RepresentativePolicyBoard

South Central Connecticut Regional Water District
90 Sargent Drive, New Haven, Connecticut 06511-5966 / 203-401-2515
http://www.rwater.com

NOTICE OF PUBLIC HEARING

The Representative Policy Board ("RPB") of the South Central Connecticut Regional Water District will hold a public hearing to consider the South Central Connecticut Regional Water Authority's Application for the approval of a project for North Sleeping Giant Wellfield Chemical Improvements.

The public hearing will be held on Thursday, May 21, 2020 at 7:00 p.m., via remote access. In accordance with Governor Lamont's, Executive Order No. 7B for the Protection of Public Health and Safety during COVID-19 Pandemic and Response, the public hearing will be held remotely under the requirements of Paragraph 1 of Executive Order No. 7B - Suspension of In-Person Open Meeting Requirements. Members of the public may attend the meeting via conference call, videoconference or other technology. For information on attending the meeting via remote access and to view the application and accompanying information, please go to https://www.rwater.com/about-us/our-boards/board-meetings-minutes?year=2020&category=1435&meettype=&page=. The Public Hearing is being held pursuant to Sections 10 and 19 of Special Act 77-98, as amended.

All users of the public water supply system, residents of the Regional Water District, owners of property served or to be served, and other interested persons, shall have an opportunity to be heard concerning the matter under consideration. Questions may also be submitted in writing to the board office by emailing jslubowski@rwater.com or by calling (203) 401-2515.

Mario Ricozzi, Chairperson
REPRESENTATIVE POLICY BOARD
South Central Connecticut Regional Water District
90 Sargent Drive
New Haven, CT 06511

Topic: 05 21 2020 Public Hearing:

- North Sleeping Giant Wellfield Chemical Improvements

Time: May 21, 2020 07:00 PM Eastern Time (US and Canada)

Join Zoom Meeting *(via conference call)*

Dial by your location

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+1 253 215 8782 US (Tacoma)

Meeting ID: 827 2997 3451

Password: 945141

Find your local number: https://us02web.zoom.us/u/kdcbsE014

South Central Connecticut Regional Water District
Representative Policy Board

Application to the RPB for the approval of North Sleeping Giant Wellfield Chemical Improvements
Exhibits

Exhibit Number/Letter	Exhibit Name
A	Application submitted to RPB on March 23, 2020 for approval of the North Sleeping Giant Wellfield Chemical Improvements
B	Notice of Public Hearing published on April 28, 2020 in the CT Post and The New Haven Register
C	Office of Consumer Affairs Memorandum dated May 13, 2020 recommending approval of the Application
D	North Sleeping Giant Wellfield Chemical Improvements Application Presentation

RECEIVED
By Jennifer Slubowski at 7:54 am, Mar 23, 2020

EXHIBIT A

RegionalWaterAuthority

South Central Connecticut Regional Water Authority
90 Sargent Drive, New Haven, Connecticut 06511-5966 203-562-4020
http://www.rwater.com

March 19, 2020

Members of the Representative Policy Board
South Central Connecticut Regional Water District
90 Sargent Drive
New Haven, CT 06511-5966

Subject: Application to the Representative Policy Board For Approval of a Project for North Sleeping Giant Wellfield Chemical Improvements

Ladies and Gentlemen:

The South Central Connecticut Regional Water Authority requests that the Representative Policy Board (RPB) accept the following enclosed document as complete:

Application for Approval of a Project for North Sleeping Giant Wellfield Chemical Improvements

Based on our conclusion that the proposed actions are consistent with the policies and advance the goals of the South Central Connecticut Regional Water Authority, are in the best interests of our customers, and will have no significant adverse impact on the environment, we are further requesting that the RPB approve this action following a public hearing.

Any questions regarding this Application may be directed to Ted Norris, Vice President of Asset Management or Rose Gavrilovic, Director of Capital Planning and Delivery.

Sincerely,

SOUTH CENTRAL CONNECTICUT REGIONAL WATER AUTHORITY

Anthony DiSalvo /

Anthony DiSalvo
David J. Borowy
Joseph A. Cermola
Kevin J. Curseaden
Suzanne C. Sack

Enclosures

Application to the Representative Policy Board for Approval of a Project for North Sleeping Giant Wellfield Facility Chemical Improvements

South Central Connecticut Regional Water Authority
March 19, 2020

Application to the Representative Policy Board
For Approval of a Project for
North Sleeping Giant Wellfield Facility Chemical Improvements

Table of Contents

1.0 Statement of Application

This is an application of the South Central Connecticut Regional Water Authority (RWA) to the Representative Policy Board (RPB) of the South Central Connecticut Regional Water District for consideration of a project to address chemical feed systems at the North Sleeping Giant (NSG) Wellfield, located in Hamden, CT.

Section 19 of Special Act 77-98 as amended requires the approval of the Representative Policy Board before the Authority commences any capital project costing more than $2.0 million. The proposed project is estimated to cost approximately $2.1 million.

The project was first included in the FY 2020 Capital Improvement Budget as a multi-year project spanning two fiscal years. Work planned for FY 2020 included the design, permitting, bidding and initiation of construction, with the project completion planned for FY 2021, at a cost estimated at $2.1 million, including a 5% contingency.

2.0 Description of Proposed Action

The NSG Wellfield, located in the town of Hamden, consists of five production wells (Wells 1, 1B, 2N, 2R and 4) with a combined capacity of 2.9 MGD. It serves the York Hill Service Area, supplying a population of over 18,000 in Hamden. The chemical treatment building associated with the wellfield was constructed in year 1968 and is in need of rehabilitation. The existing chemical treatment systems consist of chlorination for disinfection, and phosphate for corrosion control, as well as the addition of fluoride.

This project consists of replacement of the fluoride, phosphate, and sodium hypochlorite chemical feed systems with in-kind replacement of the bulk tanks, day tanks, transfer pumps, and metering pumps, as well as new piping and appurtenances for each of the chemicals.

The project also includes the installation of a new sodium hydroxide chemical feed system (for pH adjustment), inclusive of a bulk storage tank with fill system, day tank, and transfer and metering pumps, with associated piping and appurtenances. The installation of the sodium hydroxide system is for the purpose of helping to achieve consistent targeted pH of 7.5. The raw water pH from each of the NSG Wellfield's five wells varies from a pH of 6.6 to 7.8. An optimal pH of 7.5 is necessary to optimize treatment at this facility to meet current regulatory requirements, as well as plan for future regulations related to the lead and copper rule. Temporary chemical feed systems will be in place during construction so that there will not be interruptions in our ability to provide service to our customers.

Additionally, there are several upgrades to the building that will be completed, including replacement of the exhaust fans, the unit heaters, and emergency eyewash/shower. A new tempered water system will also be installed as part of the new eyewash/shower. Several of the entry doors to the chemical rooms are in poor condition, creating a security hazard and will also be replaced.

3.0 Need for Proposed Action

The NSG Wellfield is one of RWA's critical facilities and is necessary to provide water to the northern portion of our distribution system. In order to provide high-quality water to our customers in this area, the water quality of the existing wells requires reliable chemical treatment systems. The existing chemical treatment systems at this facility are over 50 years old and are in need of replacement. These systems have experienced leaks and become labor intensive for our treatment operators to maintain. The chemical rooms are very small and difficult to maneuver around and are hazardous for the operators. Piping in the chemical rooms will be reconfigured to increase maneuverability and Operator safety.

This project is necessary to improve the stability and reliability of the water produced and treated at the NSG Wellfield by addressing the known issues associated with the existing chemical feed systems. Furthermore, the addition of a new sodium hydroxide chemical feed system is required to optimize the existing treatment at the wellfield, as well as plan for future regulatory requirements. The project is also necessary to address safety concerns and other upgrades to the existing building.

4.0 Analysis of Alternatives to the Proposed Action

In determining the best course of action to address the chemical addition and improvements to the existing feed system and necessary safety improvement, RWA considered the following alternatives.

1. **Alternative 1 – Status Quo:** Taking no action is not an acceptable alternative and was dismissed quickly. It does not provide a means to address the known issues with the chemical systems at the NSG Wellfield, nor add the sodium hydroxide chemical feed system for pH adjustment. The safety hazards associated with handling chemicals and poor chemical room layouts would remain.

2. **Alternative 2 – Construction of a new Chemical Treatment Building at the North Sleeping Giant Wellfield:** This alternative would involve construction of a new Chemical Treatment Building to incorporate addition of pH adjustment chemical feed system along with new chemical feed systems for Fluoridation, Chlorination and Phosphate addition.

   This alternative was dismissed because the existing building footprint can be optimized by re-configuring the existing chemical rooms and will incorporate the addition of a new chemical feed system for pH adjustment. The capital investment for a new building is estimated at $3.75 million, would require extensive permitting and wetlands on the site would make it difficult to re-locate the building on the same site.

3. **Alternative 3 – Rehabilitation of North Sleeping Giant Wellfield Chemical Improvements:** This alternative, which is the subject of this application, consists of the replacement of all chemical treatment systems (fluoride, phosphate, and sodium hypochlorite) at the NSG Wellfield, inclusive of a bulk storage tank with fill system, day tank, transfer and metering pumps, and associated piping and appurtenances. The alternative also includes installation of a new sodium hydroxide chemical feed system for pH adjustment, as well as addressing several needed building improvements.

   This project alternative is estimated to cost $2.1 million and fully rehabilitates the chemical treatment at the wellfield. It provides for better chemical room layouts and safer working conditions for treatment operators. Additionally, it will provide the new pH adjustment system for optimization of treatment to provide the highest quality of water to our customers in the York Hill Service Area. These improvements will significantly improve stability and reliability of the water produced and treated at the NSG wellfield at the lowest cost to our customers.

4.1 Alternative Selection

The Alternatives Analysis and supporting Business Case Evaluation (BCE), conducted by RWA staff, support the selection of Alternative 3, which includes rehabilitation of the existing North Sleeping Giant Wellfield chemical building and replacement of the chemical systems and associated equipment. This solution provides the most benefit to the RWA and its customers. These benefits include improvements to water quality and reliability, the ability to meet current and future regulatory requirements, replacing aging equipment, and adding additional treatment capabilities through the installation of a new chemical treatment system. In summary, the project associated with Alternative 3 was selected for the following reasons:

- The BCE demonstrates that Alternative 3 will provide a decrease in the annual operation and maintenance costs, reduce the annual risk, and result in the highest Benefit/Cost ratio of the alternatives.
- There will be improved reliability and water quality in the York Hill Service Area, by allowing for control and adjustment of finish water pH.
- A decrease in operation and maintenance costs (approximately $2,500 annually) will be realized due to the renewal of chemical feed and treatment equipment.
- This alternative significantly improves the operational safety of the facility by improving the layout of piping and chemical feed systems.

5.0 Estimate of the Cost to Be Incurred and/or Saved

5.1 Capital Cost

The project is expected to result in a capital expenditure of approximately $2,100,000, based on the lowest responsible bid received for this project. A breakdown of the capital cost related to this project is presented in Table 1.

TABLE 1
Capital Cost Breakdown
Construction Estimate

Description	Capital Cost
Previous Expenditures (through February 2020)	$110,199
Contractor Construction Cost (low bid submitted by Associated Construction Company)	$1,371,785
Temporary Chemical Systems	$35,000
Construction Inspection	$ 226,000
Construction Administration	$60,000
RWA Costs Project Management, Permitting, SCADA Programming, Department Coordination	$166,000
Subtotal	$1,968,984
5% Contingency	$98,450
Total	$2,067,434
Rounded Total	$2,100,000

The ancillary costs associated with this project, in addition to the contractor's bid, are significant due to a few factors, including the sequencing and number of chemical systems involved, the length of the actual construction period and RWA's stringent safety requirements. This wellfield is a remote site, which requires full-time inspection and observation while the contractor is working onsite. The sequencing of construction allows the chemical systems to be worked on only one system at a time, causing the extended construction timeline. Also, upgrading of the chemical rooms requires the installation of temporary chemical feed systems to prevent interruption of service and meet system demands.

A 5% contingency of approximately $98,450 is included in this construction cost estimate. The Association of the Advancement of Cost Engineering (AACE) defines contingency as a specific provision for unforeseeable elements of cost within the defined project scope. Contingency typically ranges from 5% to 20%, based on the design level and complexity of the project. With this project being in the post-bid phase, the 5% contingency allowance was chosen in this case to cover any low unanticipated expenses that should occur.

5.2 Operations and Maintenance Costs

There will be an increase in operation and maintenance expenditures with the addition of a new chemical feed system at the NSG Wellfield. These additional costs will include the cost of the sodium hydroxide chemical itself, as well as the electrical power required to run the transfer and feed pumps. There is also expected to be a decrease in operating costs, mainly due to the reduction in treatment operator labor hours. Under current conditions, operators are frequently called out to the site to address maintenance issues, however, with the new chemical feed systems in place, the number of operator site visits is expected to decrease significantly.

Overall, this project is estimated to slightly decrease operation and maintenance expenditures when compared to the existing operations of the site. The current costs to operate and maintain the site are approximately $160,480 annually. The estimated decrease in annual operation and maintenance expenditures resulting from this project is approximately $2,500. Other operational and maintenance costs associated with site and building maintenance are not expected to change due to this project.

5.3 Bonds or Other Obligations the Authority Intends to Issue

The capital cost of the proposed project to implement the chemical feed improvements at the NSG Wellfield project is $2.1 million. This project is expected to be financed by SCCRWA Water System Revenue Bonds as well as internally generated funds. Assuming all debt financing, the annual average debt service would be approximately $121,443. As a result, the annual cost of this project to a typical residential customer would be approximately $0.73, based on the overall project cost of $2.1 million.

6.0 Preliminary Project Schedule and Permitting

6.1 Schedule

The project schedule is presented below. The project has been designed and bidding completed.

1. Permit Approvals:	April, 2020
2. RPB Application Action	June, 2020
3. Construction Contract Award:	August, 2020
4. Initiate Construction:	September, 2020
5. Complete Construction and Project	October, 2021

6.2 Permitting

Permitting will be required from the following regulatory agencies:

- The Connecticut Department of Public Health: Project Approval (previously obtained)
- Town of Hamden Building Permit (previously obtained)

7.0 Statement of the Facts on Which the Board is Expected to Rely in Granting the Approval Sought

- The North Sleeping Giant Wellfield's chemical feed systems have exceeded their estimated useful lives.
- This project alternative rehabilitates a critical infrastructure by replacing chemical feed systems that are in poor condition and adds a new pH adjustment chemical feed system to maintain reliable, high- quality water service to over 18,000 customers in the York Hill Service area.
- This project will significantly improve safety, stability and reliability of the water produced and treated at the NSG wellfield.

8.0 Explanation of Unusual Circumstances Involved in the Application

As mentioned previously, this project was included in the FY 2020 Capital Improvement Budget as a multi-year project commencing in FY 2020, with project completion planned for FY 2021. The project has been fully designed and bids have been received. Based on the low bid, the cost is estimated at $2.1 million including contingency.

9.0 Conclusion

The NSG wellfield was constructed in year 1968 and the chemical feed systems are in need of rehabilitation. The existing chemical treatment systems consist of chlorination for disinfection, and phosphate for corrosion control, as well as the addition of fluoride.

The alternatives analysis and supporting BCE, conducted by RWA staff, support the rehabilitation of the existing North Sleeping Giant Wellfield chemical building and replacement of the chemical systems and associated equipment. This solution provides the most benefit to the RWA and its customers. This project is necessary to improve the stability and reliability of the water produced and treated at the NSG Wellfield by addressing the known issues associated with the existing chemical feed systems. Additionally, the addition of a new sodium hydroxide chemical feed system is required to optimize the existing treatment at the wellfield, as well as plan for future regulatory requirements. It is also necessary to address safety concerns and other upgrades to the existing building.

The RWA concluded that the proposed action is consistent with, and advances the policies and goals of the South Central Connecticut Regional Water Authority.

APPENDIX A

Project Bid Results

Chemical Improvements at the North Sleeping Giant Wellfield

Bid Opening: 2/6/2020

	The Associated Construction Co.	Holzner Construction
For Construction of the Chemical Improvements at the North Sleeping Giant Wellfield, as detailed on the drawings ad described in the project manual	$ 1,371,785.00	$ 1,693,000.00

<u>Bid Opening Attendance</u>

Name	Company
Rena Pioselli	Holzner Construction
Robert Rechl	The Associated Construction Co.

APPENDIX B

Summary of Business Case Evaluation

Summary of Business Case Evaluation

North Sleeping Giant Wellfield Facility Improvements

Option	Project Name	Life Cycle Costs - Annuitized Cost Stream	Risk Reduction Effectiveness Factor[1]	Benefit Cost Ratio[1]
Alternative 1	Status Quo	NA	NA	NA
Alternative 2	Construction of a new treatment building	$249,347	57.66	38.68
Alternative 3	Rehabilitation of North Sleeping Giant Wellfield Chemical Improvements	$124,998	115.02	50.57
Alternative 4				

1 Higher value is more cost effective

APPENDIX C

Association for the Advancement of Cost Engineering (AACE) Standards aace International

AACE International Recommended Practice No. 18R-97

COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting

Acknowledgments:

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AACE International Recommended Practice No. 18R-97

COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting

February 2, 2005

PURPOSE

As a recommended practice of AACE International, the Cost Estimate Classification System provides guidelines for applying the general principles of estimate classification to project cost estimates (i.e., cost estimates that are used to evaluate, approve, and/or fund projects). The Cost Estimate Classification System maps the phases and stages of project cost estimating together with a generic maturity and quality matrix, which can be applied across a wide variety of industries.

This addendum to the generic recommended practice provides guidelines for applying the principles of estimate classification specifically to project estimates for engineering, procurement, and construction (EPC) work for the process industries. This addendum supplements the generic recommended practice (17R-97) by providing:

- a section that further defines classification concepts as they apply to the process industries;
- charts that compare existing estimate classification practices in the process industry; and
- a chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate.

As with the generic standard, an intent of this addendum is to improve communications among all of the stakeholders involved with preparing, evaluating, and using project cost estimates specifically for the process industries.

It is understood that each enterprise may have its own project and estimating processes and terminology, and may classify estimates in particular ways. This guideline provides a generic and generally acceptable classification system for process industries that can be used as a basis to compare against. It is hoped that this addendum will allow each user to better assess, define, and communicate their own processes and standards in the light of generally-accepted cost engineering practice.

INTRODUCTION

For the purposes of this addendum, the term process industries is assumed to include firms involved with the manufacturing and production of chemicals, petrochemicals, and hydrocarbon processing. The common thread among these industries (for the purpose of estimate classification) is their reliance on process flow diagrams (PFDs) and piping and instrument diagrams (P&IDs) as primary scope defining documents. These documents are key deliverables in determining the level of project definition, and thus the extent and maturity of estimate input information.

Estimates for process facilities center on mechanical and chemical process equipment, and they have significant amounts of piping, instrumentation, and process controls involved. As such, this addendum may apply to portions of other industries, such as pharmaceutical, utility, metallurgical, converting, and similar industries. Specific addendums addressing these industries may be developed over time.

This addendum specifically does not address cost estimate classification in nonprocess industries such as commercial building construction, environmental remediation, transportation infrastructure, "dry" processes such as assembly and manufacturing, "soft asset" production such as software development, and similar industries. It also does not specifically address estimates for the exploration, production, or transportation of mining or hydrocarbon materials, although it may apply to some of the intermediate processing steps in these systems.

The cost estimates covered by this addendum are for engineering, procurement, and construction (EPC) work only. It does not cover estimates for the products manufactured by the process facilities, or for research and development work in support of the process industries. This guideline does not cover the significant building construction that may be a part of process plants. Building construction will be covered in a separate addendum.

This guideline reflects generally-accepted cost engineering practices. This addendum was based upon the practices of a wide range of companies in the process industries from around the world, as well as published references and standards. Company and public standards were solicited and reviewed by the AACE International Cost Estimating Committee. The practices were found to have significant commonalities that are conveyed in this addendum.

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

The five estimate classes are presented in figure 1 in relationship to the identified characteristics. Only the level of project definition determines the estimate class. The other four characteristics are secondary characteristics that are generally correlated with the level of project definition, as discussed in the generic standard. The characteristics are typical for the process industries but may vary from application to application.

This matrix and guideline provide an estimate classification system that is specific to the process industries. Refer to the generic standard for a general matrix that is non-industry specific, or to other addendums for guidelines that will provide more detailed information for application in other specific industries. These will typically provide additional information, such as input deliverable checklists to allow meaningful categorization in those particular industries.

	Primary Characteristic	***Secondary Characteristic***			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

Figure 1. – Cost Estimate Classification Matrix for Process Industries

CHARACTERISTICS OF THE ESTIMATE CLASSES

The following charts (figures 2a through 2e) provide detailed descriptions of the five estimate classifications as applied in the process industries. They are presented in the order of least-defined estimates to the most-defined estimates. These descriptions include brief discussions of each of the estimate characteristics that define an estimate class.

For each chart, the following information is provided:

- **Description:** a short description of the class of estimate, including a brief listing of the expected estimate inputs based on the level of project definition.
- **Level of Project Definition Required:** expressed as a percent of full definition. For the process industries, this correlates with the percent of engineering and design complete.
- **End Usage:** a short discussion of the possible end usage of this class of estimate.
- **Estimating Methods Used:** a listing of the possible estimating methods that may be employed to develop an estimate of this class.
- **Expected Accuracy Range:** typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this results in a 90% confidence that the actual cost will fall within the bounds of the low and high ranges.
- **Effort to Prepare:** this section provides a typical level of effort (in hours) to produce a complete estimate for a US$20,000,000 plant. Estimate preparation effort is highly dependent on project size, project complexity, estimator skills and knowledge, and on the availability of appropriate estimating cost data and tools.
- **ANSI Standard Reference (1989) Name:** this is a reference to the equivalent estimate class in the existing ANSI standards.
- **Alternate Estimate Names, Terms, Expressions, Synonyms:** this section provides other commonly used names that an estimate of this class might be known by. These alternate names are not endorsed by this Recommended Practice. The user is cautioned that an alternative name may not always be correlated with the class of estimate as identified in the chart.

<table>
<tr><th colspan="2">CLASS 5 ESTIMATE</th></tr>
<tr><td>Description:
Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.

Level of Project Definition Required:
0% to 2% of full project definition.

End Usage:
Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.</td>
<td>Estimating Methods Used:
Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.

Expected Accuracy Range:
Typical accuracy ranges for Class 5 estimates are - 20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.

Effort to Prepare (for US$20MM project):
As little as 1 hour or less to perhaps more than 200 hours, depending on the project and the estimating methodology used.

ANSI Standard Reference Z94.2-1989 Name:
Order of magnitude estimate (typically -30% to +50%).

Alternate Estimate Names, Terms, Expressions, Synonyms:
Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.</td></tr>
</table>

Figure 2a. – Class 5 Estimate

CLASS 4 ESTIMATE

Description:
Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems, and preliminary engineered process and utility equipment lists.

Level of Project Definition Required:
1% to 15% of full project definition.

End Usage:
Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.

Estimating Methods Used:
Class 4 estimates virtually always use stochastic estimating methods such as equipment factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.

Expected Accuracy Range:
Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.

Effort to Prepare (for US$20MM project):
Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used.

ANSI Standard Reference Z94.2-1989 Name:
Budget estimate (typically -15% to + 30%).

Alternate Estimate Names, Terms, Expressions, Synonyms:
Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.

Figure 2b. – Class 4 Estimate

CLASS 3 ESTIMATE

Description:
Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists.

Level of Project Definition Required:
10% to 40% of full project definition.

End Usage:
Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.

Estimating Methods Used:
Class 3 estimates usually involve more deterministic estimating methods than stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.

Expected Accuracy Range:
Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.

Effort to Prepare (for US$20MM project):
Typically, as little as 150 hours or less to perhaps more than 1,500 hours, depending on the project and the estimating methodology used.

ANSI Standard Reference Z94.2-1989 Name:
Budget estimate (typically -15% to + 30%).

Alternate Estimate Names, Terms, Expressions, Synonyms:
Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.

Figure 2c. – Class 3 Estimate

CLASS 2 ESTIMATE	
Description: Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, piping and instrument diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc. **Level of Project Definition Required:** 30% to 70% of full project definition. **End Usage:** Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program.	**Estimating Methods Used:** Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detail takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods. **Expected Accuracy Range:** Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 300 hours or less to perhaps more than 3,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2-1989 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Detailed control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.

Figure 2d. – Class 2 Estimate

CLASS 1 ESTIMATE	
Description: Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. **Level of Project Definition Required:** 50% to 100% of full project definition. **End Usage:** Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.	**Estimating Methods Used:** Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities. **Expected Accuracy Range:** Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Figure 2e. – Class 1 Estimate

COMPARISON OF CLASSIFICATION PRACTICES

Figures 3a through 3c provide a comparison of the estimate classification practices of various firms, organizations, and published sources against one another and against the guideline classifications. These tables permits users to benchmark their own classification practices.

INCREASING PROJECT DEFINITION

AACE Classification Standard	ANSI Standard Z94.0	AACE Pre-1972	Association of Cost Engineers (UK) ACostE	Norwegian Project Management Association (NFP)	American Society of Professional Estimators (ASPE)
Class 5	Order of Magnitude Estimate -30/+50	Order of Magnitude Estimate	Order of Magnitude Estimate Class IV -30/+30	Concession Estimate Exploration Estimate Feasibility Estimate	Level 1
Class 4	Budget Estimate -15/+30	Study Estimate	Study Estimate Class III -20/+20	Authorization Estimate	Level 2
Class 3		Preliminary Estimate	Budget Estimate Class II -10/+10	Master Control Estimate	Level 3
Class 2	Definitive Estimate -5/+15	Definitive Estimate	Definitive Estimate Class I -5/+5	Current Control Estimate	Level 4
Class 1		Detailed Estimate			Level 5 Level 6

Figure 3a. – Comparison of Classification Practices

INCREASING PROJECT DEFINITION

AACE Classification Standard	Major Consumer Products Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)
Class 5	Class S Strategic Estimate	Class V Order of Magnitude Estimate	Class A Prospect Estimate Class B Evaluation Estimate	Class V
Class 4	Class 1 Conceptual Estimate	Class IV Screening Estimate	Class C Feasibility Estimate Class D Development Estimate	Class IV
Class 3	Class 2 Semi-Detailed Estimate	Class III Primary Control Estimate	Class E Preliminary Estimate	Class III
Class 2	Class 3 Detailed Estimate	Class II Master Control Estimate	Class F Master Control Estimate	Class II
Class 1		Class I Current Control Estimate	Current Control Estimate	Class I

Figure 3b. – Comparison of Classification Practices

INCREASING PROJECT DEFINITION

AACE Classification Standard	J.R. Heizelman, 1988 AACE Transactions [1]	K.T. Yeo, The Cost Engineer, 1989 [2]	Stevens & Davis, 1988 AACE Transactions [3]	P. Behrenbruck, Journal of Petroleum Technology, 1993 [4]
Class 5	Class V	Class V Order of Magnitude	Class III*	Order of Magnitude
Class 4	Class IV	Class IV Factor Estimate		Study Estimate
Class 3	Class III	Class III Office Estimate	Class II	
Class 2	Class II	Class II Definitive Estimate		Budget Estimate
Class 1	Class I	Class I Final Estimate	Class I	Control Estimate

[1] John R. Heizelman, ARCO Oil & Gas Co., 1988 AACE Transactions, Paper V3.7
[2] K.T. Yeo, The Cost Engineer, Vol. 27, No. 6, 1989
[3] Stevens & Davis, BP International Ltd., 1988 AACE Transactions, Paper B4.1 (* Class III is inferred)
[4] Peter Behrenbruck, BHP Petroleum Pty., Ltd., article in Petroleum Technology, August 1993

Figure 3c. – Comparison of Classification Practices

ESTIMATE INPUT CHECKLIST AND MATURITY MATRIX

Figure 4 maps the extent and maturity of estimate input information (deliverables) against the five estimate classification levels. This is a checklist of basic deliverables found in common practice in the process industries. The maturity level is an approximation of the degree of completion of the deliverable. The degree of completion is indicated by the following letters.

- None (blank): development of the deliverable has not begun.
- Started (S): work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): the deliverable has been reviewed and approved as appropriate.

	ESTIMATE CLASSIFICATION				
General Project Data:	**CLASS 5**	**CLASS 4**	**CLASS 3**	**CLASS 2**	**CLASS 1**
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production/Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
Engineering Deliverables:					
Block Flow Diagrams	S/P	P/C	C	C	C
Plot Plans		S	P/C	C	C
Process Flow Diagrams (PFDs)		S/P	P/C	C	C
Utility Flow Diagrams (UFDs)		S/P	P/C	C	C
Piping & Instrument Diagrams (P&IDs)		S	P/C	C	C
Heat & Material Balances		S	P/C	C	C
Process Equipment List		S/P	P/C	C	C
Utility Equipment List		S/P	P/C	C	C
Electrical One-Line Drawings		S/P	P/C	C	C
Specifications & Datasheets		S	P/C	C	C
General Equipment Arrangement Drawings		S	P/C	C	C
Spare Parts Listings			S/P	P	C
Mechanical Discipline Drawings			S	P	P/C
Electrical Discipline Drawings			S	P	P/C
Instrumentation/Control System Discipline Drawings			S	P	P/C
Civil/Structural/Site Discipline Drawings			S	P	P/C

Figure 4. – Estimate Input Checklist and Maturity Matrix

REFERENCES

ANSI Standard Z94.2-1989. **Industrial Engineering Terminology: Cost Engineering.**
AACE International Recommended Practice No.17R-97, **Cost Estimate Classification System.**

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EXHIBIT B

RepresentativePolicyBoard

South Central Connecticut Regional Water District
90 Sargent Drive, New Haven, Connecticut 06511-5966 / 203-401-2515
http://www.rwater.com

NOTICE OF PUBLIC HEARING

The Representative Policy Board ("RPB") of the South Central Connecticut Regional Water District will hold a public hearing to consider the South Central Connecticut Regional Water Authority's Application for the approval of a project for North Sleeping Giant Wellfield Chemical Improvements.

The public hearing will be held on Thursday, May 21, 2020 at 7:00 p.m., via remote access. In accordance with Governor Lamont's, Executive Order No. 7B for the Protection of Public Health and Safety during COVID-19 Pandemic and Response, the public hearing will be held remotely under the requirements of Paragraph 1 of Executive Order No. 7B - Suspension of In-Person Open Meeting Requirements. Members of the public may attend the meeting via conference call, videoconference or other technology. For information on attending the meeting via remote access and to view the application and accompanying information, please go to https://www.rwater.com/about-us/our-boards/board-meetings-minutes?year=2020&category=1435&meettype=&page=. The Public Hearing is being held pursuant to Sections 10 and 19 of Special Act 77-98, as amended.

All users of the public water supply system, residents of the Regional Water District, owners of property served or to be served, and other interested persons, shall have an opportunity to be heard concerning the matter under consideration. Questions may also be submitted in writing to the board office by emailing jslubowski@rwater.com or by calling (203) 401-2515.

Mario Ricozzi, Chairperson
REPRESENTATIVE POLICY BOARD
South Central Connecticut Regional Water District
90 Sargent Drive
New Haven, CT 06511

EXHIBIT C

Ciulla & Donofrio, LLP

Memo

To: Representative Policy Board

From: Office of Consumer Affairs ("OCA")

Jeffrey M. Donofrio, Esq.

Date: May 13, 2020

Re: Application to the RPB for Approval of a Project for North Sleeping Giant Wellfield Chemical Improvements ("Project")

I. BACKGROUND

On or about March 19, 2020, the South Central Connecticut Regional Water Authority (the "Authority") submitted an application (the "Application") to the Representative Policy Board (the "RPB") for approval of the Project. The Project will address the chemical feed systems at the North Sleeping Giant Wellfield in Hamden ("NSG"). The Project is a multi-year project (two fiscal years) estimated to cost $2.1 million.

NSG consists of five production wells with a combined capacity of 2.9 million gallons per day. NSG serves the York Hill service area in Hamden. The population in the York Hill service area exceeds 18,000. As stated on page 2 of the Application, "The project consists of replacement of the fluoride, phosphate, and sodium hypochlorite chemical feed systems with in-kind replacement of the bulk tanks, day tanks, transfer pumps, and metering pumps, as well as new piping and appurtenances for each of the chemicals. The project also includes the installation of a new sodium hydroxide chemical feed system, inclusive of a bulk storage tank with fill system, day tank, and transfer and metering pumps, with associated piping and appurtenances." The sodium hydroxide system is necessary to achieve the consistent targeted pH level and meet current regulatory requirements (as well as plan for future regulatory requirements). The Project also involves upgrades to the 52-year-old chemical treatment building.

NSG is a critical facility and it is beyond cavil that the water quality of the existing wells requires reliable chemical treatment. Existing chemical treatment systems at NSG have experienced various levels of obsolescence and the Project is necessary to improve the stability and reliability of the water produced at NSG. In addition, the Project is necessary to address current and future regulatory requirements and safety concerns.

II. <u>OCA'S POSITION</u>

As stated on page 3 of the Application, the "NSG Wellfield is one of the RWA's critical facilities and is necessary to provide water to the northern portion" of the Authority's distribution system. Reliable chemical treatment systems are integral to water quality. The chemical treatment systems at NSG are over 50 years old and various levels of obsolescence are evident. Ignoring the needs at NSG would compromise the stability and reliability of the water produced and treated at NSG. Thus, maintaining the status quo is not a realistic option. Constructing a new chemical treatment building at NSG would cost approximately $3.75 million and would involve permitting and wetlands challenges. In light of the challenges faced by the Authority over the next two fiscal years (as reflected in the FY'21 capital budget), rehabilitating the existing facility is the superior alternative.

The Authority's business case analysis likewise supports the Project alternative represented in the Application. As discussed on page 4 of the Application, rehabilitation of the existing facility and replacement of the chemical systems and associated equipment provides the highest benefit to consumers. Improved water quality and reliability, the ability to comply with current and future regulatory requirements, enhanced operational safety and a decrease in O&M expenses all support the Authority's selection of the rehabilitation alternative.

The estimated Project cost of $2.1 million includes $1,371,785 for the contractor procured via bidding. Due to the nature of the Project, there are also significant soft costs. Specifically, construction administration, construction inspection, project management, permitting, SCADA programming and coordination services are estimated to cost, in the aggregate, approximately $450,000. The Authority expects the duration of the construction phase to be 13 months, which somewhat drives the soft costs. Given the nature and scope of the Project, the OCA finds the 5% contingency to be appropriate.

The Project is necessary and appropriate because the chemical feed systems at the NSG have exceeded their estimated useful lives. The Project is critical to the Authority's ability to maintain high quality, reliable water service to over 18,000 customers in Hamden. The alternative chosen is the most cost-effective and timely option and is supported by the Authority's business case analysis. The estimated Project cost includes the low bid by the construction contractor and reasonable soft cost estimates for a project of the nature, scope, and duration of the Project. The OCA recommends approval of the Application by the RPB.

Respectfully submitted,
Office of Consumer Affairs

/s/ Jeffrey M. Donofrio

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EXHIBIT D

North Sleeping Giant Wellfield Chemical Improvements

Project Presentation

Regional Water Authority
Representative Policy Board Public Hearing
May 21, 2020
Rose Gavrilovic and Orville Kelly

Project Background

- North Sleeping Giant Wellfield located in Hamden, CT
- Serves over 18,000 customers in York Hill Service Area
- Consists of five wells with a capacity of 2.9 MGD
- Constructed in 1968
- Chemical Treatment consists of:
    - Hypochlorite, Fluoride & Phosphate

Project Need

- Chemical Treatment Systems
  - End of useful life
  - Labor/Maintenance intensive for Treatment Operators
- Chemical Rooms
  - Small and difficult to maneuver around
  - Pose Safety hazard
- Future Planning/Compliance
  - Addition of sodium hydroxide chemical feed system

Project Scope

- Chemical System Improvements
  - Replacement of fluoride, phosphate, and hypochlorite systems
- New sodium hydroxide system
  - Treatment optimization
  - Planning for future regulatory requirements
- Building upgrades
  - HVAC
  - Safety Equipment

Summary of Alternatives Analysis

- Status Quo:
  - Not an acceptable alternative
- Construction of a new Chemical Treatment Building:
  - Higher capital cost, extensive permitting and wetlands.
- Rehabilitation and addition of new pH adjustment:
  - Meets all project objectives, significantly improves stability and reliability of the wellfield at lowest cost.

Budget and Schedule

- Total Project Budget – $2.1M
  - Previous Spend – approximately $110,000
  - Multi-Year Project – $2.0 M budgeted in FY20-FY22
- Proposed Project Schedule
  - Bids Received – February 2020
  - Anticipated RPB Action – June 2020
  - Construction – September 2020 – October 2021

* Originally budgeted/scheduled to complete in FY21; Delayed due to COVID-19.

In Summary

- NSG Wellfield is a critical facility serving over 18,000 customers in the York Hill Service Area.
- Proposed project replaces all chemical feed systems, which are beyond their useful life.
- Optimizes treatment and plans for future regulatory requirements with new pH adjustment chemical system.
- Improve stability, safety and reliability of the water produced and treated in the northern portion of RWA's service territory.