1242:	EPA 608
PCB-Aroclor 1248:	EPA 608
PCB-Aroclor 1254:	EPA 608
PCB-Aroclor 1260:	EPA 608

PESTICIDES IN WASTEWATER

Aldrin:	EPA 608

PESTICIDES IN WASTEWATER (Cont.)

a-BHC:	EPA 608
b-BHC:	EPA 608
d-BHC	EPA 608
g-BHC (Lindene):	EPA 608
Chlordene:	EPA 608
4,4-DDD:	EPA 608
4,4'-DDT:	EPA 608
Dieldrin:	EPA 608
Endosulfen I:	EPA 608
Endosulfan Sulfete:	EPA 608
Endrin:	EPA 608
Endrin Aldehyde:	EPA 608
Heptechlor:	EPA 608
Heptechlor Epoxide:	EPA 608
Methoxychlor:	EPA 608
Toxephene:	EPA 608

VOLATILE ORGANICS IN WASTEWATER

1,1,1 Trichloroethene:	EPA 624
1,1,2,2-Tetrachloroethene:	EPA 624
1,1,2-Trichloroethene:	EPA 624
1,1-Dichloroethene:	EPA 624
1,1-Dichloroethene:	EPA 624
1,2 Dichloroethane:	EPA 624
1,2-Dichlorobenzene:	EPA 624
1,2-Dichloropropene:	EPA 624
1,3-Dichlorobenzene:	EPA 624
1,4-Dichlorobenzene	EPA 624
2-Chloroethylvinyl ether:	EPA 624
Acrolein:	EPA 624
Acrylonitrile:	EPA 624
Benzene:	EPA 624
Bromodichloromethene:	EPA 624
Bromoform:	EPA 624
Bromomethene:	EPA 624
Carbon Tetrechloride:	EPA 624
Chlorobenzene	EPA 624
Chloroethane:	EPA 624
Chloroform:	EPA 624
Chloromethene:	EPA 624
c-1,3-Dichloropropene:	EPA 624
Dibromochloromethene:	EPA 624
Dichlorodifluoromethane:	EPA 624

This certificate supercedes all previously issued certificates.

Program Meneger

NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

AMRO Environmental Laboratories Corp., 111 Herrick St., Merrimack, NH 03054 603) 424-2022
Certificate Number: 100102-B Date of Issue: July 20, 2002 Expiration Date: July 19, 2003 Page 3 of 3

GRANTS PRIMARY ACCREDITATION TO THE ABOVE MENTIONED LABORATORY FOR THE FOLLOWING ANALYSES:

VOLATILE ORGANICS IN WASTEWATER (Cont.)

Ethylbenzene:	EPA 624
Methylene Chloride:	EPA 624
t-1,2-Dichloroethene:	EPA 624
t-1,3-Dichloropropene:	EPA 624
Tetrachloroethene:	EPA 624
Toluene:	EPA 624
Trichloroethene:	EPA 624
Trichlorofluoromethene:	EPA 624
Vinyl Chloride:	EPA 624

WASTEWATER SEMIVOLATILE ORGANICS

1,2,4-Trichlorobenzene:	EPA 625
2,4,5-Trichlorophenol:	EPA 625
2,4,6-Trichlorophenol:	EPA 625
2,4-Dichlorophenol:	EPA 625
2,4-Dimethylphenol:	EPA 625
2,4-Dinitrophenol:	EPA 625
2,4-Dinitrotoluene:	EPA 625
2,6-Dinitrotoluene:	EPA 625
2-Chloronaphthelene:	EPA 625
2-Chlorophenol:	EPA 625
2-Methyl-4,6-dinitrophenol:	EPA 625
2-Nitrophenol:	EPA 625
3,3-Dichlorobenzidine:	EPA 625
4-Bromophenyl phenyl ether:	EPA 625
4-Chloro-3-methylphenol:	EPA 625
4-Chlorophenyl phenyl ether:	EPA 625
4-Nitrophenol:	EPA 625
Acenephthene:	EPA 625
Anthracene:	EPA 625
Benzidine:	EPA 625
Benzo(e)enthrecene:	EPA 625
Benzo(e)pyrene:	EPA 625
Benzo(a,h)anthrecene:	EPA 625
Benzo(b)fuoranthene:	EPA 625
Benzo(g,h,i)perylene:	EPA 625
Benzo(k)fuoranthene:	EPA 625
Benzyl butyl phthalate:	EPA 625
Bis(2-chloroethoxy) methane:	EPA 625
Bis(2-chloroethyl) ether:	EPA 625
Bis(2-chloroisopropyl) ether:	EPA 625
Bis(2-ethylhexyl) phthalate:	EPA 625
Chrysene:	EPA 625

WASTEWATER SEMIVOLATILE ORGANICS (Cont.)

Diethyl phthalate:	EPA 625
Dimethyl phthalate:	EPA 625
Di-n-butyl phthalate:	EPA 625
Di-n-octyl phthalate:	EPA 625
Fluoranthene:	EPA 625
Fluorene:	EPA 625
Hexachlorobenzene:	EPA 625
Hexachlorobutediene:	EPA 625
Hexachlorocyclopentadiene:	EPA 625
Hexachloroethane:	EPA 625
Indeno(1,2,3-c,d)pyrene:	EPA 625
Isophorone:	EPA 625
Naphthalene	EPA 625
Nitrobenzene:	EPA 625
n-Nitrosodi-n-propylamine:	EPA 625
n-Nitrosodiphenylamine:	EPA 625
Pentachlorophenol:	EPA 625
Phenanthrene:	EPA 625
Phenol:	EPA 625
Pyrene:	EPA 625

This certificate supercedes all previously issuad certificates.

Program Manager

CASE NARRATIVE
0208204

GENERAL

1. No QC deviations were observed.

TRACE METALS
SOIL

1. No QC deviations were observed.

AMRO Environmental Laboratories Corp.

Date: *30-Aug-02*

CLIENT: Camp Dresser & McKee Inc. **Lab Order:** 0208204
Project: 36493 Exeter Lead Shot Study

Lab ID: 0208204-01 **Collection Date:** 8/6/02
Client Sample ID: PR-6-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TCLP		**SW1311/6010B**				Analyst: **SJK**
Lead	460	0.25		mg/L	1	8/30/02 12:04:47 AM

Lab ID: 0208204-02 **Collection Date:** 8/6/02
Client Sample ID: Wtl-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TCLP		**SW1311/6010B**				Analyst: **SJK**
Lead	3.2	0.25		mg/L	1	8/30/02 12:10:15 AM

Lab ID: 0208204-03 **Collection Date:** 8/6/02
Client Sample ID: B-2 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TCLP		**SW1311/6010B**				Analyst: **SJK**
Lead	680	0.25		mg/L	1	8/30/02 12:15:42 AM

Lab ID: 0208204-04 **Collection Date:** 8/6/02
Client Sample ID: PR-14-0 **Matrix:** SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS, TCLP		**SW1311/6010B**				Analyst: **SJK**
Lead	1.1	0.25		mg/L	1	8/30/02 12:29:58 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

AMRO Environmental Laboratories Corp.

Date: *11-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208204
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Method Blank

Sample ID **MB-7653** Batch ID: **7653** Test Code: **SW1311/6010** Units: **mg/L** Analysis Date **8/29/02 11:06:53 PM** Prep Date **8/29/02**
Client ID: Run ID: **ICP-OPTIMA_020829A** SeqNo: **240313**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	ND	0.25	mg/L									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: *11-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208204
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID **0208215-01AMS** Batch ID: **7653** Test Code: **SW1311/6010** Units: **mg/L** Analysis Date **8/29/02 11:42:47 PM** Prep Date **8/29/02**
Client ID: Run ID: **ICP-OPTIMA_020829A** SeqNo: **240318**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	9.56	0.25	mg/L	10	0	95.6	75	125	0			

Sample ID **0208215-01AMSD** Batch ID: **7653** Test Code: **SW1311/6010** Units: **mg/L** Analysis Date **8/29/02 11:48:21 PM** Prep Date **8/29/02**
Client ID: Run ID: **ICP-OPTIMA_020829A** SeqNo: **240319**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	9.722	0.25	mg/L	10	0	97.2	75	125	9.56	1.68	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: *11-Sep-02*

CLIENT: Camp Dresser & McKee Inc.
Work Order: 0208204
Project: 36493 Exeter Lead Shot Study

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID **LCS-7653** Batch ID: **7653** Test Code: **SW1311/6010** Units: **mg/L** Analysis Date **8/29/02 11:12:14 PM** Prep Date **8/29/02**
Client ID: Run ID: **ICP-OPTIMA_020829A** SeqNo: **240314**

Analyte	QC Sample Result	RL	Units	QC Spike Amount	Original Sample Result	%REC	LowLimit	HighLimit	Original Sample or MS Result	%RPD	RPDLimit	Qua
Lead	9.681	0.25	mg/L	10	0	96.8	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank
NA - Not applicable where J values or ND results occur

Appendix C

Appendix C

Memorandum Regarding Geotechnical Test Pit Findings

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Michael Oakland, Ph.D., P.E.*

Date: *May 7, 2003*

Subject: *Preliminary Subsurface Explorations*
Water Treatment Plant
Exeter, New Hampshire

Introduction

This memorandum summarizes our Phase I subsurface investigations and conceptual level foundation design recommendations for the proposed Water Treatment Plant in Exeter, New Hampshire. A detailed subsurface investigation should be conducted for the detailed design phase. The purpose of this preliminary investigation was to attempt to identify potential for shallow bedrock at the site of the treatment plant and along the alignments of the proposed utilities.

The treatment plant will be located on the northern shore of Exeter Reservoir replacing the existing plant currently located at the western end of the reservoir. The plant will include a Control and Administration Building with up to four treatment modules. The footprint of the building and treatment modules is an "L" shape, covering some 16,000 square feet. The work also includes a 400,000-gallon clearwell beneath the plant and two lined earthen washwater/solids holding cells.

Site and Subsurface Conditions

Existing Site Conditions

The proposed water treatment plant will be located off Portsmouth Avenue, on the east side of the Portsmouth Avenue and south side of Holland Way. The ground surface at the site ranges from approximately El. 40 to El. 55 at the location of the proposed structures.

Subsurface Investigation

Nine test pits, TP-1 to TP-7, TP-8A and TP-8B, were excavated to investigate the shallow subsurface conditions at the site. Since there was an obstruction at relatively shallower depth at the originally planned location of Test Pit TP-8, designated as TP-8A, another test pit, designated as TP-8B, was excavated in the vicinity. The test pits were excavated by

M. Bradsher Excavation, arranged by the Town, using a truck-mounted backhoe on September 3, 2002. Depths of the test pits ranged from 7 feet to 11 feet below the existing ground surface. Upon completion of the excavation, all test pits were backfilled with the material excavated.

The surveyed locations of the test pits are shown in Figure 1 and test pit logs are attached.

Subsurface Conditions

Surface conditions at the vicinity of the proposed structures consisted of approximately 0.4 feet to approximately 1 foot of topsoil. Fill, ranging from approximately 2 feet to approximately 7 feet in thickness, was encountered in all the test pits except Test Pits TP-1 and TP-8 below the topsoil. Fill consisted of light/dark brown sand with varying amounts of silt and gravel. Light brown fine to medium sand with little silt was encountered below the natural topsoil. The thickness of this layer was ranging from approximately 2 feet to approximately 3 feet. Below this layer, gray/blue mottled clay with varying amount of silt was encountered in most of the test pits. There was an obstruction at the bottom of Test Pits TP-3, TP-5, TP-7, TP-8A, and TP-8B. It is possible that there may be either large boulders or bedrock at those locations.

Large boulders, approximately 5 feet in diameter, were observed at the ground surface in the vicinity of the test pits.

Groundwater was not encountered in any of the test pit excavations.

The interpretation of general subsurface conditions presented herein is based on conditions observed at the test pit locations. However, subsurface conditions may vary at locations other than the test pits. In addition, groundwater levels will change with time, season, temperature, and construction activities in the area, as well as other factors. Groundwater conditions at the time of construction may be different from those found in the explorations.

Preliminary Foundation Design Recommendations

Based on the test pits, it appears that the proposed water treatment plant structures can be supported on spread footings within the naturally deposited inorganic soils, clay, silt or sand and gravel layers or deeper underlying strata, or on compacted structural fill directly over the suitable bearing soils after the removal of the overlying topsoil, fill or other unsuitable material. Allowable bearing capacity and other foundation design criteria will be determined based on the proposed test borings and review of the proposed structures.

Construction Considerations

Depending on the depths of the proposed structures, it appears that bedrock and/or boulder excavation may be required. The test boring program should include coring to confirm the existence of bedrock and/or boulders which may require blasting as part of the sitework.

Recommendations for Further Explorations

Recommendations given in this memorandum are conceptual level foundation design recommendations and detailed subsurface investigations should be conducted for the detailed design phase.

Attachments:

Test Pit Location Plan
Test Pit Logs

NOTES:

1. BASE MAPPING PROVIDED BY CARTOGRAPHIC ASSOCIATES, INC. OF LITTLETON, NEW HAMPSHIRE. COM ASSUMES PARCEL LIMITS WERE DEVELOPED THROUGH TAX MAP SCANNING AND TOPOGRAPHY WAS DEVELOPED FROM AERIAL SURVEY CAUSING THESE NOT TO ALIGN PRECISELY. DETAILED PROFESSIONAL LAND SURVEY TO BE PROCURED IN SUBSEQUENT PHASE OF DESIGN.
2. APPROXIMATE FLOOD PLAIN LIMITS SHOWN PER FEMA FLOOD INSURANCE STUDY FOR EXETER, NEW HAMPSHIRE.
3. WETLANDS MITIGATION/REPLACEMENT WILL BE REQUIRED IN NOTED AREAS OF IMPACTED WETLANDS.
4. LEAD SAMPLE ID ASSOCIATIONS ARE AS FOLLOWS:
   B-X: EXISTING RIFLE RANGE SOIL BERM
   WTP-X: PROPOSED WATER TREATMENT PLANT STRUCTURES
   WTL-X: WETLAND IN THE SOUTHEAST CORNER OF THE SITE
   PR-X: EXISTING (OR PRESENT) TRAP RANGE.

PRELIMINARY EDGE OF WETLAND

PROCESS & ADMIN BUILDING

ROUTE 88 CONNECTOR

EXETER RESERVOIR

EXISTING RIFLE RANGE

100-YEAR & 500-YEAR FLOOD PLAIN LIMITS

2-CELL WASHWATER/ SOLIDS HOLDING LAGOON

SEE NOTE 3

ELECTRICAL TRANSFORMER

PROPOSED DRIVEWAY

EXETER & HAMPTON ELECTRIC COMPANY EASEMENT

GROUND OBSCURED

POLE

TEST PIT GROUND SURFACE ELEVATIONS (NAVD 88)

TEST PIT ID.	ELEVATION (FEET)
TP 1	42.40
TP 2	52.51
TP 3	53.31
TP 4	50.43
TP 5	55.22
TP 6	51.82
TP 7	49.32
TP 8A	52.02
TP 8B	52.58

LEGEND:

- TP 1 ⊠ TEST PIT LOCATION
- WTP-4 ⊕ (CONC) LEAD SAMPLE LOCATION AND RESULTING CONCENTRATION (mg/kg)
- ▲ SURFACE WATER SAMPLE

PLAN
1" = 50'
25 0 50

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: A. LEBLANC
DRAWN BY: N.CAMPBELL
SHEET CHK'D BY: A. LEBLANC
CROSS CHK'D BY: J.DIERCKS
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

LEAD SAMPLING AND TEST PITS
LOCATION PLAN

PROJECT NO. 0260-38493
FILE NAME: \CIVL\CSTPL009

FIGURE NO.
1
0260-XXXXX

C:\Projects\0260\38493\CIVL\CSTPL009.dwg May 06, 2003 - 10:02am szawlowskip

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-1
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.7' Topsoil. Moist, dark brown, SAND, trace silt with organics (roots).		E
1			
	0.7'-3' Dry, light brown, f-m SAND, little silt, trace c sand.		E
2			
3			
	3'-9' Dry, gray mottled CLAY, little silt.		M-D
4			
5			
6			
7			
8			
9			
	BOE @ 9 feet		
10			
11			
12			

T.P. DIMENSIONS
Width (ft): 3
Length (ft): 10
Depth (ft): 9
Vol (ft^3):

TEST PIT PLAN

N ⇧

BOULDER COUNT
6 in-12 in: 2
12 in-18 in:
18 in-24 in:
24 in-30 in:

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks:

Updated On: 04/09/01

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-2
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-1' Topsoil. Moist, dark brown, SAND, little gravel, trace silt with organics (roots).		M
1			
	1'-4' Dry, brown, SAND, some gravel with occasional boulders (FILL).		M
2			
3			
4			
	4'-5' Dry, dark brown, SAND, trace silt with organics (roots).		E
5			
	5'-7' Dry, light brown, SAND, little silt.		E
6			
7			
	7'-11' Dry, gray/brown mottled, CLAY, some silt.		D
8			
9			
10			
11			
	BOE @ 11 feet		
12			

T.P. DIMENSIONS
Width (ft): 3
Length (ft): 12
Depth (ft): 11
Vol (ft^3):

TEST PIT PLAN

N ⇧

BOULDER COUNT
6 in-12 in: 3
12 in-18 in: 3
18 in-24 in:
24 in-30 in:

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks:

Updated On: 04/09/01

CDM

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One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-3
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.4' Topsoil. Moist, light brown, SAND, little silt with organics (roots).		E
1			
	0.4'-5' Dry, light brown, SAND, some gravel, little silt with organics (roots).		M-D
2			
3			
4			
5			
	5'-7' Dry, light brown, f-m SAND, little silt, trace c sand with organics (roots).		M
6			
7			
	7'-10' Dry, light brown, f-m SAND and GRAVEL, little silt.		D
8			
9			
10			
	Refusal @ 10 feet		
11			
12			

T.P. DIMENSIONS	
Width (ft):	3
Length (ft):	15
Depth (ft):	10
Vol (ft^3):	

TEST PIT PLAN

N ⇧

BOULDER COUNT	
6 in-12 in:	2
12 in-18 in:	1
18 in-24 in:	2
24 in-30 in:	

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT

E : Easy
M : Moderate
D : Difficult

Remarks: Moved test pit location towards east to the edge of the slope.

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-4
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.4' Topsoil. Moist, light brown, SAND, little silt with organics (roots).		E
1			
	0.4'-3' Dry, light brown, SAND, some gravel, little silt with organics (roots).		M
2			
3			
	3'-7' Dry, light/dark brown, SAND, some silt, trace gravel.		M
4			
5			
6			
7			
	7'-10' Dry, gray/blue, SILT, some clay, little sand with organics (large tree roots).		M-D
8			
9			
10			
	BOE @ 10 feet		
11			
12			

T.P. DIMENSIONS	
Width (ft):	3
Length (ft):	15
Depth (ft):	10
Vol (ft^3):	

TEST PIT PLAN

N ⇧

BOULDER COUNT	
6 in-12 in:	5
12 in-18 in:	1
18 in-24 in:	
24 in-30 in:	

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks: Moved test pit location towards west to the edge of the slope.

Updated On: 04/09/01

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-5
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.8' Topsoil. Moist, dark brown, SAND, little gravel, trace silt with organics (roots).		E
1			
	0.8'-3' Dry, light brown, SAND, some gravel, trace silt with occasional boulders (FILL).		M
2			
3			
	3'-3.8' Dry, dark brown, SAND, trace silt with organics (roots).		M
4			
	3.8'-5' Dry, light brown, SAND, some silt.		M
5			
	5'-10' Dry, gray/blue CLAY, some silt.		D
6			
7			
8			
9			
10			
	Refusal @ 10 feet		
11			
12			

T.P. DIMENSIONS	
Width (ft):	3
Length (ft):	10
Depth (ft):	10
Vol (ft^3):	

TEST PIT PLAN

N ⇧

BOULDER COUNT	
6 in-12 in:	2
12 in-18 in:	3
18 in-24 in:	1
24 in-30 in:	

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks: There are some big boulders, ~5 feet, on the ground surface in the vicinity of test pit.

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-6
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.5' Topsoil. Moist, light brown, SAND, little silt with organics (roots).		E
1			
	0.5'-2' Dry, light brown, SAND, some gravel, trace silt with occasional boulders (FILL).		D
2			
	2'-7' Dry, gray, SILT, some clay, little fine sand with organics (roots).		D
3			
4			
5			
6			
7			
	7'-11' Moist, gray SILT and CLAY.		D
8			
9			
10			
11			
	BOE @ 11 feet		
12			

T.P. DIMENSIONS
Width (ft): 3
Length (ft): 15
Depth (ft): 11
Vol (ft^3):

TEST PIT PLAN

N ⇧

BOULDER COUNT
6 in-12 in: 2
12 in-18 in:
18 in-24 in:
24 in-30 in:

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks: Encountered obstruction at 3 feet. Continued excavating on one side of the obstruction. There are big boulders in the area.

CDM

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(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-7
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.5' Topsoil. Moist, light brown, SAND, little silt with organics (roots).		E
1			
	0.5'-2' Dry, light brown, fine SAND, some silt.		E
2			
	2'-4' Dry, gray, CLAY, some silt with organics (roots).		M
3			
4			
	4'-10' Dry, gray CLAY, little silt.		D
5			
6			
7			
8			
9			
10			
	Refusal @ 10 feet		
11			
12			

T.P. DIMENSIONS

Width (ft):	3
Length (ft):	15
Depth (ft):	10
Vol (ft^3):	

TEST PIT PLAN

N ⇧

BOULDER COUNT

6 in-12 in:	3
12 in-18 in:	1
18 in-24 in:	
24 in-30 in:	

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT

E : Easy
M : Moderate
D : Difficult

Remarks:

Updated On: 04/09/01

CDM

50 Hampshire Street
One Cambridge Place
Cambridge, MA 02135
(617) 452-6000

Test Pit Log

Client:	Town of Exeter, NH	Contractor:	MBradsher Excavation (Operator: Donny Garlend)	Test Pit No.	TP-8A & 8B
Project Name:	Exeter WTP	Equipment:	Backhoe w/ tracks (Kobelco Mark IV SK100)	Logged By:	O. Bilgin
Project Location:	Exeter, NH	Depth to Water:	Not observed	Date:	3-Sep-02
Project Number:	0260-36493-PD.GEO	Ground Surface EL:		Page:	1 of 1

DEPTH (feet)	SOIL DESCRIPTION	STRATA CHANGE	EXCAV. EFFORT
	0-0.7' Topsoil. Moist, light brown, SAND, little silt with organics (roots).		E
1			
	0.7'-3' Dry, light brown, SAND, and gravel with organics (roots).		M
2			
3			
	3'-7' Dry, light brown, GRAVEL and SAND, trace silt with fractured rock pieces.		D
4			
5			
6			
7			
	Refusal @ 7 feet		
8			
9			
10			
11			
12			

T.P. DIMENSIONS	
Width (ft):	3
Length (ft):	10
Depth (ft):	7
Vol (ft^3):	

TEST PIT PLAN

N ⇧

BOULDER COUNT	
6 in-12 in:	3
12 in-18 in:	1
18 in-24 in:	
24 in-30 in:	

DESCRIPTION
and : 35 to 50 %
some : 20 to 35 %
little : 10 to 20 %
trace : 1 to 10 %

EXCAVATION EFFORT
E : Easy
M : Moderate
D : Difficult

Remarks:

Updated On: 04/09/01

Appendix D

Appendix D

Exeter River Pumping Station – 1972 Construction Drawings

TOWN OF EXETER, NEW HAMPSHIRE

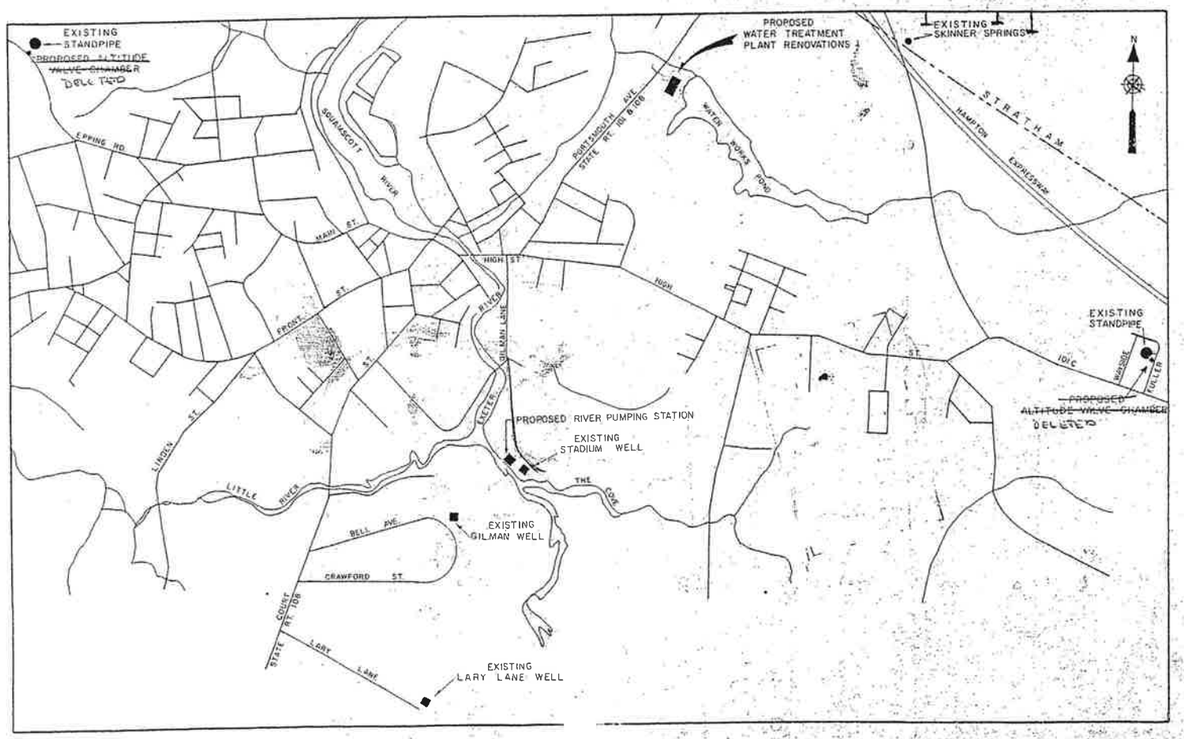
A-1 A-2 A-3

WATER DEPARTMENT

WATER TREATMENT PLANT

AND APPURTENANT WORK

PROJECT NO. WS-NH-38 JULY, 1972 CONTRACT NO. 2 OF 2



0 2000
IN FEET

LOCATION PLAN

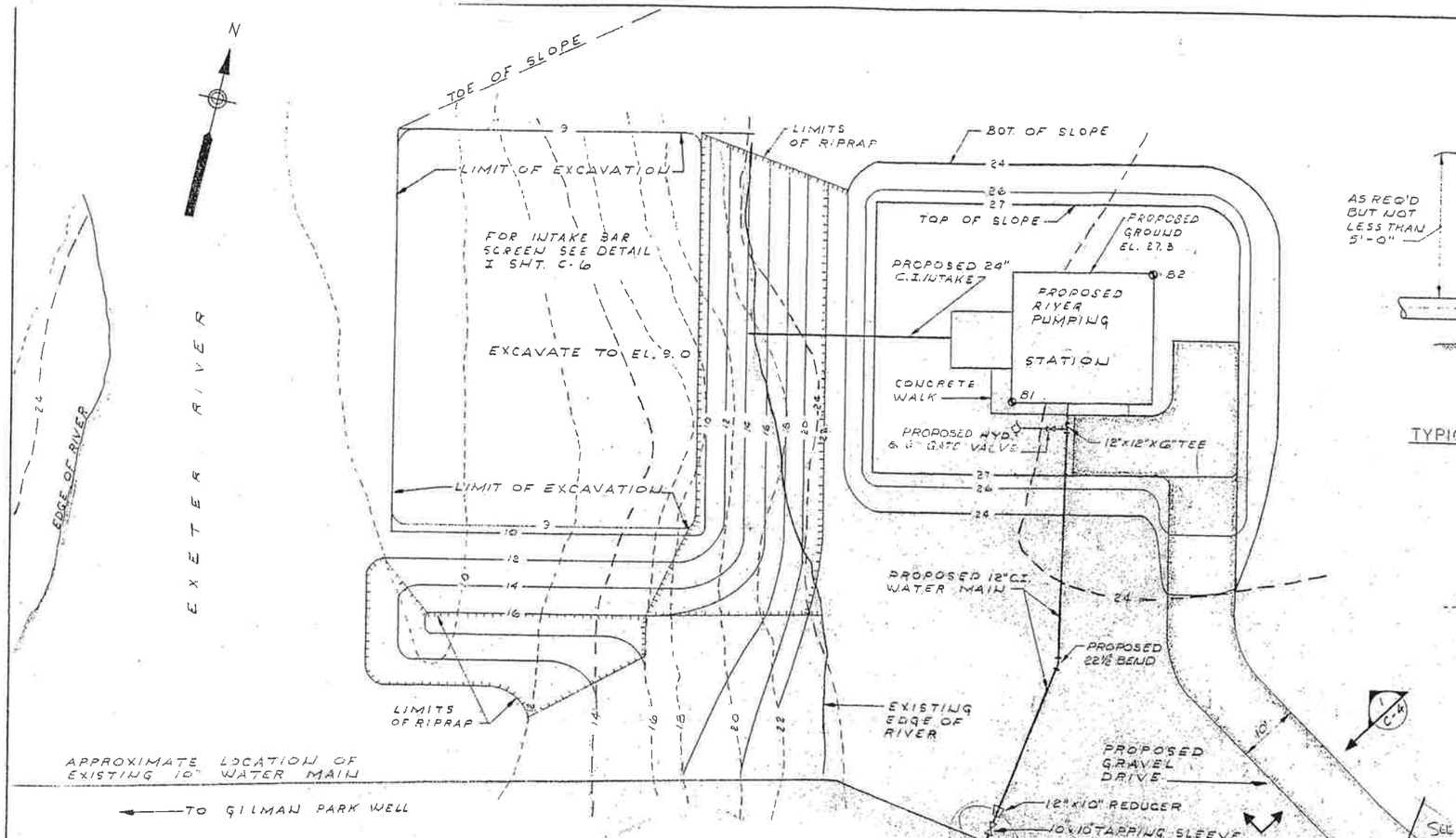
LIST OF DRAWINGS

SHEET NO.	TITLE
	CIVIL
1	COVER SHEET, TITLE, LOCATION PLAN, LIST OF DRAWINGS
2 C-1	EXISTING SITE - BUILDING, PIPING & GRADING
3 C-2	PROPOSED GRADING PLAN
4 C-3	OUTSIDE PIPING PLAN
5 C-4	RIVER PUMPING STATION
6 C-5	SKINNER SPRINGS AND SPILLWAY
7 C-6	OUTSIDE DETAILS
	ARCHITECTURAL
8 A-1	FILTER BUILDING - FIRST FLOOR PLAN AND ELEVATIONS
9 A-2	FILTER BUILDING - BASEMENT AND ROOF PLANS AND DETAILS
10 A-3	FILTER BUILDING - WALL SECTIONS AND DETAILS
11 A-4	FILTER BUILDING - WINDOWS, DOORS & MISCELLANEOUS DETAILS
12 A-5	SEDIMENTATION BUILDING - PLANS, SECTIONS AND DETAILS
13 A-6	RIVER PUMPING STATION - PLANS, SECTIONS AND DETAILS
	STRUCTURAL
14 S-1	EXISTING FILTER BUILDING & CLEARWELL
15 S-2	FILTER BUILDING SUB-BASEMENT PLAN
16 S-3	FILTER BUILDING BASEMENT PLAN
17 S-4	FILTER BUILDING FIRST FLOOR PLANS
18 S-5	FILTER BUILDING ROOF FRAMING PLAN
19 S-6	FILTER BUILDING SECTIONS
20 S-7	SEDIMENTATION BUILDING - PLANS, SECTIONS AND DETAILS
21 S-8	RIVER PUMPING STATION - PLANS, SECTIONS AND DETAILS
22 S-9	MISCELLANEOUS SECTIONS AND DETAILS
23 S-10	ALTITUDE VALVE CHAMBER

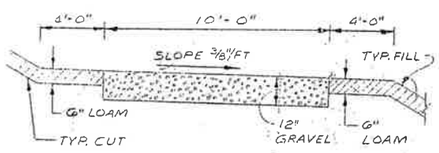
SHEET NO.	TITLE
	MECHANICAL
24 M-1	EXISTING W. T. P. - FILTER GALLERY
25 M-2	STADIUM, GILMAN PARK AND LARY LANE
26 M-3	RIVER PUMPING STATION
27 M-4	INTAKE STRUCTURE
28 M-5	SEDIMENTATION AND FLOCCULATION BASIN
29 M-6	BASIN DETAILS
30 M-7	BASEMENT PLAN
31 M-8	FIRST FLOOR PLAN
32 M-9	CHLORINATION
33 M-10	INSTRUMENTATION - FLOW SCHEMATIC
34 M-11	INSTRUMENTATION - DETAILS
35 M-12	PLUMBING - FIRST FLOOR
36 M-13	PLUMBING - BASEMENT
37 M-14	HEATING AND VENTILATING - 1
38 M-15	HEATING AND VENTILATING - 2
	ELECTRICAL
39 E-1	TREATMENT PLANT - SITE PLAN
40 E-2	TREATMENT PLANT - LIGHTING - BASEMENT PLAN
41 E-3	TREATMENT PLANT - BASEMENT PLAN
42 E-4	TREATMENT PLANT - FIRST FLOOR PLAN
43 E-5	FLOCCULATION AND SEDIMENTATION BASINS AND GATE HOUSE PLANS
44 E-6	~~TREATMENT PLANT - MOTOR CONTROL CENTER~~
45 E-7	~~PLANS - PUMPING STATIONS~~

WESTON & SAMPSON
ENGINEERS
BOSTON, MASS.

26-105



PLAN
SCALE 1"=10'

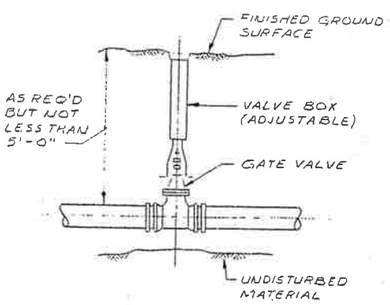


TYPICAL SECTION THRU GRAVEL ROAD

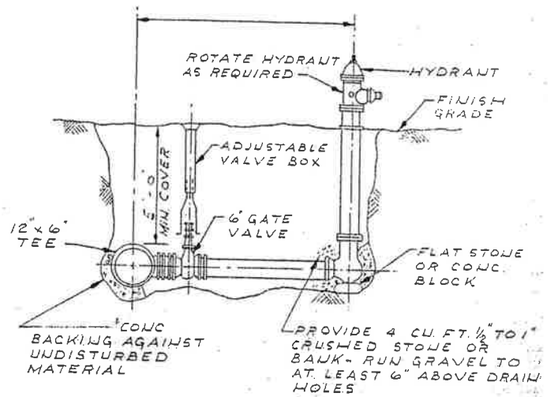
SECTION 1/C-4
NO SCALE

LEGEND

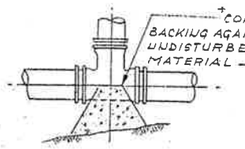
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EDGE GRAVEL DRIVE
- LIMIT OF RIPRAP
- B#2 BORING LOCATION



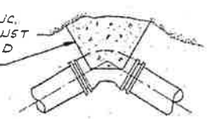
TYPICAL GATE VALVE
NO SCALE



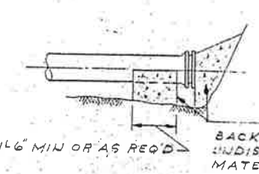
TYPICAL HYDRANT AND VALVE DETAIL
NO SCALE



PLAN
TYPICAL TEE
NO SCALE



PLAN
TYPICAL BEND
NO SCALE



TYPICAL PLUG
NO SCALE

TABLE OF BEARING AREAS IN SQ FT. AGAINST UNDISTURBED MATERIAL FOR WATER MAIN FITTINGS

SIZE OF MAIN	TEES	90° BEND	45° BEND	PLUGS
4, 6, 8	4	4	4	4
10	10	15	10	10
12	15	22	12	15
16	26	36	20	26
24	60	85	45	60

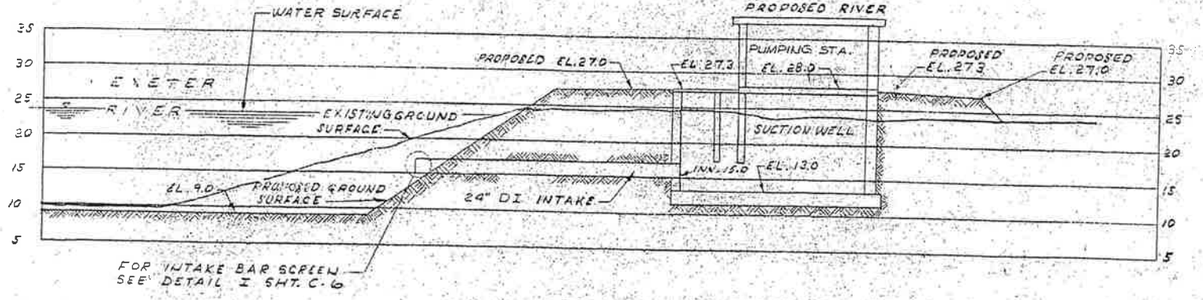
NOTE: FOR FITTINGS WITH LESS THAN 45° DEFLECTION USE BEARING AREAS OF 450 FT.

CONCRETE BACKING FOR WATER PIPE
NO SCALE

* CONC. FOR THRUST BLOCKS SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 2500 P.S.I. (F'c)

NOTES

1. FOR BORING LOGS SEE SPECIFICATION
2. ELEVATIONS REFER TO USGS
3. CLEARING AND GRUBBING SHALL BE LIMITED TO THE AREA TO BE GRADED.
4. LOCATION OF PROPOSED RIVER PUMPING STATION TO BE LOCATED BY THE ENGINEER.



LONGITUDINAL SECTION
SCALE: VERT. 1"=10'
HORZ. 1"=10'

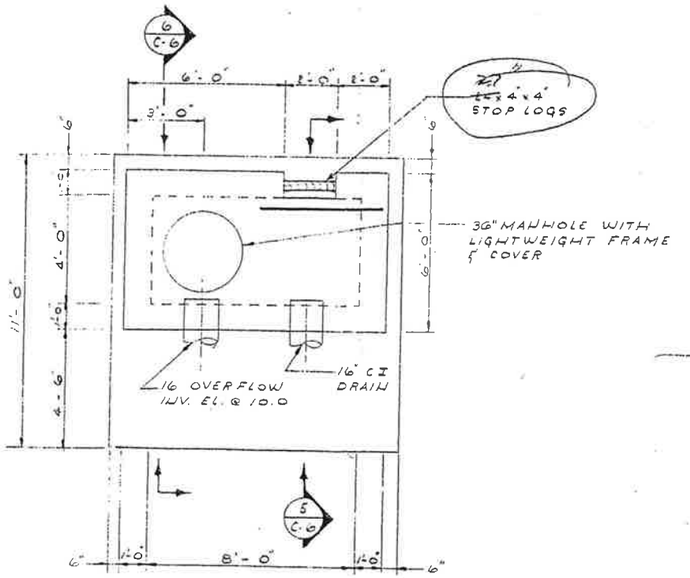
NO.	DRAWN BY	DATE	CHECKED BY	APPROVED BY

APPROVED
FOR WESTON & SAMPSON, ENGINEERS
REG. PROF. ENGR. DATE

TOWN OF EXETER, NEW HAMPSHIRE
WATER DEPARTMENT
WATER TREATMENT PLANT AND APPURTENANT WORK
RIVER PUMPING STATION
CIVIL

DRAWN BY	S.W.
CHECKED BY	S.E.S.
APPROVED BY	

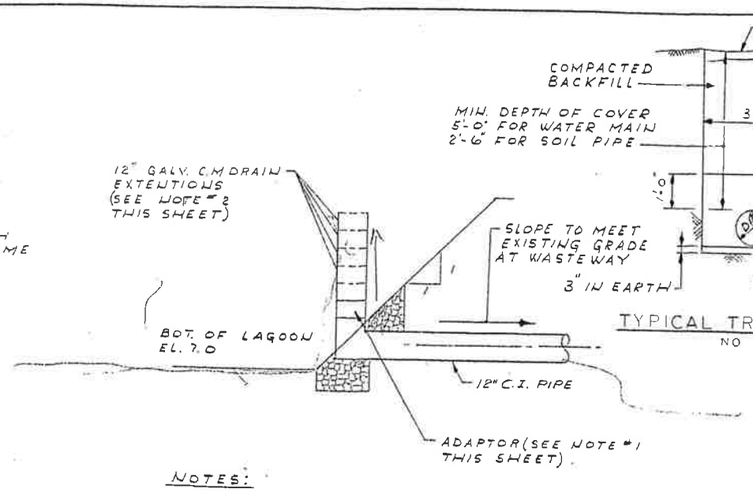
WESTON & SAMPSON
ENGINEERS
10 HIGH STREET BOSTON, MASS.
SCALE AS SHOWN DATE JANUARY, 1972
SHEET 5 OF 45 SHEETS



DETAIL (A / C-2)

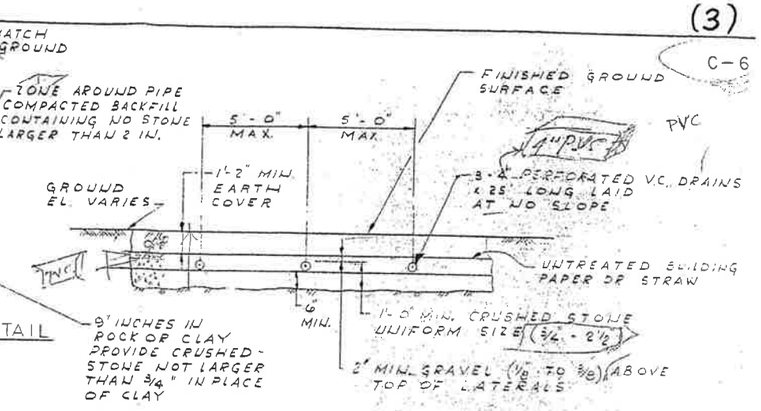
WATER RECOVERY SYSTEM PLAN

SCALE: 3/8" = 1'-0"



TYPICAL TRENCH DETAIL

NO SCALE



DETAIL (F / C-3)

CROSS SECTION OF LEACHING FIELD

SCALE = NONE

NOTES:

1. PROVIDE A CAST IRON ADAPTOR TO CORRUGATED METAL PIPE EXTENTIONS ON CAST IRON PIPE ELBOW
2. CORRUGATED METAL PIPE EXTENSIONS 6" LONG WITH CONNECTING BANDS SHALL BE PROVIDED FOR RAISING THE OUTLET AS SLUDGE BUILDS UP.

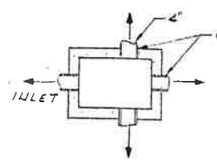
DETAIL (E / C-3)

SLUDGE DRYING BED OUTLET

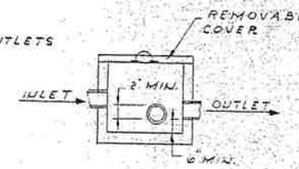
SCALE = NONE

NOTE

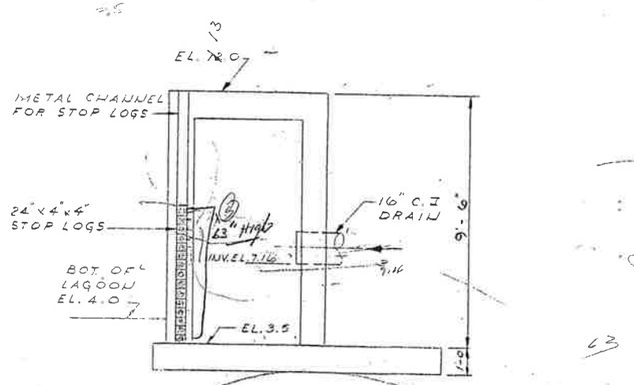
1. ALL METAL SHALL BE THOROUGHLY COATED WITH TWO COATS OF KOPPERS BITUMASTIC NO. 50
2. BAR SCREEN TO BE USED FOR RIVER PUMPING STATION AND WATER WORKS PONDS INTAKES



PLAN

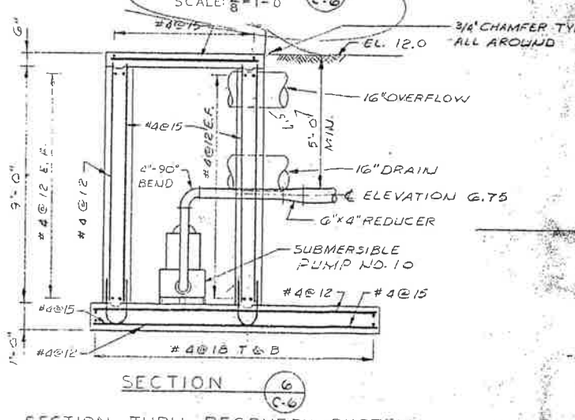


SECTION



SECTION (5 / C-6)

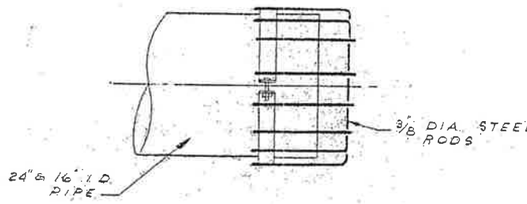
SCALE: 3/8" = 1'-0"

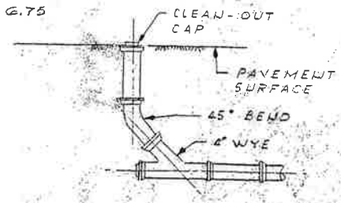


SECTION (6 / C-6)

SECTION THRU RECOVERY SYSTEM

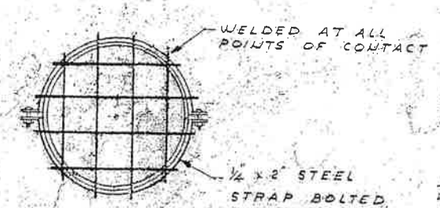
SCALE: 3/8" = 1'-0"





DETAIL (H / C-3)

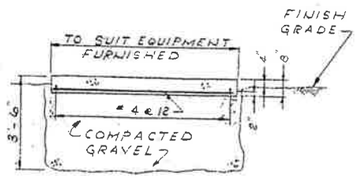
SCALE: 1 1/2" = 1'-0"



DETAIL (I / C-3)

NO SCALE

INTAKE BAR SCREEN



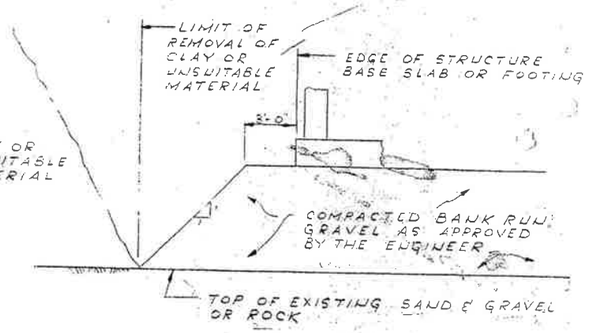
DETAIL (D / C-2)

NO SCALE

CONCRETE PAD

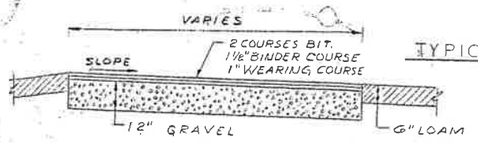
DISTRIBUTION BOX

SCALE = NONE



TYPICAL STRUCTURE EMBANKMENT LIMITS

SCALE: 1/4" = 1'-0"



TYPICAL SECTION THRU PAVED ROAD

NO SCALE

NO.	DRAWN BY	DATE	CHECKED BY	APPROVED BY

APPROVED

FOR: WESTON & SAMPSON, ENGINEERS

REG. PROF. ENGR. _____ DATE _____

TOWN OF EXETER, NEW HAMPSHIRE

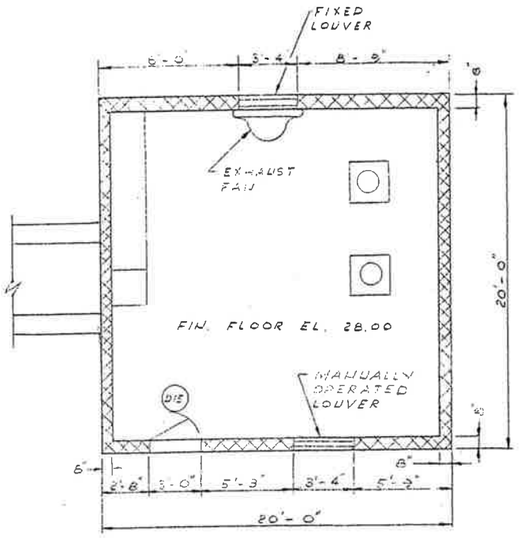
WATER DEPARTMENT

WATER TREATMENT PLANT AND APPURTENANT WORK

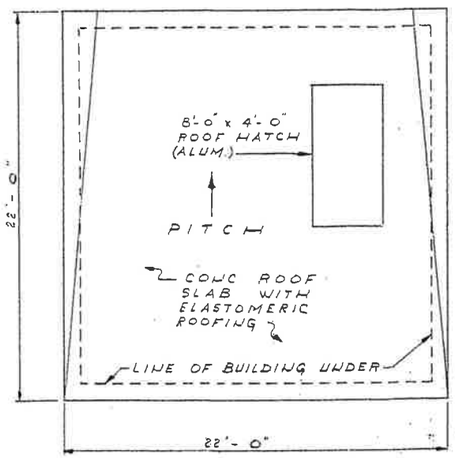
OUTSIDE DETAILS

CIVIL

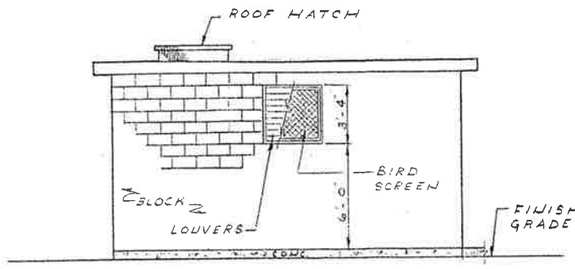
DRAWN BY: E.K.E.R.D.	WESTON & SAMPSON ENGINEERS
CHECKED BY: S.C.S.	10 HIGH STREET BOSTON, MASS.
APPROVED BY: S.C.	SCALE: AS SHOWN DATE: JANUARY, 1972



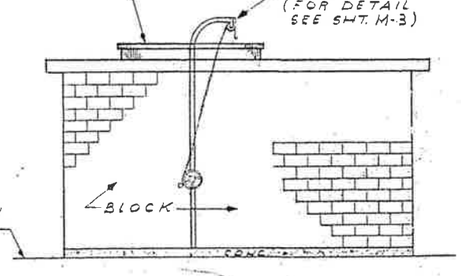
FLOOR PLAN
SCALE $\frac{1}{4}$"=1'-0"



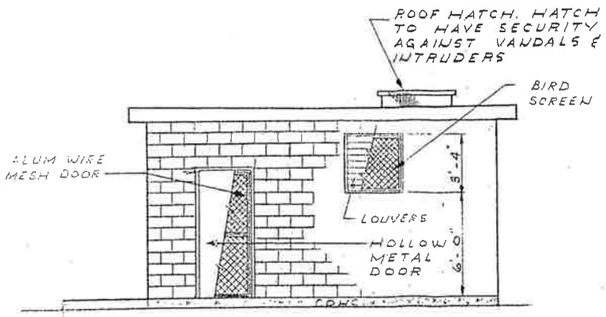
ROOF PLAN
SCALE $\frac{1}{4}$"=1'-0"



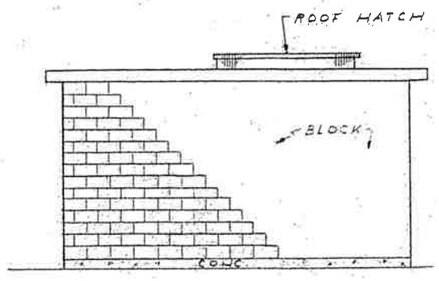
NORTH ELEVATION
SCALE $\frac{1}{4}$"=1'-0"



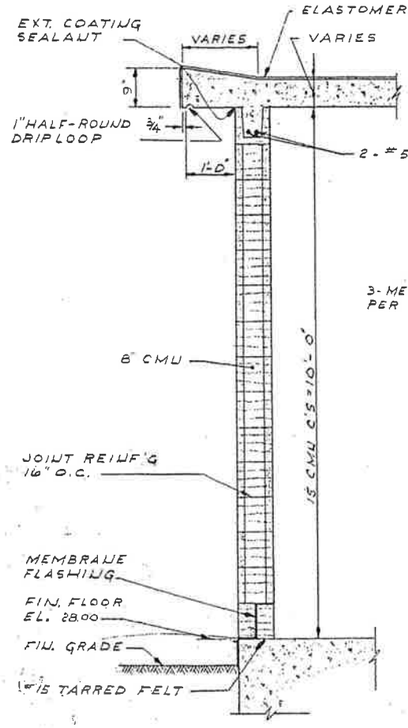
WEST ELEVATION
SCALE $\frac{1}{4}$"=1'-0"



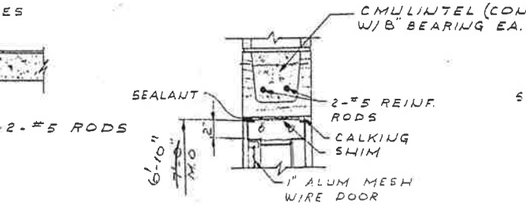
SOUTH ELEVATION
SCALE $\frac{1}{4}$"=1'-0"



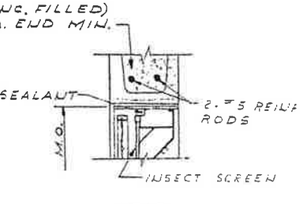
EAST ELEVATION
SCALE $\frac{1}{4}$"=1'-0"

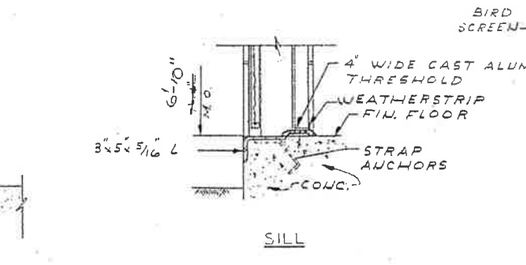


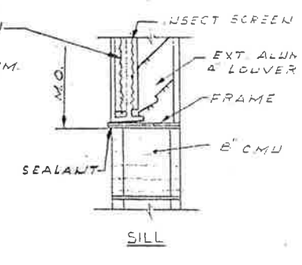
TYPICAL WALL SECTION
SCALE $\frac{3}{4}$"=1'-0"



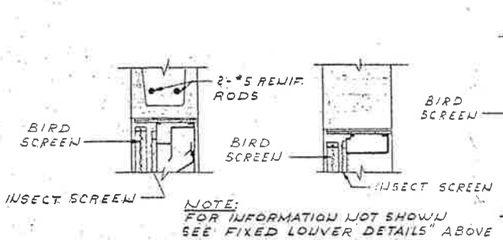
DOOR DETAILS
SCALE: $1\frac{1}{2}$"=1'-0"



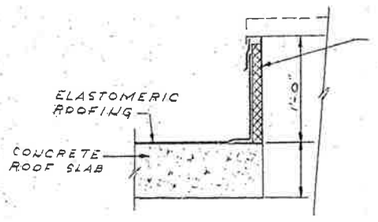




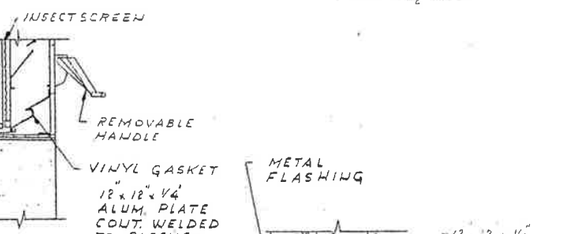
FIXED LOUVER DETAILS
SCALE: $1\frac{1}{2}$"=1'-0"



MANUAL OPERATING LOUVER DETAILS
SCALE: $1\frac{1}{2}$"=1'-0"



ROOF HATCH FLASHING DETAIL
SCALE: $1\frac{1}{2}$"=1'-0"



EXHAUST PIPE SLEEVE DETAIL
SCALE $1\frac{1}{2}$"=1'-0"

NO.	DRAWN BY	DATE	CHECKED BY	APPROVED BY

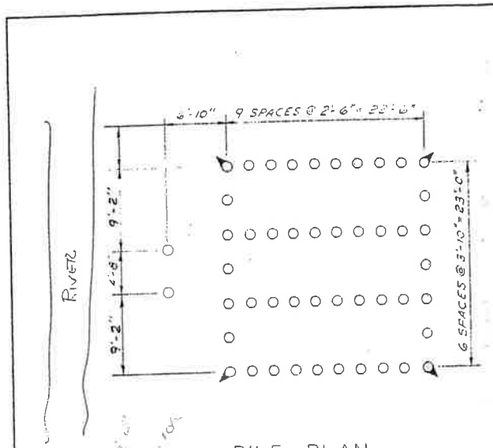
APPROVED
FOR: WESTON & SAMPSON, ENGINEERS
REG. PROF. ENGR. DATE

TOWN OF EXETER, NEW HAMPSHIRE
WATER DEPARTMENT
WATER TREATMENT PLANT AND APPURTENANT WORK

RIVER PUMPING STATION PLANS; SECTIONS, AND DETAILS

ARCHITECTURAL

DRAWN BY G.S. - F.R.D	WESTON & SAMPSON ENGINEERS
CHECKED BY F.U.M.	10 HIGH STREET BOSTON, MASS.
APPROVED BY J.F.P.	SCALE 1/4"=1'-0" DATE JANUARY, 1972
	SHEET 13 OF 45 SHEETS 26-9



NOTE: ALL PILES 20' UNTREATED WOOD

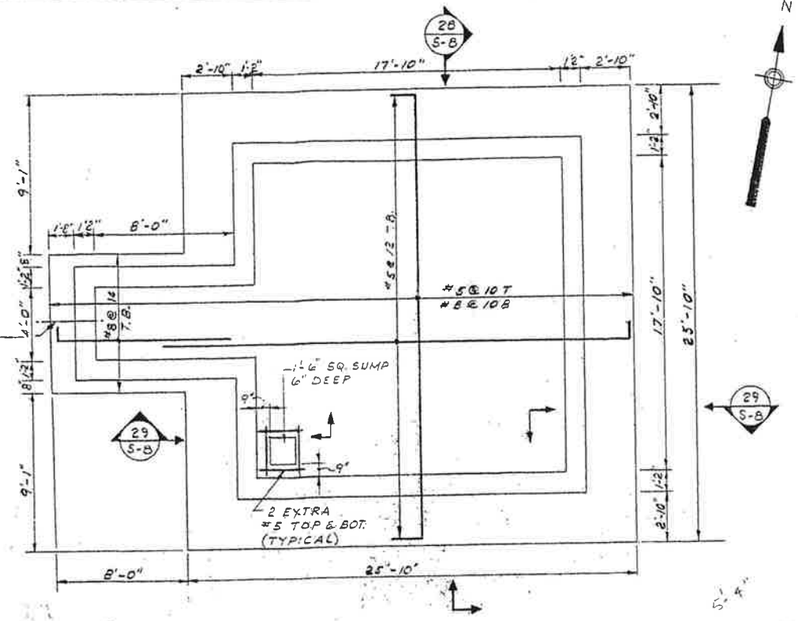
LEGEND

○ VERTICAL PILES CUT TOTAL 44 OFF @ EL. 11.50

◁ BATTERED PILES CUT TOTAL 4/48 OFF @ EL. 11.50

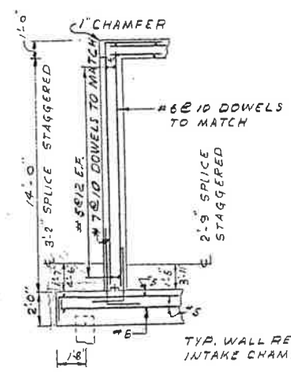
PILE PLAN

SCALE: 1/8" = 1'-0"



BASEMENT PLAN

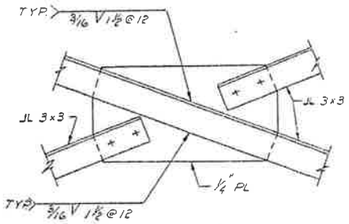
SCALE: 1/4" = 1'-0"



TYP. WALL REINFORCING FOR INTAKE CHAMBER ALSO

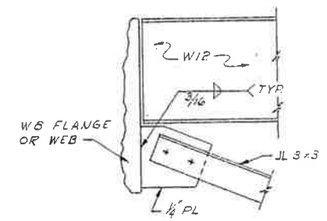
SECTION 29 S-8

SCALE: 1/2" = 1'-0"



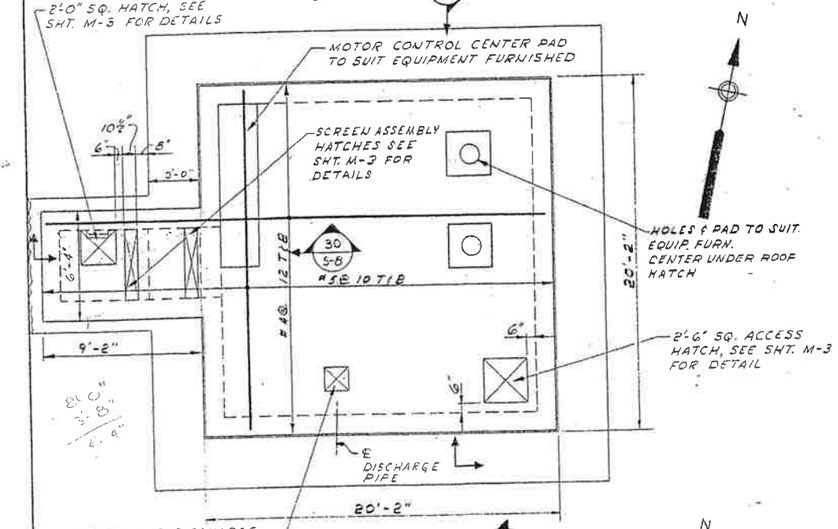
DETAIL N S-7

SCALE: 1 1/2" = 1'-0"



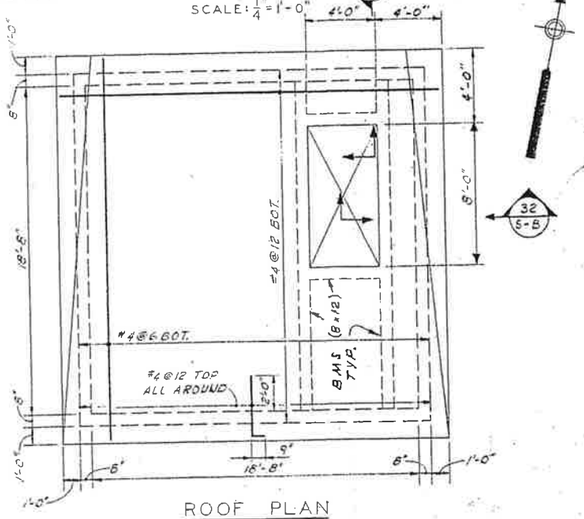
DETAIL O S-7

SCALE: 1 1/2" = 1'-0"



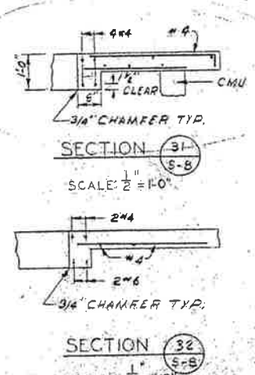
FLOOR PLAN 31 S-8

SCALE: 1/4" = 1'-0"



ROOF PLAN

SCALE: 1/4" = 1'-0"

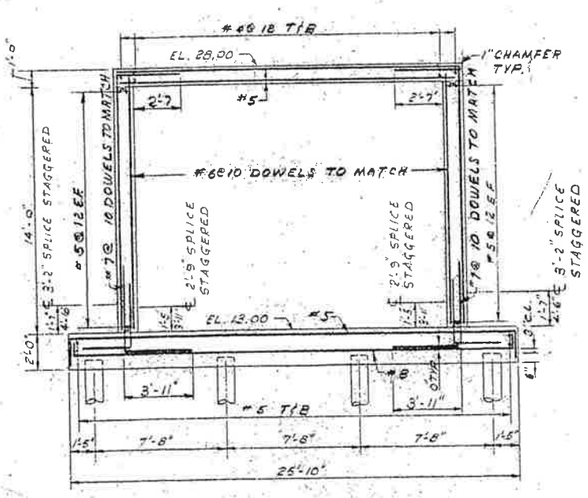


SECTION 31 S-8

SCALE: 1/2" = 1'-0"

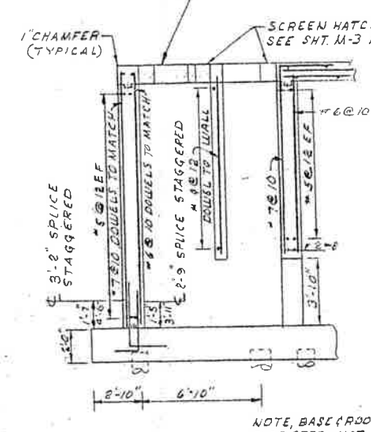
SECTION 32 S-8

SCALE: 1/2" = 1'-0"



SECTION 28 S-8

SCALE: 1/4" = 1'-0"



NOTES:

1. FOR GENERAL NOTES AND TYP. DETAILS SEE SHEET S-9.
2. ALL MAIN REINFORCING TO BE CENTERED ON PILES.
3. ALL ELEVATIONS REFER TO U.S.G.S. DATUM.

NOTE, BASE & ROOF SLAB STEEL NOT SHOWN-SEE PLANS

SECTION 30 S-8

SCALE: 1" = 1'-0"

NO.	DRAWN BY	DATE	CHECKED BY	APPROVED BY

APPROVED

FOR WESTON & SAMPSON, ENGINEERS

REG. PROF. ENGR. DATE

TOWN OF EXETER, NEW HAMPSHIRE

WATER DEPARTMENT

WATER TREATMENT PLANT AND APPURTENANT WORK

RIVER PUMPING STATION PLANS, SECTIONS & DETAILS

STRUCTURAL

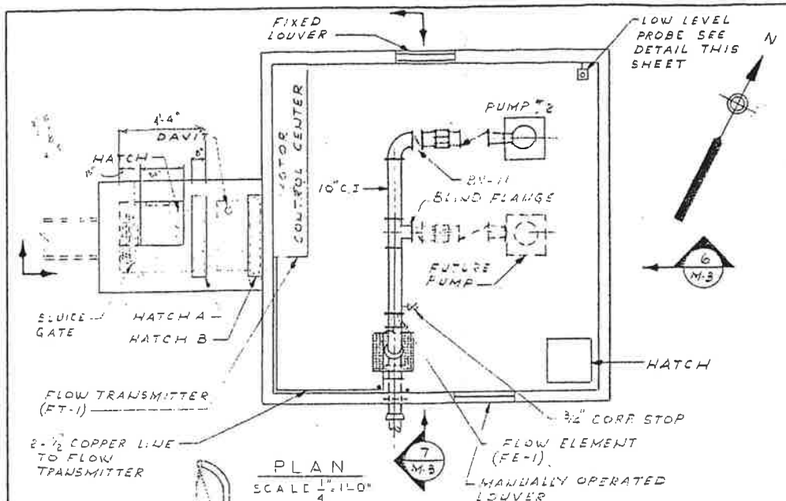
DRAWN BY	S.W.
CHECKED BY	P.J.M.
APPROVED BY	L.F.P.

WESTON & SAMPSON ENGINEERS

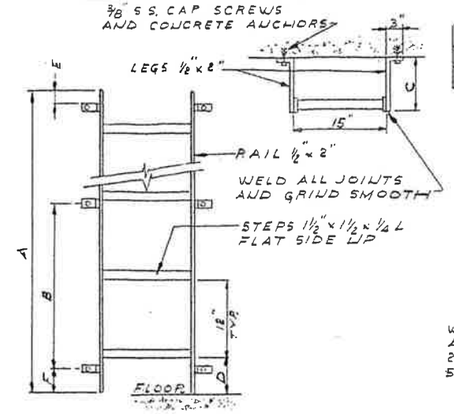
10 HIGH STREET BOSTON, MASS

SCALE 1/4"=1'-0" DATE JANUARY, 1972

SHEET 21 OF 45 SHEETS 26-8



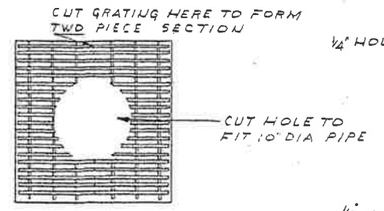
PLAN
SCALE 1" = 1'-0"

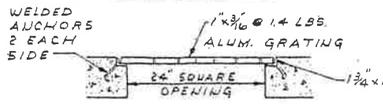


ALUMINUM LADDER
NO SCALE

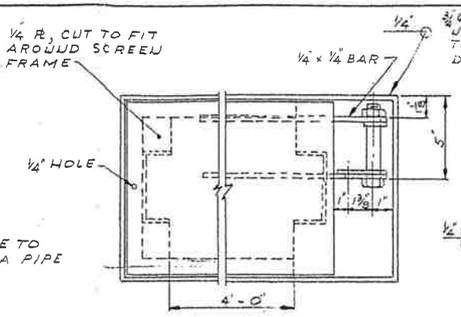
ALUMINUM LADDER SCHEDULE

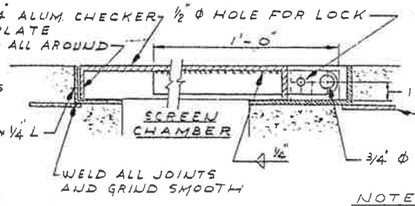
A	B	C	D	E	F	LOCATION
14'-3"	7'-0"	9"	6"	6"	6"	SCREEN CHAMBER



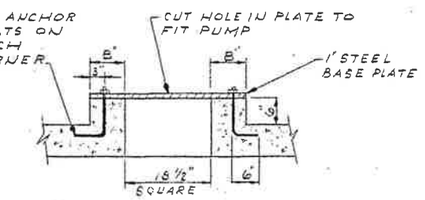


FLOOR GRATING AROUND PIPE
SCALE 1"=1'-0"

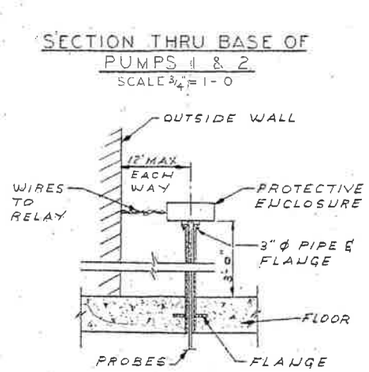




NOTE: MATERIAL ALUMINUM

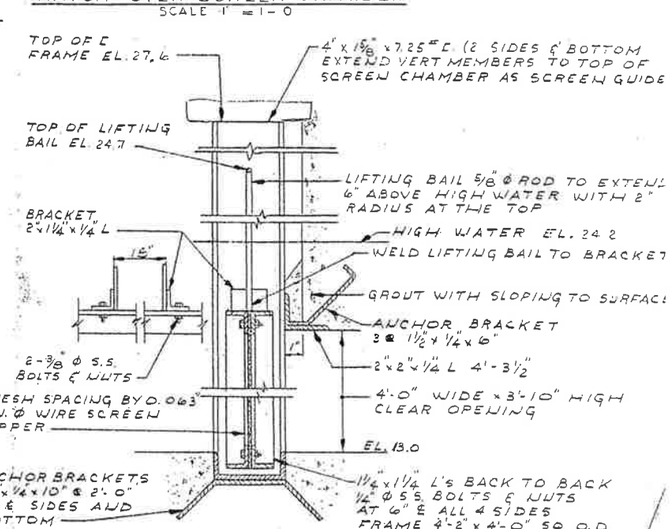


SECTION THRU BASE OF PUMPS 1 & 2
SCALE 3/4" = 1'-0"

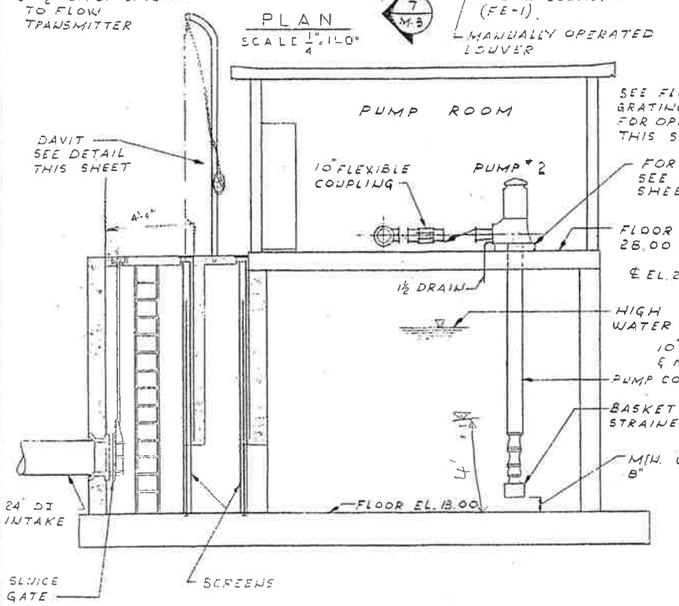


LOW LEVEL PROBES MOUNTING
SCALE 1"=1'-0"

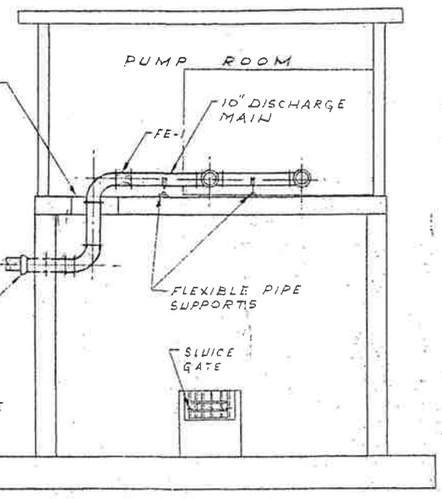
HATCH OVER SCREEN CHAMBER
SCALE 1" = 1'-0"



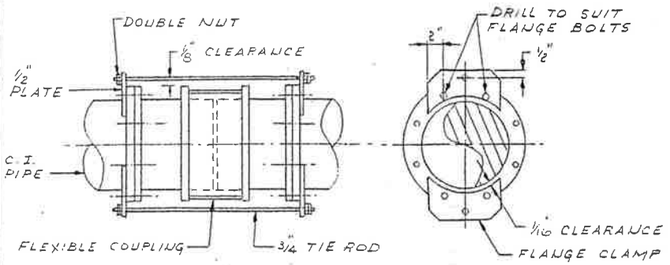
NOTE
1. SCREEN FRAME & SCREEN GUIDE TO BE WELDED AT ALL JOINTS EXCEPT WHERE BOLTED
2. MATERIAL - STEEL



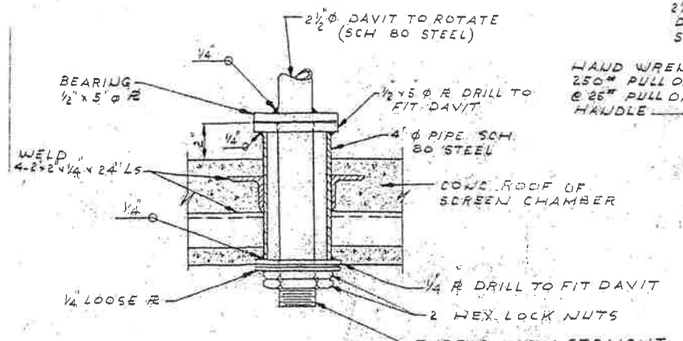
SECTION (6 M-3)
SCALE 1"/4 = 1'-0"



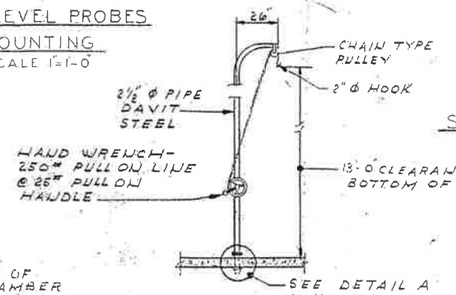
SECTION (7 M-3)
SCALE 1"/4 = 1'-0"



TIED FLEXIBLE COUPLING DETAIL
NO SCALE



DETAIL (A M-3)
SCALE 3"=1'-0"



DAVIT
SCALE 1/4" = 1'-0"

SCREEN DETAIL
SCALE: 3"=1'-0"

NO.	DRAWN BY	DATE	CHECKED BY	APPROVED BY

APPROVED
FOR WESTON & SAMPSON, ENGINEERS
REG. PROF. ENGR. DATE

TOWN OF EXETER, NEW HAMPSHIRE
WATER DEPARTMENT
WATER TREATMENT PLANT AND APPURTENANT WORK
RIVER PUMPING STATION
MECHANICAL

DRAWN BY	G.S. - ERD
CHECKED BY	S.E.S.
APPROVED BY	L.F.P.

WESTON & SAMPSON
ENGINEERS
10 HIGH STREET BOSTON, MASS.
SCALE AS SHOWN DATE JANUARY, 1972
SHEET 26 OF 45 SHEETS 26-8

Appendix E

Appendix E

Electrical Systems Preliminary Design Memorandum

CDM

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Jeff Romeo*

Date: *September 19, 2002*

Subject: *Exeter, New Hampshire Water Treatment Plant*
Electrical Preliminary Design Report

Introduction

The purpose of this memorandum is to establish the preliminary electrical design requirements of the water system improvements project for the Town of Exeter, New Hampshire.

Electrical Utility Services

The utility company servicing the Town of Exeter is Unitil Exeter & Hampton Electric Company (E&H Electric). New 480 VAC, 3-phase grounded electric services from E&H Electric shall be obtained for the new Water Treatment Plant (WTP) and the new Low-Lift Pumping Station (LLPS). The existing Exeter River Pumping Station's (ERPS) electrical service and distribution systems will also require improvements. The primary voltages would be determined during detailed design through coordination efforts with E&H Electric.

New Water Treatment Plant
CDM anticipates that the new service for the WTP will be obtained from Holland Way/Route 88 Connector. It is further expected that the primary service conductors be extended underground from Holland Way/Route 88 Connector to a new pad-mounted transformer located adjacent to the new WTP. CDM assumes that the new transformer would be owned and maintained by E&H Electric. CDM estimates the electric service for the WTP to be 800kVA or 1000 amps at 480 VAC, 3-phase.

New Low-Lift Pumping Station
CDM anticipates that the new service for the LLPS will be obtained from Portsmouth Avenue and the primary service conductors be extended underground to a new pad-mounted transformer located adjacent to the pumping station. CDM assumes that the new transformer be owned and maintained by E&H Electric, and estimates the electric service for the LLPS to be 200kVA or 240 amps at 480 VAC, 3-phase.

Exeter River Pumping Station
The service at the existing ERPS will be upgraded to meet the new process mechanical load requirements. CDM's January 2002 *Town of Exeter, New Hampshire Water System Evaluation Study* provides further details regarding the electrical evaluation of this station.

Operation and Distribution Voltages

120/208 volts, solidly grounded wye, three phase systems:

- Emergency Lighting (120 V, single phase)
- Fluorescent Lighting (120 V, single phase)
- HID Lighting (120 V, single phase)
- Incandescent Lighting (120 V, single phase)
- Convenience Receptacles (120 V, single phase)
- Uninterruptible Power Supplies - UPS (120 V, single phase)
- Motor Control Circuitry (120 V, single phase)
- Miscellaneous 3-phase building loads (208 V, 3-phase)

480 volts, solidly grounded wye, three phase systems:

- Motors greater than ½ hp less than 350 hp
- Mechanical heating and air conditioning equipment (where load requires)
- Distribution to Motor Control Centers.

Lighting Systems

In general, the lighting systems shall be designed to meet the New Hampshire State Energy Code requirements applicable to industrial facilities. Lighting systems will comply with the requirements of E&H Electric to qualify for energy rebate programs, where available. During final design, CDM recommends that energy rebate forms be obtained from the power company, and that all required calculations and data be compiled and submitted to the power company on behalf of the Town. Lighting levels in maintained foot-candles shall be designed to meet the recommendations of Illuminating Engineering Society (IES) Volume 2, Latest Edition of the IES Lighting Handbook and the guidelines given herein.

Approximate design lighting levels in maintained footcandles (fc):

- Offices - 50fc (provide multi-level switching)
- Laboratories - 50fc (supplement with task lighting)
- Maintenance Shops - 80fc (provide task lighting as needed)
- Conference Rooms - 50fc (provide multi-level switching)
- Control rooms - 30-50fc (provide multi-level switching)
- Lunchroom - 30fc
- Toilets and Locker Rooms - 20fc
- Stair Landings - 20fc
- Corridors - 10fc
- Records storage - 30fc
- Bulk storage - 20fc
- Electrical Rooms - 30fc
- Parking (average) - 3fc
- Roadways (average) - 1fc
- Ramps and Corners - 5fc
- Entrance Areas - 50fc, Uniformity Ratio 4:1
- Process Areas - 30-40fc
- Mechanical and Boiler Areas - 30fc
- Tunnels and Pipe Galleries - 10-20fc

Lighting calculations assume a work plane of 24 inches above floor level for Process and Mechanical type spaces, 30 inches above floor for finished spaces and a ground level for outdoor lighting.

Telephone Service

New telephone services shall be installed to both the new WTP and the Low-Lift Pumping Station. The existing telephone service at the Exeter River Pumping Station shall be investigated during detailed design for recommendations on upgrades or replacements. The telephone services shall be coordinated with the local telephone provider in Exeter, New Hampshire during detailed design.

New Water Treatment Plant
The WTP shall be provided with dial tone service to all office workspaces, office equipment (i.e. fax machines) and miscellaneous locations around the facility. Handset/phone locations shall be coordinated with the architects and Town during detailed design to ensure that the telephone system meets the needs of the Town. Additional dial tone service requirements include, but are not necessarily limited to, the fire alarm control panel, security control panel and instrumentation control panel (SCADA system).

New Low Lift Pumping Station
The new LLPS shall be provided with dial tone service to the facility. A handset/phone shall be located in the building for facility personnel. Additional dial tone service requirements include, but are not necessarily limited to, the fire alarm control panel, security control panel and instrumentation control panel (SCADA system).

Life Safety

Life safety systems shall be designed in accordance with the applicable codes. In general, life safety systems shall consist of emergency egress lighting and fire alarm systems. Fire alarm systems shall be designed in accordance with NFPA 72 and be provided with battery backup to maintain operations during power outages. Emergency egress lighting shall be provided in accordance the NFPA 101 to maintain a safe egress path and illumination of critical process areas. Additional emergency lighting shall be provided near all equipment (i.e. MCC, Switchboard, Generators, etc.) that needs to be accessed to restore normal power.

Please note that all new generators installed at this facility shall be suitable for stand-by power only and not be considered life safety or emergency equipment.

Stand-by Power

Stand-by power generators shall be installed and incorporated into the electrical distribution systems for the aforementioned facilities. Generators are anticipated to be installed outside each building (WTP, LLPS and ERPS) located adjacent to the electrical rooms or equipment. The outdoor generators shall be specified with "skintight" weatherproof enclosures. Generator sizing and capacity shall be determined during detailed design depending on what level of stand-by power is required or requested. Coordination with the process mechanical engineer and Town of Exeter shall define the extent of the stand-by power systems.

The transfer from normal to standby power shall be made through the use of microprocessor based automatic transfer switches. The automatic transfer switches shall also monitor the normal power, provide generator start command and other monitoring/control features.

Variable Frequency Drives

Variable frequency drives shall be a pulse-width-modulated (PWM) design, to convert a fixed AC input to a variable voltage, variable frequency AC output. Under normal operating conditions, harmonic currents introduced into the power system supply network from the variable frequency drives shall not exceed the distortion limits for a general system as defined in IEEE Standard 519, when measured at the point of common coupling. Furthermore, variable frequency drives on motors greater than 50 hp shall be 18-pulse technology. 18-pulse drives shall meet distortion limitations defined by IEEE (519) at the drive terminals. Variable frequency drives on motors 50 hp and less shall be 6-pulse technology with line reactors. 6-pulse drives shall meet distortion limitations defined by IEEE (519) at the bus from which the drive is fed. If IEEE distortion limitations cannot be met on 6-pulse drives with line reactors then harmonic trap filters shall be required.

cc: Barry Squibb, P.E.

Appendix F

Appendix F

Instrumentation and Control Systems Preliminary Design Memorandum

CDM

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Augustin Serino*

Date: *September 17, 2002*

Subject: *Exeter, New Hampshire Water Treatment Plant*
Instrumentation and Control Preliminary Design Report

Introduction

The purpose of this memorandum is to establish the preliminary instrumentation and control design philosophy and requirements for the water system improvements project in the Town of Exeter, New Hampshire.

The new WTP will be provided with an instrumentation and control system that will provide the ability to the major components of the plant in automatic mode. Each process area will be provided with a programmable logic controller (PLC) that will be hardwired to the local instrumentation. The PLCs will be networked to a central computer, and the system will allow for remote monitoring and control. The system shall be interfaced with the water treatment package provided by US Filter. The system shall be configured to handle all required monitoring and control of the remote sites, such as booster pump stations and remote storage tanks.

The design of the instrumentation and control system for the Exeter WTP will follow industry-accepted practices and also incorporate the Town's control system goals.

General

The design philosophy will be based on maximizing the system availability while minimizing installation and operating costs. In general, the design will provide a system that meets the following criteria:

- Each plant area will function as a stand-alone entity. Specifically, loss of communications with other areas of the plant will not inhibit local equipment from properly operating. System setpoints downloaded from a remote workstation or programmable logic controller (PLC) shall be saved locally to prevent loss of control.

- Distributed control concepts will be used. Therefore, each plant area will use a single, stand-alone PLC for equipment monitoring and control.
- All control schemes should be simple to understand and easy to maintain/troubleshoot.
- All plant PLCs shall connect to a single communications network to facilitate programming and data monitoring from a central location.
- Backup, hardwired, manual control capabilities will be provided for all critical equipment.
- All alarm conditions (e.g., pump overload, sump high level) shall report to the SCADA system.
- The SCADA system must be fault tolerant to prevent loss of data. Thus, redundancy is critical.
- The system shall include the ability for remote access through a dial-up connection.
- The system equipment shall match existing Instrumentation and Control equipment at the Town of Exeter's Wastewater Treatment Facility to facilitate interconnections between the systems, spare parts inventory and system troubleshooting/maintenance.

The design of the system will be based on open system concepts consistent with industry standards. The goals and benefits of this approach are:

- Easy to expand to meet changing future needs
- Readily supported by a multitude of local vendors
- Intuitive for Town staff to operate and maintain
- Provide a mechanism to control and track water treatment costs (e.g., labor, chemical, power, etc.)
- Maintain accurate and up-to-date information on physical facilities and equipment.

The control system design will be based on ease-of-use concepts. All instruments and panels will be located in accordance with National Electric Code (NEC), but also to support operations and maintenance goals. In general, these concepts include:

- Locate all indicators at roughly 4-feet 6-inches from floor to allow easy viewing
- Provide working space around all instruments and panels.

- Use simple descriptors on all control devices to minimize operator confusion (e.g., Hand-Off-Automatic on selector switches)
- Provide excess space inside every control panel to allow for possible future needs
- Provide convenience receptacle and overhead light in all free-standing enclosures
- Provide separation between low voltage (120 VAC and below) and high voltage (greater that 120 VAC) in every panel
- Provide individual fuses in each panel to allow electrical isolation on a loop or system basis.
- Provide simple, intuitive graphic displays for monitoring and controlling the WTP from SCADA

Central Control System

The control system will use PLC's and human machine interface (HMI) systems (i.e., terminals) connected via a local area network. Specifically, the system will have the following features:

- Three SCADA Computers
- A Redundant Master PLC
- A standalone PLC for every major process and remote site
- An Ethernet based local area network
- An Uninterruptable Power Source (UPS) system to provide backup power in the control room
- Approximately 35 graphical displays to monitor/control equipment
- Automatic report generation for daily, monthly, and regulatory reports
- Multiple hierarchical levels of control
- The Control system will be designed to match the existing control system in the Town of Exeter's Wastewater Control System.

PLC Systems

The design of the control system following an industry accepted hierarchy where equipment is controllable from several layers within the plant. The hierarchy levels are field/equipment, local control panel, and PLC/HMI system. Each is described as follows:

- *Field/Equipment Level* – At this level an operator can manually control equipment through the use of a local Hand-Off-Remote (HOR) selector switch. When this switch is put in the "hand" position, the equipment operates providing all the hardwired interlocks are satisfied. Examples of hardwired interlocks are motor overload, and high motor temperature. When the selector switch is placed in the "off" position, the equipment is stopped. When the selector switch is placed in the "remote" position, equipment control is transferred to the next hierarchy level. For most equipment the next level is the PLC/HMI system. For some equipment, such as the a vendor skid system, however, the manufacturer may furnish a local panel.

- *Local Control Panel* – This hierarchy level corresponds to any control panels provided by US Filter to locally operate the equipment that they provide. The local control panel will be actively in control of a piece of equipment when that piece of equipments LOR switch is in "Remote". From the local control panel, the operator will be able to select one of two operating modes – Local Automatic or Remote. In Local Automatic mode, the control panel will sequence and pace equipment based on operator setpoints. The operator will enter setpoints through the local operator interface at the local control panel. When the operator selects "Remote", which shall be the normal operating mode, the control will get transferred to the next hierarchical level.

- *PLC/HMI System* – At this level, the operator uses the graphical displays furnished as part of the SCADA system to control equipment. Each piece of equipment will have an associated Auto-Off-Manual selector switch. When the local field level selector switch is in "Remote" and the software selector switch is in the "Manual" position, the operator will control the equipment providing all the hardwired and software safety interlocks are satisfied. Examples of software safety interlocks are high-high level, and high system pressure. When the software selector switch is in the "Off" position, the equipment is stopped. When the software selector switch is in the "Auto" position, is controlled based on the programmed algorithm stored in the PLC.

Control Room

A control room layout will be developed to meet the operational and budgetary requirements. The architectural floor plans described in Section 3 include the control room layout. In general, the control room must have sufficient space to accommodate the following:

- Two Computers and Two 21-inch monitors
- One control console
- One Reference Table
- One printer stand to accommodate up to two printers
- One equipment table to accommodate radio and telephone equipment
- One bookshelf
- Two file cabinets
- Space for the main control panel that houses the master PLC, network equipment, and SCADA communications equipment.

Appendix G

Appendix G

HVAC Systems Preliminary Design Memorandum

CDM

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Asesh Raychaudhuri, P.E.*

Date: *September 24, 2002*

Subject: *Exeter, New Hampshire Water Treatment Plant*
HVAC Preliminary Design Report

Introduction

The purpose of this memorandum is to establish the preliminary heating, ventilation, and air conditioning (HVAC) requirements for of the water system improvements project for the Town of Exeter, New Hampshire.

Codes and Standards

The following codes and standards shall apply:

- New Hampshire State Building Code
- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Handbooks
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Duct Construction Manuals
- National Fire Protection Association (NFPA)
- Air Moving and Conditioning Association (AMCA).
- Associated Air Balance Council (AABC).
- National Environmental Balancing Bureau (NEBB).
- American Conference of Governmental Industrial Hygienists (ACGIH).

General Design Criteria

Outdoor Conditions
Design conditions are selected based on applicable energy code criteria.

- Winter: 9 Degrees F Dry Bulb at 99 percent
- Summer: 85 Degrees F Dry Bulb/70 Degrees F Wet Bulb at 1.0 percent
- Latitude: 43 degrees N

Indoor Conditions
Design conditions for indoor environments shall be as indicated in Table 1, which appears at the end of this memorandum.

Heating

Heating will be provided by a central boiler plant. As with the existing WTP, CDM has assumed that boilers will be fired by natural gas. Hot water/propylene glycol mixture will be piped to the various parts of the complex with 180 degrees F supply and 160 degrees F return. Control of all heating equipment except unit heaters shall be by means of throttling valves. Heating in the pump buildings will be provided by electric unit heaters. Construction and electrical rating of the units will be as required by the space in which the unit is located.

Air Conditioning

In general, cooling will be provided by package direct expansion-type (DX) cooling units. Cooling controls will in general be provided as part of the package unit. Electrical rooms will be provided with DX cooling units.

Ventilation

In general, ventilation will be provided by supply air handling units in combination with exhaust fans.

Outdoor air intakes will be located to prevent intake of vehicle exhaust emissions, and short circuiting of exhaust air from exhaust discharges. Exhaust discharge points will be located away from outdoor air intakes. With the exception of clean ventilation exhaust air, exhaust discharges will not be located where they will discharge on to people. Louvers will not be used over doors for exhaust. Exhaust containing hazardous materials will be located so the discharge point is inaccessible to people and the exhaust plume will discharge in a safe location using vertical upblast discharge.

Area	Temperature (° Fahrenheit)		Outdoor Air Ventilation	Comments
	Summer	Winter		
Conference Rooms	78	68	20.0 cfm/person	Mechanical cooling
Control Rooms	78	68	20.0 cfm/person	Mechanical cooling
Corridors	N/a	68	0.05 cfm/ft^2	
Electrical Room	85	55	0.05 cfm/ft^2	Mechanical cooling. Maintain positive pressurization.
Laboratories	78	68	20.0 cfm/person	Lab hood exhaust
Offices	78	68	20.0 cfm/person	Mechanical cooling
Toilet Rooms	N/a	68	50.0 cfm/fixture	100 percent exhaust
Pump Rooms	104	55	6 ac/hr or as required	Freeze protection provided. Provide ventilation for heat removal and to limit humidity and condensation.
HVAC and other Mechanical Rooms	104	55	6 ac/hr summer	
Garage	104	55	1.5 cfm/ft^2	
Chemical Storage	104	55	6 ac/hr	12 ac/hr unheated emergency
Shop	104	65	Ventilation to maintain the temperature	
Pretreatment / Filtration Tank Area			Supply and exhaust to maintain negative pressure.	

Notes:

N/a = Not Applicable

cfm = cubic feet of air per minute

ac/hr = air changes per hour

Table 1
Indoor HVAC Design Conditions

Appendix H

Appendix H

Plumbing and Fire Protection Systems Preliminary Design Memorandum

CDM

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Jack Sheehan*

Date: *September 17, 2002*

Subject: *Exeter, New Hampshire Water Treatment Plant*
Plumbing and Fire Protection Systems Preliminary Design Report

The purpose of this memorandum is to outline the recommended design criteria for the plumbing and fire protection systems at the new Exeter Water Treatment Plant (WTP).

Plumbing and Fire Protection Codes

Plumbing and fire protection systems will be designed in accordance with all applicable Federal, State and local codes and standards including all amendments thereto including, but not necessarily limited to, the following:

- International Building Code (IBC) 2000
- National Plumbing Code (NPC) 1993
- American Society Of Plumbing Engineers Data Book
- National Fire Protection Association Standards (NFPA)
- Applicable State of New Hampshire Regulations
- Occupational Safety and Health Act (OSHA)

Plumbing Systems

The plumbing systems to be included in the final design documents will consist of the following:

- Potable Water System

- Protected Water System (non-potable water) (process usage)
- Emergency Water System (emergency showers and eye wash units)
- Sanitary System
- Special Waste System
- Building Waste System
- Trench Drainage System
- Roof Drainage System
- Natural Gas System (Laboratory Usage and Heating System)
- The availability of gas supply shall be determined with Gas Company during final design.
- Town water will be available from the water treatment plant.

Special Conditions for Plumbing Systems

In general, all piping and fixtures exposed to freezing conditions will be protected with heat tracing or other forms of freeze protection. Further commentary on specific sub-systems follows:

Water Systems

Potable Water System

- The potable water system in the building will be provided with a water meter and reduced pressure backflow preventer at the connection to the incoming water service. A second backflow preventer will be required if a bypass is deemed necessary in accordance with the state or local codes.
- The water pressure will be the available head off of the distribution pumps from the plant
- The potable water system will be extended throughout the building to serve all regular plumbing fixtures and drinking fountains including the emergency water system.
- All potable and protected water piping will be sized to limit flow velocities to approximately 6 feet per second.

- In addition to providing storage-type water heaters for larger demand areas, point-of-use electric water heaters will be provided for remote areas of small demands.

Protected Water System

- Protected water system will be included to provide water to hose stations, chemical processes and miscellaneous process needs. This system will be supplied from the potable water system through a reduced pressure backflow preventer. A second backflow preventer will be included if a bypass is determined necessary.

- An OSHA regulation sign pertaining to "not for human consumption" will be required at all locations where hose-end and wash down outlets occur.

- All protected water outlets provided for process requirements will be identified with a number and listed in a protected water schedule included on the drawings.

Emergency Water System

- Emergency water system will consist of a dedicated potable water source providing water to emergency showers and eyewash units.

- Tepid water system will be designed in accordance with ANSI standard Z358.1-1998.

- System will provide potable water at 80°F at a flow rate and duration required by the fixture.

- Water flow sensing devices will be included to actuate an alarm provided under electrical work.

Sanitary Systems

Sanitary

- Sanitary system will serve all regular plumbing fixtures, which consist of toilets, urinals, lavatories, showers, service sinks, electric water coolers, kitchenettes and regular floor drains and will discharge into an approved sanitary system.

Building Waste

- Building waste systems will be provided to serve all process areas requiring floor drains, trench drains and process equipment drains.

- Building waste systems will be designed to handle the largest flow from any of the following:
    - Equipment leakage
    - Washdown water
    - Controlled drainage from equipment or vessels.
- Waste piping buried below or encased in concrete slabs will be limited to 3-in minimum size.
- Individual or combined building waste systems will terminate approximately 5-ft-0-in outside of the building foundation wall.
- Portions of the waste systems, as well as the sanitary systems, which cannot flow by gravity will incorporate sump pits and duplex sump pump systems for pumping into the gravity piping systems.

Special Waste Systems

- Special waste system will be provided to receive waste streams from the laboratory and chemical storage/mixing areas.
- The special waste streams will be neutralized and treated as required by code prior to discharging into the sanitary system.

Trench Drainage Systems

- Trench drainage systems are a portion of the building waste systems and will meet the same criteria.
- Trench drains will typically be provided at the base of all potentially wet walls, e.g., areas adjacent to wet walls, tankage or exterior walls which are subject to groundwater levels above the floor slab elevation.
- Trench drain fixtures will be provided at the low point of the trenches at spacing not exceeding 32 feet on center.

Natural Gas System

- Natural gas system will be extended from exterior main to a point adjacent to each of the buildings requiring gas service complete with exterior meter and pressure regulator under the civil/utility portion of the work. The natural gas system will include piping from the discharge side of the pressure regulator and will extend through the building as required to serve all heating/cooling units, water heaters and laboratory fixtures.

Roof Drainage System

- The roof drainage system will serve all roof and area drains and will terminate at a point 5-ft-0-in outside of the building foundation wall or at a point that will be determined by the client. Continuation of the exterior portion of the system will be included under the civil, underground piping sections of the work. On buildings with a parapet, a secondary roof drainage system will be designed unless scuppers for the roof are designed.

Fire Protection

- A review of building construction, occupancy and process classification will be made during final design to determine fire protection systems required to meet state and local codes, NFPA standards, fire department's fire prevention officer and the client's insurance underwriter.

- Source of water or fire suppression systems will be protected from backflow by means of a double check valve assembly or reduced pressure backflow preventer.

- An evaluation will be made of the water service and the availability of adequate amount of water to satisfy anticipated fire suppression system demand.

- Fire service from the yard main into the building will be provided under the civil/utility portion of the work must be coordinated by the fire protection system designer.

- Special suppression systems such as foam, carbon dioxide, dry pipe system, pre-action system, deluge system, etc. will be included where required.

- Portable fire extinguishers will be provided and located under the architectural portion of the work.

- A meeting should be held with the local fire chief to review the fire protection requirements of the plant. The meeting should take place at a location selected by the fire chief and would be attended by the fire protection designer, architect, electrical engineer and project manager.

The fire protection designer will be required to prepare performance-type plans and specifications that will include all pertinent information required to allow a fire protection system contractor to prepare final detailed installation drawings. Specifications will cover all major pieces of equipment, piping and valves.

Appendix I

Appendix I

Permitting Plan Memorandum

CDM

Memorandum

To: *Alan G. LeBlanc, P.E.*

From: *Magdalena Lofstedt, PWS and Isabel Simoes*

Date: *September 11, 2002*

Subject: *Permitting Plan for the Proposed Exeter Water Treatment Plant*

Overview

Pursuant to CDM's scope of work for Task 3 in our Phase 2 WTP Preliminary Design contract, this memorandum provides an overview of the permits needed for the following:

- Construction of a new 3.4-mgd Water Treatment Plant;
- Pipeline, roadway, and new raw water pump station construction adjacent to the Exeter Reservoir;
- Installation of a new intake pipeline into the Exeter Reservoir;
- Sluice gate replacement at the outlet of Exeter Reservoir;
- Rehabilitation of the Exeter River Pumping Station; and the
- Discharge of raw water pumped from the Exeter River into the Exeter Reservoir.

This memorandum describes the anticipated environmental permits and approvals, information needs/next steps, and schedule.

Description of Anticipated Permits and Approvals

U.S. Army Corps of Engineers (Section 10 and/or Section 404)

Description

Work in wetlands and waterways is regulated by the U.S. Army Corps of Engineers (the Corps) under the authority of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. In New Hampshire, the Corps has developed the State of New Hampshire Programmatic General Permit (PGP) to expedite its evaluation of permit applications and streamline the permitting process. The purpose of the New Hampshire State PGP (NH SPGP) is to minimize duplication between the New Hampshire's Regulatory Program governing

work within coastal inland waters and wetlands and the Corps regulatory program under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

There are three categories associated with the NH SPGP using the state defined criteria: non-reporting projects (minimum impact projects) and two types of projects that will be screened (minor and major impact projects). The Corps reviews projects according to the State of New Hampshire classification of minimum, minor, and major projects as per part WT 303, 400, 600. Projects with impacts up to 3 acres may be considered under the NH SPGP.

A Minimum Impact Project is non-reporting for projects that impact less than 3,000 square feet of inland wetlands or waterways and disturb less than 50 linear feet of a seasonal stream or dry river channel. Non-reporting minimum impact projects may proceed upon approval from the NH Wetlands Bureau without notification to the Corps provided all terms and conditions of the PGP are met.

Minor and Major Impact Project applications are reviewed by the Corps, New Hampshire and Federal resource agencies (U.S Fish and Wildlife, U.S Environmental Protection Agency, National Marine Fisheries Service) after approval from the NH Wetlands Bureau and a determination made that either: 1) the project meets the criteria of the PGP and can proceed with no changes and no additional Corps review is needed; 2) additional information is needed before making a permitting decision; or 3) the project does not meet the PGP criteria and an Individual Permit is required.

For Minor Impact Projects, applicants may proceed after the 30-day review period. For Major Impact Projects, the applicant must wait for written authorization from the Corps. A project is classified as a Minor Impact Project when there is 3,000 to 20,000 square feet of impacts to inland wetlands and waterways and disturbance of up to 200 linear feet of perennial stream of flowing river. Any project in or adjacent to prime wetlands, in tidal wetlands, tidal buffer zone, sand dunes, bogs, or in a wetland that is an exemplary natural community or has endangered or threatened species is classified as a Major Impact Project, regardless of the amount of impact. If impacts to inland wetlands or waterways are greater than 20,000 square feet or disturb 200 or more linear feet of a stream or river, a project is classified as a Major Impact Project.

Any project impacting over 3 acres and that does not meet the terms and conditions of the NH will require an Individual Permit from the Corps of Engineers. In accordance with the NH SPGP, the Corps reserves the right to take discretionary authority on any project, regardless of impact category, which the Corps determines will have more than minimal environmental impact.

Applicability to Exeter's Water System Project

The proposed WTP project will require construction within wetlands and work associated with new intake pipelines and outlet at the Exeter Reservoir. This type of work will require approval from NH DES Wetlands Bureau and screening from the Corps depending on the amount of impacts to wetlands and project classification. The project will likely be categorized as a Major Impact Project due to the amount of direct impacts to wetlands. However, in accordance with the regional environmental concerns, most proposals for work which involve impacts over 1 acre will require an Individual Permit application be submitted directly to the Corps. The permit application will require about three weeks to prepare and up to six months for approval.

EPA National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit

EPA currently regulates stormwater discharges from construction sites that are 5 acres or larger. In 2003, sites that are 1 acre or larger will also be required to obtain a NPDES permit. In determining acreage, the cumulative area of disturbance should be used (plant site and all ancillary facilities). Obtaining an NDPES permit involves the preparation of a Stormwater Pollution Prevention Plan and submittal of a short form, Notice of Intent to Discharge, to EPA. This permit is commonly included in the General Contractor's scope of work during the construction phase.

New Hampshire Department of Environmental Services, Wetlands Bureau Permit

Description

The Department of Environmental Services (DES) Wetlands Bureau is responsible for enforcement and regulating activities within coastal and inland wetlands and waterways through the rules and regulations set forth in RSA 482-A. The majority of projects that impact wetlands will require the use of one of two applications, the Standard Dredge and Fill Application or the Minimum Impact Expedited Application. Based on the Federal NH SPGP and DES rules, each project that requires a wetlands permit is classified in one of three categories according to the potential impact of the project (minimum, minor, major). The classification scheme is briefly described above and in the DES Rules (Part Wt302). In addition, any project that proposes to impact an area in or adjacent to prime wetlands, in tidal wetlands, tidal buffer zone, sand dunes, bogs, or in a wetland that is an exemplary natural community or has endangered or threatened species, is classified as a major project regardless of the amount of impact requested. The Expedited Permit Process for Wetlands Minimum Impacts projects allows the Department of Environmental Services Wetlands Bureau staff to issue permits without the N.H Wetlands Board action within thirty days from receipt of a completed application for certain minimum impact projects. However, for NHDES to process a Minimum Impact Expedited application within thirty days, the signature by the local Conservation Commission is required.

Note, in the Standard Dredge and Fill Application, the applicant will need to explain why the proposal has less environmental impact on wetlands than other reasonable alternatives. The application will need to illustrate why the proposal is the least impacting alternative by showing a reason or need for the project and by showing that wetland impacts have been avoided or minimized wherever possible.

Applicability to Exeter's Water System Project
The proposed WTP project will require construction within wetlands and work associated with the new intake pipeline and outlet at the Exeter Reservoir. Wetlands on the proposed water treatment plant site were delineated on March 1, 4, and 7, 2002. This type of work will require approval from NH DES Wetlands Bureau and screening from the Corps depending on the amount of impacts to wetlands and project classification. The project will likely be categorized as a Major Impact Project due to the amount of direct impacts to wetlands and if Prime Wetlands are impacted. Agencies should be contacted at the beginning of the final design phase to determine if endangered or threatened species are present. The permit application will require about two weeks to prepare and up to 3 months for approval.

Communication with Federal and State Agencies

Description
As part of the NH wetlands permitting process, communication will be required with the U.S. Fish & Wildlife Service; NH Fish & Game Department; and NH Department of Resources and Economic Development – Natural Heritage Inventory to assess potential project impacts on plants, fish, and wildlife that may be within the project corridor including: rare, special concern species; state and federally listed threatened and endangered species; migratory fish and wildlife and exemplary natural communities.

Applicability to Exeter's Water System Project
Correspondence including the project description and a USGS project location map should be sent to the agencies listed above prior to submitting the Standard Dredge and Fill Application to NH DES (approximately one month) so that relevant correspondence from the agencies can be incorporated into the application.

New Hampshire Comprehensive Shoreland Protection Act (CSPA) RSA 483-B

Description
This Act was passed to protect New Hampshire's lakes, ponds, rivers, and estuaries. The Act establishes minimum standards for the future subdivision, use, and development of the shorelands within 250 feet of the state's public waters. When repairs, improvements, or expansion are proposed to existing development, the law requires these alterations to be consistent with the intent of the Act. The NHDES Wetlands Bureau is responsible for enforcing the standards within the protected shoreland, unless a community adopts an ordinance or shoreland provisions which are equal or more stringent than the Act. A project must follow the Minimum Shoreland Protection Standards set forth in the Act (RSA 483-B)

including Erosion Control for Construction in the Protected Shoreland Buffer Zone and Natural Woodland Buffer Restrictions.

Applicability to Exeter's Water System Project
Construction of the WTP will require work within 250 feet of the adjacent reservoir. In addition, Exeter has a local ordinance which prohibits construction 300-ft of the shoreline without a special exception. Work within the protected shoreland will be approved through the NH wetlands permitting process.

Alteration of Terrain Permit (Site Specific)

NH DES Water Division issues these permits under NH Administrative Rules Env-Ws 415. Alteration-of-Terrain permits (a.k.a. Site Specific Permit-RSA 485-A:17) are designed to protect New Hampshire surface waters by minimizing soil erosion and controlling stormwater runoff. A permit shall be obtained from the division prior to commencing any construction, earth moving or other significant alteration of the characteristics of the terrain when a contiguous area of 100,000 square feet or more will be disturbed. (Developments and earth removal operations, a contiguous earth disturbance of 100,000 square feet including building area, parking, driveways, roadways, utility construction, landscaping and borrow areas would require a Site Specific permit.)

In addition to the above, RSA 483-B, the "Comprehensive Shoreland Protection Act," requires that any person intending to conduct an activity within the protected shoreland resulting in a contiguous disturbed area exceeding 50,000 square feet to first obtain a permit pursuant to RSA 485-A:17. The protected shoreland is defined by the act as all land located within 250 feet of the reference line of public waters.

Historical/Archaeological Preservation Review & Compliance

Description
The Historic Preservation Act requires project areas be evaluated to determine the presence of cultural resources. All federally funded, licensed, or assisted projects in New Hampshire are subject to the review requirements of Section 106 of the National Historic Preservation Act of 1966, as amended (16U.S.C. 470), implemented by the federal Advisory Council on Historic Preservation's procedures, Protection of Historic Properties (36 CFR Part 800). All NH state-licensed, assisted, or contracted projects, activities, and programs are subject to the review requirements of a similar state law, RSA 227-C:9, as implemented by state administrative rules. State agencies, departments, commissions, and institutions are required to submit such undertakings to the State Historic Preservation Officer (SHPO) of the Division of Historical Resources for an initial determination of whether such proposed actions are located in or may affect cultural resources.

If a project is conducted entirely with local or donated funds, and no federal or state funds or programs are involved, review by the division of Historical Resources is usually not required because it is the federal or state funding which triggers the historic preservation review; if

federal funds become involved later, the project should then be submitted to the Division of Historical Resources for review.

Applicability to Exeter's Water System Project
The procurement of State Revolving Fund (SRF) funding would trigger the requirement for historical / archaeological preservation review and compliance. Construction of the WTP will require clearing of undeveloped areas that are densely vegetated. Correspondence including a narrative description of the proposed project, the project's area of potential effects (including secondary areas or impacts); the nature and extent of any past development or disturbance on the subject property (including the location of existing utilities, previous landscape alterations, and when these changes were made), a photocopy of the relevant portion of a soils map and/or soil boring log for ground-disturbing projects, and a USGS project location map along with a site plan. To avoid delays in the project, a letter should be sent to the NH Division of Historical Resources during the planning phases to determine the presence of archaeological resources on the site.

Exeter Shoreland Protection District

The Exeter Shoreland Protection District is defined, in part, to include the areas of land within 300-ft horizontal distance of the shoreline of the Squamscott River and its major tributaries, of which the Exeter Reservoir is one. Of the six purposes for the District's establishment listed in Part 9.3 of the *Exeter Zoning Ordinance – Amended March 2000*, the first states, in part: "...to protect and promote public health, resource conservation and the general welfare and to...protect, maintain, and enhance the water quality of the Exeter River, its tributaries and the Water Works Pond in the Town of Exeter, and to ensure the continued availability of a safe water supply." Section 9.3.4 of the Exeter Zoning Ordinance forbids construction within 300-ft of the shoreline without a special exception.

Local Zoning District Designation

The Town-owned parcel is presently designated as being in a "CT" zoning district, an abbreviation for "Corporate Technology Park". "CT" zoning includes density and dimensional regulations. Exceptions would have to be sought if a plan were proposed to infringe upon any of these requirements.

Exeter Conservation Commission

Continued coordination with the Conservation Commission is suggested during the planning phases for the project. Approval from the Conservation Commission is received through the NH DES Standard Dredge and Fill Application process. The Conservation Commission will provide written correspondence to the NH DES with their approval or any issues they may want addressed through the permitting process. Projects need to be in compliance with local wetlands setback requirements, including a 25-ft "no disturbance" zone, and a 75-ft "no building" zone, unless waivers are procured.

Other Potentially-Required Permits

Design Standards for Water Treatment

The NHDES Water Supply Engineering Bureau requires that all persons proposing to supply water for domestic uses, in accordance with the definition of a public water system shall not construct any new system or enlarge any existing system without first submitting detailed plans of the proposed construction to the water division and securing its approval in accordance with ENV-Ws 370, Env-WS 372, Env-Ws 376, and Env-Ws 377. Plans and specifications should be submitted to the WSEB at appropriate intervals for review, comment, and approval by NHDES.

Sewer Connection Permit

NHDES Water Division, Wastewater Engineering Bureau, requires sewer connection permits be completed for any proposed connections. The new WTP's sanitary discharge will be routed to the existing sewer in Portsmouth Avenue, thus triggering this requirement.

NPDES

Discharge of any process water to the reservoir or other water body would require an NPDES permit. Such discharges, however, are not currently anticipated.

Miscellaneous

Other miscellaneous permits that should be evaluated for applicability include:

- Construction Related Permits/Approvals

  Including but not limited to the following: road openings (particularly with NHDOT for the Holland Way curb cut), blasting approvals, easements and hazardous waste (lead shot has been deposited on the site by the Exeter Sportsman's Club, as described in Appendix B).

- Fuel and Chemical Storage Permits (Operations)

  These permits require coordination with the NH Dept of Public Safety, the Office of the State Fire Marshall and/or the Exeter Fire Department.

- Emergency Response Plan (ERP) and Spill Prevention Control and Countermeasure (SPCC) Plan

- Tight Tanks/Underground Storage Tanks

- NH Air Permit Program

  The NHDES, Air Resources Division, regulates and limits air emissions from a variety of sources within New Hampshire through a statewide permitting program.

Information Needs/Next Steps

As design progresses, thresholds for all permits described in this memorandum should be compared to project-specific information to finalize the project permitting needs. Based on the current preliminary design layout, work will occur within the protected shoreland, thus requiring approval from NHDES (and the Town of Exeter under local ordinances). The extent of wetlands impacted (and therefore the type of ACOE and NHDES wetlands permits) is dependent on the final facilities layout and grading, although it is likely that a NHDES Major Impact Permit and an ACOE Individual Permit will be required. Once final plans are available, the appropriate application can be made to both agencies.

In a meeting held on August 14, 2002 with representatives from NHDES and the Exeter Conservation Commission, the requirement that project need be demonstrated was emphasized, as was the need to minimize wetland impacts to the extent practicable. For unavoidable impacts, a mitigation plan must be developed and incorporated in the permit applications. NHDES has indicated some flexibility in their acceptance of a mitigation plan; such a plan may include conservation of adjacent lands (e.g., the Blanchard property). NHDES also indicated that a functional assessment of the affected wetlands will be required as part of its permit review.

Because of the proximity of the proposed work to the reservoir, erosion and sedimentation controls will also be important. The Stormwater Pollution Prevention Plan developed for the NPDES permit and Site Specific Alteration of Terrain Permit (if impacts exceed 100,000 s.f.) will address construction controls. The NHDES permit application must address controls during and after construction. The Exeter Conservation Commission indicated that they will want to see infiltration and/or treatment of stormwater that comes into contact with new structures and driveways, and noted that rigorous sedimentation controls will be needed when installing pipelines along the Exeter Reservoir access road.

Schedule

The current construction bid date is spring 2004. Allowing approximately 1 year for the permitting process, application preparation should begin by spring 2003. However, the permitting schedule is tied to the preliminary design schedule. Once sufficient information is available on facilities layout and extent of grading (and that information is reflected on plans), applications can be prepared and submitted.

Other Steps

To streamline the permitting process and avoid/minimize delays CDM recommends that meetings be held with agencies prior to submittal of applications.

Appendix J

Appendix J

Value Engineering Comment/Response Table

No.	Comment	Exeter / CDM Response 01/08/2003	Comment Accepted and Cost Adjusted?
WTP-23	Delete VFDs for filter backwash pumps and use rate of flow controllers	CDM recommends this be a final design phase decision. Rate of flow controllers dissipate discharge head, and therefore add electrical consumption (adding operational cost). These pumps, however, will not be used to the extent that the added operational costs are significant.	No, but this should be evaluated in the final design phase.
WTP-24	Use magna drives in lieu of VFDs for backwash water pumps and finished water pumps	CDM would do this if so directed, but notes the following about magna drives: • As LZA indicates, they are not as efficient electrically as a VFD over a wide speed range. • They lack communication capabilities that VFDs offer. • They move the rotor, but do not start the motor, whereas a VFD provides the motive control and a starter. • Magna drives may not be as smooth or precise in providing the desired motor speed (and thus, discharge flow). LZA's cost worksheets do not explicitly indicate that soft starters or capacitors are included in their cost computations. • There is no "soft start", "ramp up", or "ramp down" possible with a magna drive. • Magna drives will decrease the power factor (adding operational cost) and require that a capacitor be installed	No.
WTP-27 *"Design Suggestion"*	Provide buried concrete backwash water equalization tank in lieu of open air lagoons.	To be evaluated in final design phase. This would add cost to project. Current CDM approach to be maintained for preliminary design.	No.
WTP-30-A	Consolidate building, clearwell, and backwash tank.	Clearwell beneath requires access hatches above. Access hatches require housekeeping curbs around them, with 3-ft clearance around curbs. This will require greater floor space above. Clearwell beneath will require thicker slabs, larger columns. Elevator is desired for second floor access – this was not included in LZA's cost detail.	Yes. Consolidation will also lessen the site area impacted by construction.
WTP-30-B	Consolidate WTP facilities within the building footprint.	This has been done. Elevator has been provided in revised preliminary design for second floor handicapped access.	Yes.
SPS-1	Use can pumps for Exeter Reservoir Pumping Station	CDM included this suggestion in the completion of preliminary design.	Yes.

Table 1
Phase 2 Water Treatment Plant Preliminary Design
Review of Value Engineering Comments

No.	Comment	Exeter / CDM Response 01/08/2003	Comment Accepted and Cost Adjusted?
SPS-2 / SPS-6	Add only one new pump to Exeter River Pumping Station and raise the floor elevation 4-feet.	While the motor was reportedly replaced in the late 1990s, the existing pump is approaching 28 years old. CDM would not recommend keeping this pump in service as part of the renovated pumping station. Exeter agreed with this assessment. CDM investigated raising elevations, and proposes this be accomplished through specification of modified pump construction versus floor elevation modification. The final design phase should consider elevating other critical pieces of mechanical and electrical equipment.	SPS-2: No. / SPS-6: Yes.
SPS-4	Use smaller horsepower pumps with a 2.5-mgd capacity for the Exeter River pumping station.	CDM agrees that this would defer costs for higher capacity until demand in system actually shows the need arising for greater firm capacity. Exeter considered reduction in firm capacity from 3.4-mgd to and advised CDM that a reduction to 3.0-mgd would be acceptable.	Yes. See response notes in column to left.
SPS-7 *"Design Suggestion"*	Provide separate electrical supply to the Exeter River Pumping Station in lieu of an emergency generator.	Depending on where the nearest substation is, a separate electrical supply could be very costly. CDM suggested Exeter consider having the ERPS reconstructed such that it is capable of receiving power from a *portable* generator, instead. Exeter agreed to this.	No.
HLPS-2	Reuse existing high lift pump in new finished water pumping station.	This is a good suggestion, as the pump was installed in 2001 and features a design point close to what will be required for the new WTP. Some modification of existing pump may have to be made to operate in the new WTP's clearwell, which likely will be of different depth than the existing WTP's clearwell. CDM recommends costs be quantified and adjusted during final design phase.	Yes, but the cost for this has not yet been adjusted. This should be evaluated in the final design phase.

Table 1
Phase 2 Water Treatment Plant Preliminary Design
Review of Value Engineering Comments

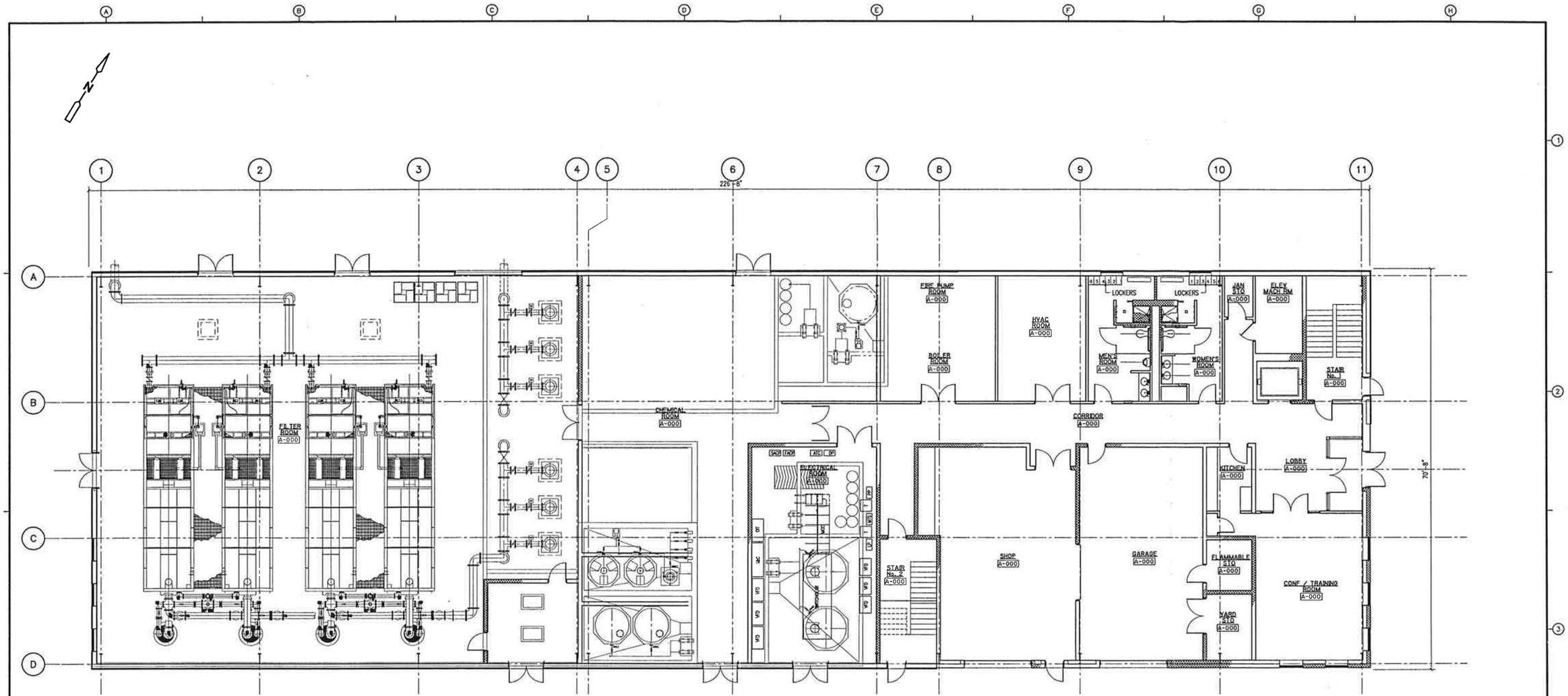
No.	Comment	Exeter / CDM Response 01/08/2003	Comment Accepted and Cost Adjusted?
G-1 *"Design Suggestion"*	Use the design-build project delivery process in lieu of the design-bid-build project delivery process.	CDM notes that design-build will require the same construction expenditure to get the same quality construction project that would be procured through design-bid-build. Further development of the preliminary design (30-35%) would be necessary for design-build to be bid in a manner that provides the town with a project of equal quality to what is presently envisioned. Design-build may shorten project schedule, however if SRF funds are to be considered, negotiations with DES will be required to establish the proper protocol for developing the RFP, bidding the project and establishing the selection process. This could take more time that than traditional design bid. The Town will still need to engage a consultant (CDM) engineer to act on their behalf. This will be true throughout the entire project including construction observation. Under design/bid typically we see less competition because there are fewer D/B firms willing to expend the funds required to prepare the bid proposal which requires a significant amount of engineering design. Certainly a greater degree of competition generally results in reduced costs. Savings associated with D/B projects in many cases are due to a reduction in those areas designed to elevate operations and maintenance efficiency. Any initial savings may be offset by greater O&M costs over the life of the facility. Another area of concern is a lessening of the redundancies typically built into treatment facilities. Reducing these redundancies may have an impact on the operation and ability to provide continuous service. Capital costs can be reduced by providing lesser quality equipment. Generally higher quality and more efficient equipment with longer life expectancies are specified under traditional design/bid.	No.
G-3	Re-use the emergency generator from the existing water treatment plant in the new WTP or low lift pumping station.	Existing generator has less value and less "quality" than a new generator would have. As the generator was installed as part of the 1987 WTP upgrade design, it will be 18 years old in 2005, and beyond its useful life in 2010. LZA's costs do not include adequate money to move and reinstall the generator, which is estimated to cost on the order of $25,000. CDM suggests that preliminary design carry a new generator, and that this issue be revisited in final design.	No.

Table 1
Phase 2 Water Treatment Plant Preliminary Design
Review of Value Engineering Comments

Appendix K

Appendix K

Drawings Representing Basis of Opinion of Probable Construction Cost



PLAN

PLAN

1/8" = 1'-0"

NOTE:
THIS DRAWING REPRESENTS BASIS OF OPINION OF PROBABLE PROJECT COST PRESENTED IN TABLE 3-11.

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	ORWN	CHKD	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: B. GIORGI
CROSS CHK'D BY: JED/JFW
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

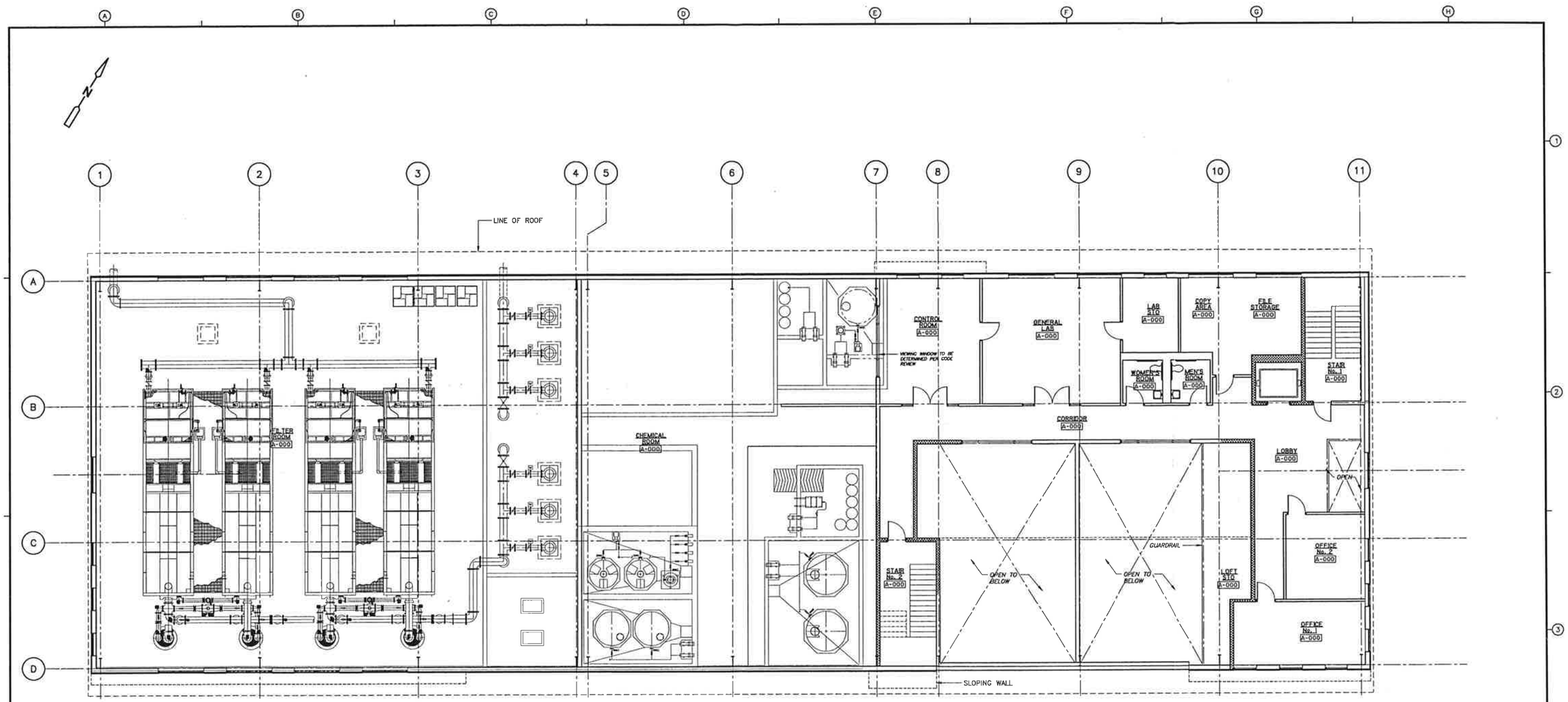
CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
FIRST FLOOR PLAN

PROJECT NO. 0260-36493
FILE NAME: APBFL001

FIGURE NO.
3-7A



PLAN

PLAN

1/8" = 1'-0"

1/8" = 1'- 0"

4 2 0 4 8

NOTE:
THIS DRAWING REPRESENTS BASIS OF OPINION OF PROBABLE PROJECT COST PRESENTED IN TABLE 3-11.

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: M. PELLETIER
DRAWN BY: M. PELLETIER
SHEET CHK'D BY: B. GIORGI
CROSS CHK'D BY: JED/JFW
APPROVED BY: E. NAZARETIAN
DATE: APRIL 2003

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations

TOWN OF EXETER, NEW HAMPSHIRE
WATER SYSTEM IMPROVEMENTS
WATER TREATMENT PLANT
PHASE 2 - PRELIMINARY DESIGN

PROCESS BUILDING
SECOND FLOOR PLAN

PROJECT NO. 0260-36493
FILE NAME: APBPL001

FIGURE NO.
3-7B

Appendix L

Appendix L

Memorandum Regarding WTP Design Waste Handling Facilities

CDM

Design Memorandum

To: *Victoria Del Greco*

From: *Al LeBlanc*

Date: *May 28, 2003*

Subject: *Exeter, New Hampshire Water Treatment Plant (WTP) Design Waste Handling Facilities*

In meetings between the Town of Exeter and Camp Dresser & McKee Inc. (CDM) on March 20 and April 15, 2003, we have discussed the matter of process waste water handling and residuals management. This memorandum presents our understanding of the Town's goals relating to waste handling, estimates of waste flow and solids production at the new WTP, an overview of handling options, and CDM's recommended approach.

Exeter's Goals Relating to Waste Handling

We understand the Town wishes to achieve the following goals relating to waste handling:

- Minimizing the quantity of flow and solids concentration conveyed to the Town's sanitary sewer system, which is sometimes negatively affected by such flows from the existing WTP.
- Avoiding "lagoon" facilities which may (a) be cumbersome to remove solids from, (b) preclude easy maintenance of surrounding vegetation, and/or (c) be aesthetically unpleasing.
- Minimizing the overall waste water storage volume provided as part of the new WTP design.
- Minimizing the waste water storage facilities' impact to overall site surface area impacted, with consideration of providing waste storage volume beneath the WTP building. Persons have proposed that doing this, or relocating outdoor holding cells to a location immediately adjacent to the WTP building, would potentially serve to minimize the lead shot remediation area.
- Minimizing overall cost for waste handling facilities.

Estimates of Waste Flow from New WTP

Excluding sanitary sewage generated in the lavatories of the new WTP, CDM estimates projected waste flows from the new WTP as shown in Table 1:

Source	Flow From Source (gallons per day)		Comments and Basis of Computation
	At 2016 Maximum Daily Flow (3 mgd)	*At 2020 Average Daily Flow (2 mgd)*	
Filter Backwashing	84,000	56,000	Maximum day computation assumes 3 out of 4 filters washed on a given day. Average Day assumes 2 out of 4 filters washed per day. See Note 1.
Filter-To-Waste	32,000	21,000	Maximum day computation assumes each of the 3 filters backwashed in a given day are run in filter-to-waste mode for a 15 minute period at maximum filtration rate. Average day computation assumes 2 filters washed. See Note 2.
Sedimentation Basin Withdrawal	122,000	91,000	Each sedimentation basin is continuously cleaned by microsand recirculation pumps as part of the Actifloc process. All recirculated flow (26.4 gpm) is directed to a hydrocyclone sand separator. The hydrocyclone's typical separation is such that 20% of the flow it receives is re-introduced into the pretreatment process, with the remaining 80% directed to waste. A given module's recirculation pump run at a constant speed whenever the module is on line. Average Day computation assumes 3 of 4 modules on-line. See Note 3.
Totals	238,000	168,000	Based on 3.0 mgd WTP maximum day production, this total equates to approximately 8% of maximum daily flow.

Notes:

1. (140 ft^2/filter) x (3 filters backwashed / day) x (200 gal/ft^2) = 84,000 gallons/day
2. (140 ft^2/filter) x (3 filters backwashed / day) x (15 min) x (5 gal/min/ft^2) ~= 32,000 gallons/day
3. (26.4 gal/min/module) x (4 modules) x (60 min/hr) x (24 hr/day) x 80% ~= 122,000 gallons/day

Table 1
Waste Flow Estimates

Estimates of Solids Exiting the New WTP

Excluding sanitary sewage generated in the lavatories of the new WTP, CDM estimates projected solids production at the new WTP as shown in Table 2:

Source	Solids Generated (pounds per day)		Comments and Basis of Computation
	At 2016 Maximum Daily Flow (3 mgd)	*At 2020 Average Daily Flow (2 mgd)*	
Turbidity	127	85	Based on average turbidity of 2.54 ntu from the Exeter Reservoir, which was slightly higher than the average turbidity from the Exeter River between September 1999 and November 2000. See Note 1.
Coagulant	676	451	Assumes the use of Polyaluminum Chloride as the coagulant. Specifically, Holland Chemical Company, Inc. advised CDM that their PC 605 product yields approximately 0.45 lb of residuals per lb of PC 605 fed. See Note 2.
Polymer Coagulant Aid	7	5	Assumes the use of cationic polymer "LT22" manufactured by Ciba Specialty Chemicals. See Note 3.
Polymer Filter Aid	38	25	Assumes the use of cationic polymer "EC-461" by Southern Water Consultants. See Note 4.
Powdered Activated Carbon	400	266	See Note 5.
Manganese	3	2	See Note 6.
Iron	15	10	See Note 7.
Microsand Loss	24	16	Assumes 8 lb of microsand is lost per million gallons treated.
Totals	**1,290**	**860**	Based on 3.0 mgd WTP maximum day production. Raw water quality data per CDM's January 2002 *Town of Exeter, New Hampshire Water System Evaluation Study.*

Notes:

1. (2.54 ntu) x (estimated 2 mg/L suspended solids / ntu) x (8.34 lb / gal) x (3.0 mgd) = 127 lb/day
2. (Maximum 60 mg/L PC605) x (0.45 lb solids / lb PC 605) x (8.34 lb / gal) x (3.0 mgd) = 676 lb/day
3. (Maximum 0.27 mg/L polymer coagulant aid) x (8.34 lb / gal) x (3.0 mgd) = 7 lb/day
4. (Maximum 1.5 mg/L polymer filter aid) x (8.34 lb / gal) x (3.0 mgd) = 38 lb/day
5. (Maximum 16 mg/L PAC) x (8.34 lb / gal) x (3.0 mgd) = 400 lb/day
6. (Maximum 0.1 mg/L Mn) x (8.34 lb/gal) x (3.0 mgd) = 3 lb/day
7. (Maximum 0.6 mg/L Fe) x (8.34 lb/gal) x (3.0 mgd) = 15 lb/day

Table 2
Solids Production Estimates

Solids Handling Options

Based on the data presented in Table 2, and assuming that the solids are concentrated to 0.5%, then a solids volume of [(1,290 lb) / (62.4 lb/ft^3) / (0.005) = 4,135 ft^3 per day] nearly 31,000 gallons per day would be produced. CDM's experience indicates that delivery of a 0.5% solids stream is not typically problematic in sanitary sewer systems. Further, CDM's January 2002 *Water System Evaluation Study* noted that an average of 300,000 gallons per day was discharged from existing WTP to the sewer during a 21-day period in August 2000. The projected 31,000 gallons of flow per day would represent a significant decrease from existing conditions.

If 238,000 gallons of waste flow were produced by the new WTP each day, and 31,000 gallons per day were pumped to the sanitary sewer system, then some 207,000 gallons per day would remain to be recycled to the new plant's headworks. This averages to 144 gallons per minute based on 24-hour per day recycling.

There are a number of options available for concentrating solids and storing waste flows, as described below:

Wash Water Holding Cells with Settling Capabilities
CDM's October 2002 draft *Phase 2 Water Treatment Plant Preliminary Design Report* schematically presents a 2-cell holding pond system outside the water treatment plant. Such an arrangement is used successfully by many New England water treatment plants, wherein waste flows are directed to ponds sized adequately for settling to occur, with the cleaner supernatant recycled to the headworks of the plant. Examining a single cell for Exeter's waste flows, assuming that such a cell should provide freeboard, and one day's worth of waste flow and solids storage, CDM estimates size and depth requirements as presented in Table 3.

Depth Range Within Pond	Purpose	Area Requirements
5-feet to 8-feet below surrounding grade	Solids Storage	(4,135 ft^3/day) / (3 ft) = 1,378 ft^2 (Approximately 37-ft square) The above solids-driven area computation would provide a basin loading rate of (238,000 gal/day) / (1,378/ft^2) = 173 gpd/ft^2. This rate would be acceptable, as CDM typically recommends a maximum loading rate of 200 gpd/ft^2.
2-feet to 5-feet below surrounding grade	Wash Water Storage	If a 2-ft zone for wash water holding were provided above the solids storage zone, then (1,378 ft^2) x (2 ft) = 2,756 ft^3 = 20,618 gallons of storage would be provided. This, however, is less than the volume of one filter backwash. If a 3-ft zone for wash water holding were provided above the solids storage zone, then (1,378 ft^2) x (3 ft) = 4,134 ft^3 = 30,926 gallons of storage would be provided. This is greater than the volume of one filter backwash, but still judged to be inadequate. If a 3-ft zone for all waste flow for one day is provided, then some 238,000 gallons (31,814 ft^3) would be required. This translates to [(31,814 ft^3) / (3 ft) = 10,605 ft^2], or approximately 103-ft square. If a 3-ft zone for 3 filters' backwash and filter-to-waste is provided, then some 116,000 gallons (15,506 ft^3) would be required. This translates to [(15,506 ft^3) / (3 ft) = 5,169 ft^2], or approximately **72-ft square**. A holding cell some 5,169 ft^2 would provide 22 gpm/ft^2 loading rate – well within CDM's recommended maximum loading rate of 200 gpd/ft^2.
0 to 2 feet below surrounding grade	Freeboard	Area in "freeboard zone" governed by solids or waste water storage requirements.

Table 3
Preliminary Sizing Criteria for Washwater Holding/Settling Ponds

The 72-ft square, 8-ft deep pond cell's lowest 3 feet could feature sharply tapered side slopes, as a 72-ft square surface area for solids storage is unnecessary. This would be typical of the two cells provided as part of this project. The cost of such a system would be $51,000 plus markups and contingencies, which was presented in CDM's initial project cost estimate.

Wash Water Holding Cells with Separate Settling Facilities

The pond cell arrangement presented in Table 3 is based on settling occurring within the holding cells. If solids were to be concentrated upstream of the holding cells, cell maintenance and overall size would be lessened. Such upstream concentration can be achieved through the use of small in-line treatment units, such as plate settlers, small sludge blanket clarifiers, or even membranes. If one were to install a sludge blanket clarifier to treat

the sedimentation basin withdrawal waste stream, the pond cell design would require much less solids storage volume, and would feature a design as presented in Table 4.

Depth Range Within Pond	Purpose	Area Requirements
7-feet to 8-feet below surrounding grade	Solids Storage	The lowest 1-ft of the pond would be reserved for settled solids deposition.
2-feet to 7-feet below surrounding grade	Wash Water Storage	If a 5-ft zone for 3 filters' backwash and filter-to-waste is provided, then some 116,000 gallons (15,506 ft^3) would be required. This translates to [(15,506 ft^3) / (5 ft) = 3,101 ft^2], or approximately **56-ft square**. A holding cell some 3,101 ft^2 would provide 37 gpm/ft^2 loading rate – well within the recommended maximum loading rate of 200 gpd/ft^2.
0 to 2 feet below surrounding grade	Freeboard	Area in "freeboard zone" governed by solids or waste water storage requirements.

Table 4
Preliminary Sizing Criteria
for Washwater Holding Ponds With Limited Solids Holding Capacity

The 56-ft square, 8-ft deep pond cell would be typical of two provided as part of this project. The approximate cost of such a system, plus a sludge blanket clarifier (such as the "ClariCone™" system from Chicago Bridge & Iron Company, or equal) to treat the sedimentation basin waste stream, would be $175,000 plus markups and contingencies. A schematic drawing of the ClariCone™ is available at the manufacturer's website, http://www.chicago-bridge.com/clrschematic.html. CDM also notes that similar, non-proprietary hopper-type systems can be constructed at lower costs.

Wash Water Holding Cells Beneath WTP Structure

The pond cell concept provides wash water storage in pond cells detached and downgradient from the WTP. Town of Exeter personnel inquired about constructing such storage beneath the WTP, in an effort to lessen overall site impact and to remove a facility that could be aesthetically unpleasing. Below-plant storage, however, would come at significant cost. To store one day's worth of maximum waste flow (238,000 gallons), a below-plant storage basin would cost an estimated $366,000 plus markups and contingencies. Alternately, a similar storage basin sized to store one day's worth of filter backwash and filter-to-waste (116,000 gallons), plus the cost of a sludge blanket clarifier, is estimated to cost $358,000, plus markups and contingencies. Given capital cost and confined space entry implications (acknowledging that entries into the tank would be infrequent), CDM does not recommend below-plant waste flow storage.

Recommendations

The holding cells presented in CDM's *Draft Phase 2 WTP Preliminary Design Report* were sited outside of wetlands. Further, their location was preliminarily determined to be of a relatively low lead concentration. New Hampshire's Risk Characterization and Management Policy 51 mg/kg was exceeded in only the top 3 inches of a sample in the proposed holding cell location. Further sampling during the final design phase will provide more information on the required lead removal. Given operational and capital cost considerations as detailed above, CDM recommends outdoor wash water holding cells with separate settling facilities for the sedimentation basin waste flow stream. CDM recommends that a non-proprietary hopper-type system be the basis of final design, with further sizing and details presented by the 30% design submittal.

We believe such a configuration will best achieve the Town's waste handling goals as stated herein.

Further Issues to Be Addressed

Details to be resolved within the final design phase include:

- Examination of the operational and maintenance considerations for a Claricone™ unit, or equal.
- Review of holding pond exfiltration issues, including consideration of state requirements.
- Fully understanding the Town's sanitary sewer system and concerns over WTP residuals flow. This will dictate allowable sewer pumping flow rates, solids concentration, and discharge timeframe (e.g., during low sewer flow periods from x:xx p.m. to x:xx a.m., etc.).
- Determining proposed WTP operating hours, which will affect recycle pump discharge rate requirements.

Please contact us if you have any questions on this matter.

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