PROGRAM REVIEW: WATER & WASTEWATER

2016

SOLANO
COMMUNITY COLLEGE

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1.1 Introduction. Introduce the program. Include the program's catalogue description, its mission, the degrees and certificates offered, and a brief history of the program. Include the number and names of full-time faculty, adjunct faculty, and classified staff. Discuss any recent changes to the program or degrees (*limit to 2-3 pages max*).

Program Description
A study of the principles of water and wastewater disposal and purification including municipal and industrial wastewater collection and treatment. The program will satisfy most of the requirements for certification of water and wastewater treatment personnel.

Certificate of Achievement and Associate in Science
A Certificate of Achievement can be obtained by completing the 25-33-unit major. The Associate in Science Degree can be obtained upon completion of 60 units, including the major, the general education requirements, and electives. All courses for this major must be completed with a grade of C or better or a P if the course is taken on a Pass/No Pass basis.

Program Outcomes
Students who complete the Water and Wastewater Technology Certificate of Achievement/Associate Degree will be able to
1. Certification of plant operators
2. Treatment methods & technology
3. Technology, laws and regulations

REQUIRED CORE COURSES . . . . . units
WATR 100 Wastewater Treatment I 4
WATR 101 Basic Chemistry for Water and Wastewater . . 4
or
WATR 102 Sanitary Chemistry 4
WATR 104 Water Treatment I 3
WATR 106 Instrumentation and Controls. 3
WATR 107 Mathematics of Water and
Wastewater Treatment 4
Select 4 or 5 units from Specialty Courses. 4-5
Select from Option 1, 2, or 3. 3-9

Specialty Courses - Select 4 or 5 units
WATR 105 Wastewater Treatment II 3
WATR 108 Water Treatment II 3
WATR 120 Distribution Systems Maintenance 2
WATR 121 Collection Systems Maintenance 2

Select from the following options:
OPTION 1
BIOT 160 Basic Concepts/Methods in Biotechnology . . . 4
OPTION 2
BIO 014 Principles of Microbiology 4
CHEM 010 Intermediate Chemistry 4
or
CHEM 051 Chemistry for the Health Sciences. 5

or
CHEM 001 General Chemistry 5
OPTION 3
WATR 103 Biological Principles of Water
and Wastewater 3
Total units 25-32

A new Certificate, Water/Wastewater Fundamentals has been approved by the Solano College curriculum committee and is awaiting submission to and approval by the Bay Area Community College Consortium, the Regional Career Technical Education committee that reviews and approves CTE programs. This new certificate represents a "stackable" certificate. Afterwards the program will be submitted to the Chancellors Office. These approvals should be completed in Fall 2017 and the certificate should be listed in the next catalog.

Requirements	**Dept. Name/#**	**Name**	**Units**
Required Courses (13 units)	WATR 100	Wastewater Treatment I	4
	WATR 104	Water Treatment I	3
	WATR 107	Mathematics of Water and Wastewater Treatment	4
	WATR 120	Distribution Systems Maintenance	2

The SCC Water and Wastewater Operator series certificate and associates degree program has been serving students in the Solano and surrounding communities for nearly three decades. During this time, very little progress has been made in relation to faculty staffing, classroom assignments and professional growth. Staffing has been primarily adjunct faculty hired from surrounding water and wastewater facilities. These adjunct faculty members are career professionals in this particular industry and typically work a 40 hour week in addition to teaching at SCC.

The last Program Review, conducted in 2010, reported rising FTES, and credited increases in enrollment and fill rate to the program's involvement with the Bay Area Consortium for Water and Wastewater Education (BACWWE). This is a consortium of 17 Bay Area water and wastewater agencies that have combined to offer our classes in order to address the need for plant personnel. The BACWWE program is off site and remains an independent platform for operator educational training. SCC supports the program and offers college credits as a satellite location of SCC. Instructors from the BACWWE program also teach on campus. In 2014 Solano College dramatically expanded the program after becoming part of the Design It-Build It-Ship It Department of Labor grant administered by the Contra Costa Community College District. This grant was 4-year, $14.9 million U.S. Department of Labor-funded initiative in the East Bay under the Trade Adjustment Assistance Community College Career Training (TAACCCT) program. The goal of DBS was to build an integrated, regional, industry-driven workforce development system in the East Bay. It began in 2012 and ended in 2016 and Solano College received about $ 2 million from the grant, and a portion of these monies went to BACWWE programs.

Adjunct Faculty

Antoo, Adrian, *School of Mathematics & Sciences,* B.A.,
Eastern Illinois University
Dominguez, Steven, *School of Mathematics & Sciences*
Keener, Roger, *School of Mathematics & Sciences,* A.S.,
Solano Community College; B.A., St. Mary's of California, Moraga
Zolfarelli, Paul, *School of Mathematics & Sciences,* A.A.,
Chabot College

Full Time Faculty –Microbiology and Biotech 160 courses – liaison to the curriculum committee

Dekloe, James, *School of Mathematics & Sciences,* B.A., M.A.,
and C. Philosophy, University of California, Los Angeles

1.2 Relationship to College Mission and Strategic Goals. Describe the program's relationship to the overall mission of the college: "Solano Community College educates an ethnically and academically diverse student population drawn from our local communities and beyond. We are committed to help our students to achieve their educational, professional and personal goals centered on thoughtful curricula in basic skills education, workforce development and training, and transfer level education. The College accomplishes this three-fold mission through its dedicated teaching, innovative programs, broad curricula, and services that are responsive to the complex needs of all students."

Using the matrix provided in Table 1, describe which of SCC's Strategic Directions and Goals the program supports. Address only the goals relevant to the program. *Limit evidence to one paragraph per objective.*

Table 1. SCC's Strategic Directions and Goals

Goal 1: Foster Excellence in Learning

Obj. 1.1 Create an environment that is conducive to student learning

Program Evidence: Courses in the Water/Waste Water program generally consist of lecture sessions, once weekly to include interactive discussion of the presented material. This material is typically assigned as homework reading assignments and answering questions throughout the assigned chapter. Material is then presented in the lectures with class participation and expanded explanations when needed. Power Point presentations seem to be effective when tied to the reading material and an outline of the PP lesson sent as a word document to students prior to lecture appears to enhance the lecture experience. The discussion session provides an opportunity for the instructor to assess the students' grasp of the material and clarify any points made in the reading assignment. Instructors provide feedback to students on each homework assignment and tests.

Obj. 1.2 Create an environment that supports quality teaching

Program Evidence: Students are instructed in the classroom environment by licensed State of CA water and wastewater treatment plant operators, lab and maintenance and repair professionals. As such, students are introduced to the technologies associated with treatment processes from professionals currently working in the allocation of resources, treatment, distribution, QA/QC and environmental protection fields of study and regulatory compliance as set forth by the federal EPA, State EPA, OSHA and Water Resources Control Board. As such, students are exposed to best management practices, current events and typically visit an operational treatment facility during each semester of instruction.

The vast majority of the W/WW program material is presented as lecture, typically one weekly meeting consisting of 2 to 4 hours depending upon the course. Prior to the lecture meeting, students are assigned generous reading requirements from approved texts and any material or homework the instructor has assigned outside of the text. Typically homework will consist of 3-6 hours of student preparation.

Obj. 1.3 Optimize student performance on Institutional Core Competencies

Program Evidence: Students are required to read text book material each week which enhances their comprehension of the subject material. Homework also consists of interpreting the material they have read and answering a range of questions regarding the material prior to our class meeting. The written homework is turned in for credit and supports one component of the overall grading system. Students are also required to participate in post-test and exam review sessions so the instructor can also evaluate the student for grammar, pronunciation and clarity. Term papers or other forms of essay writing are not included as part of the curriculum.

Goal 2: Maximize Student Access & Success

Obj. 2.1 Identify and provide appropriate support for underprepared students

Program Evidence: Currently, we have no full time or even part time faculty at SCC to support our students other than what the college provides in existing tutors of math or chemistry. W/WW math is unique in that predetermined formulas for plant operations, distribution systems and storage facilities are used. Students are encouraged to take advantage of these resources; however, most students are not local, work full time jobs or may have difficulty rearranging schedules to meet with SCC tutors. Most of our students are not recent high school graduates, some work full time while others patch together part time work and receive tuition or other financial assistance. Some have been out of school for a decade or more.

Obj. 2.2 Update and strengthen career/technical curricula

Program Evidence: See Section 2.16.

Obj. 2.3 Identify and provide appropriate support for transfer students

Program Evidence: The W/WW program at SCC is non transferrable; the degree and certificate prepare students for the workforce as graduates of a CTE program.

Obj. 2.4 Improve student access to college facilities and services to students

Program Evidence: There are no Canvas online offerings of instruction. W/WW program text books were at one time available for check out in the SCC Library; however, it is uncertain if this is still correct. Students are directed to various employer sponsored job fairs and also job announcements and intern opportunities are passed along to the students as they are brought to the instructors' attention. See Section 4.3 for discussion of equipment and facilities needs. See Section 2.8 for a discussion of course offerings at the centers.

Obj. 2.5 Develop and implement an effective Enrollment Management Plan

Program Evidence: Course offerings in the W/WW curriculum have doubled to, typically, 4 courses per semester, dispersed among the requirements for program completion and electives. Courses are rotated every semester to avail students entering the program to begin in one of the lower level courses while offering returning program students to continue on to the advanced courses. Students are encouraged to complete the certification program major as well as strive to attain the W/WW AS degree offered at SCC.

Goal 3: Strengthen Community Connections

Obj. 3.1 Respond to community needs

Program Evidence: Water and Waste Water Treatment curriculum at SCC provides the knowledge required for students to successfully obtain required CA State licensing. Licensing provides students with opportunities to provide continued access to clean, healthy drinking water and environmentally friendly waste disposal technologies within communities in CA. The industry advisory committee has updated the curriculum, as needed.

Obj. 3.2 Expand ties to the community

Program Evidence: Students are provided treatment plant operations opportunity through volunteer and paid internships at various treatment plants throughout the SF Bay and North Bay areas. SCC's work experience program also offers opportunities for W/WW program students whenever possible. See Section 3.4, Career Technical Programs.

Goal 4: Optimize Resources

Obj. 4.1 Develop and manage resources to support institutional effectiveness

Program Evidence: Unfortunately, the W/WW program at SCC has not provided instructors any stable classroom and laboratory facilities. This lack of facility has restricted instructional staff the opportunity to take advantage of any budgeted funds to increase student success. Outside resources consisting of Napa, Solano, Yolo and other surrounding treatment districts are available and willing to contribute grant funding and also functioning lab and field equipment to our program; however, no adequate, consistent, centralized facility exists at SCC to support physical displays and equipment. In the past, the BACWWE program (Bay Area Consortium for Water and Wastewater Education) obtained funding from water and wastewater agencies and from a Department of Labor grant. These monies bought equipment for the program. BACWWE courses were taught in classrooms at the agencies and distributed all over the Bay Area. This program lost support of the college and the majority of the faculty who taught in it have changed their affiliation to Gavilan College in Gilroy, CA.

Obj. 4.2 Maximize organization efficiency and effectiveness

Program Evidence: As stated above in section 2.5, curriculum access and rotation are currently at a 10-15 year high. This is due to increased recruitment of adjunct faculty and the ability to stagger course offerings through a 4-5 semester rotation of the major.

Obj. 4.3 Maintain up-to-date technology to support the curriculum and business functions

Program Evidence: This is not happening. SCC has done a fine job of outfitting and supporting media stations in the classroom. The W/WW program received some equipment as part of the Department of Labor grant, but would benefit from additional and facilities to teach the technology surrounding water analysis, system control and data acquisition stations, and systems equipment operation and maintenance models. Recently, a division memo was circulated stating the 300 building would be shifted from a chem/science facility to a STEM facility but no mention if the W/WW program would be offered a room where we can begin to build an area representative of our teaching goals. A commitment for space in the 300 building once the current programs are relocated to the new Science building would move the program toward increased certainty with a prospect of improvement.

1.3 Enrollment. Utilizing data from Institutional Research and Planning (ITRP), analyze enrollment data. In table format, include the number of sections offered, headcounts, the full-time equivalent enrollment (FTES), and the WSCH for each semester since the last program review cycle. If data is available for the number of declared majors in the discipline, please include as well. Compare the enrollment pattern to that of the college as a whole, and explain some of the possible causal reasons for any identified trends.

The number of sections of each course offered since 2010 has remained fairly consistent, with a drop occurring in Spring 2016, as indicated by the following data from Institutional Research and Planning:

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	10	10	8	12	8	12	10	12	10	8

Total enrollments began to decrease in Spring 2015, as shown in the table below:

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	248	227	188	272	157	246	213	186	218	133
WATR 100	66	26	65	50	45	36	52	6	39	7
WATR 101	16		16	23	10	22	12	28	14	31
WATR 103		20		18		28	19	19	27	16
WATR 104	39	32		71		46	28	13	29	
WATR 104 x- W										
WATR 105	19	28	14	24	13	16	13	18		14
WATR 106	21	37	27		28	30	27	28	13	29
WATR 107		25	34	27	30	19	32	17	30	
WATR 107 x- W										
WATR 108	14		32		31		30	14		20
WATR 112		18								15
WATR 120	53			22		13			51	
WATR 120 x- P								15		
WATR 121	20	29		37		36			15	
WATR 125		12								1
WATR 126								28		

The primary instructor for WATR 100 notes that part of the low enrollment for the class in spring 2015 and spring 2016 was from the course being off the main campus site and coordinated thru the BACWWE program.

FTES and WSCH rates have fluctuated from year to year, as seen in the following table:

		Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	**FTES**	11.6	8.4	11.5	13.3	9.1	15.5	14.8	9.7	15.4	9.0
	WSCH	722	622	650	850	539	743	710	599	663	409

1.4 Population Served. Utilizing data obtained from Institutional Research and Planning, analyze the population served by the program (gender, age, and ethnicity) and discuss any trends in enrollment since the last program review. Explain possible causal reasons for these trends, and discuss any actions taken by the program to recruit underrepresented groups.

1.4a - Gender

Table shows headcount of students and % of headcount by gender

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016
Total	176 100%	194 100%	152 100%	193 100%	133 100%	167 100%	145 100%	134 100%	128 100%	105 100%	64 100%
Female	19 11%	28 14%	20 13%	24 12%	20 15%	30 18%	22 15%	27 20%	26 20%	19 18%	18 28%
Male	155 88%	164 85%	129 85%	163 84%	110 83%	132 79%	117 81%	101 75%	99 77%	83 79%	42 66%
Not Reported	2 1%	2 1%	3 2%	6 3%	3 2%	5 3%	6 4%	6 4%	3 2%	3 3%	4 6%

Typically, women are underrepresented in enrollment in relation to the general population dynamics of the college system. This could be a result of more women that are interested in the sciences will gravitate toward nursing programs or other chemistry or science programs involving laboratory research or analysis. W/WW instructors do not typically attend the job fairs in the surrounding area due to full time job commitments. This may be a partial reason why women are not as well represented in the program as men. Other reasons would include the

female students gravitate more directly to W/WW chemistry as an off shoot or minor within other 4 year college programs.

Data for enrollment based on age group suggests that W/WW students are older than the general

SCC Enrollment by Age

	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014
	0% 1	0% 1	0% 0	0% 0	0% 0
0-17	6% 647	5% 592	5% 452	6% 573	6% 457
18-25	58% 6,685	59% 6,470	61% 6,041	59% 5,758	58% 4,715
26-30	12% 1,364	11% 1,243	11% 1,109	11% 1,108	13% 1,024
31-35	7% 765	6% 691	6% 647	6% 624	8% 616
36-40	5% 570	5% 505	4% 441	5% 455	5% 381
41-45	4% 480	4% 441	4% 387	4% 363	4% 297
46+	9% 1,097	9% 994	9% 886	9% 913	8% 684

Water/ Wastewater Enrollment by Age

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016
17 or less					1 1%						1 2%
18 & 19	4 2%	7 4%	4 3%	8 4%	6 5%	10 6%	15 10%	8 6%	7 5%	2 2%	5 8%
20 - 24	31 18%	26 13%	15 10%	22 11%	20 15%	33 20%	28 19%	23 17%	27 21%	20 19%	12 19%
25 - 29	26 15%	29 15%	32 21%	39 20%	26 20%	28 17%	30 21%	29 22%	26 20%	21 20%	9 14%
30 - 34	22 13%	19 10%	16 11%	19 10%	12 9%	24 14%	19 13%	29 22%	22 17%	16 15%	14 22%
35 - 39	19 11%	32 16%	21 14%	27 14%	18 14%	20 12%	14 10%	7 5%	11 9%	8 8%	7 11%
40 - 49	48 27%	54 28%	39 26%	49 25%	35 26%	32 19%	29 20%	21 16%	25 20%	26 25%	10 16%
50 and over	26 15%	27 14%	25 16%	29 15%	15 11%	20 12%	10 7%	17 13%	10 8%	12 11%	6 9%

SCC population, as noted in the Introduction above. Survey results indicate that 52% of students are taking courses in W/WW for professional development.

Class structure surrounding ethnicity is somewhat diverse with the majority of students of Caucasian descent, followed by Hispanic and Asian. The enrollment rates for Hispanic and Asian students are comparable with the college as a whole.

African American representation is low (averaging about 17% college-wide, and down to about 5% in recent years in the program). Obviously, if we had a fulltime or even part time faculty to represent the W/WW program, our representative could participate in career fairs at SCC and surrounding high schools throughout the year. Awareness of the W/WW program would increase and more students looking for a career technical field of study may gravitate toward this program.

1.4c - Ethnicity

Table shows headcount of students and % of headcount by ethnicity

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016
Total	176 100%	194 100%	152 100%	193 100%	133 100%	167 100%	145 100%	134 100%	128 100%	105 100%	64 100%
Am. Indian or Alaskan Native	2 1%	5 3%	1 1%	2 1%	1 1%	3 2%	3 2%		3 2%	3 3%	3 5%
Asian or Pacific Islander	25 14%	22 11%	22 14%	32 17%	25 19%	24 14%	28 19%	16 12%	19 15%	17 16%	13 20%
Black Non-Hispanic	16 9%	18 9%	13 9%	26 13%	14 11%	24 14%	15 10%	10 7%	10 8%	4 4%	3 5%
Hispanic	24 14%	20 10%	31 20%	38 20%	21 16%	27 16%	29 20%	31 23%	29 23%	23 22%	14 22%
Other	29 16%	28 14%	12 8%	13 7%	10 8%	9 5%	7 5%	10 7%	3 2%	4 4%	1 2%
White Non-Hispanic	80 45%	101 52%	73 48%	82 42%	62 47%	80 48%	63 43%	67 50%	64 50%	54 51%	30 47%

1.5 Status of Progress toward Goals and Recommendations. Report on the status of goals or recommendations identified in the previous educational master plan and program review.

Table 2. Educational Master Plan (2012)

	Educational Master Plan	Status
1	Continue to expand course offerings per year	Ongoing
2	Integrate industry standards into program	Ongoing
3	Develop marketing strategy for current and potential students as well as local industry/employment groups	Suspended with retirement of D. Mann
4	Assess the potential to develop a "fast-track" program (two years or three semesters)	Suspended. This was accomplished as part of the Department of Labor grant, but has not been realized since the ending of the grant

5	Recruit industry Advisory Group for curriculum and equipment review	In progress. The industry advisory committee met regularly when the BACWWE program flourished. It has not met since, although email exchanges about curriculum continue.
6	Secure supply budget for program expansion	In progress. The program dramatically expanded with funding from the Design It-Build It-Ship It grant, but the funding has not been replaced after the funding ended in 2016.
7	Work with related programs to ensure students have needed math and science skills	In progress. The program has coordinated with other departments to develop the Bridge to Biosciences program, a program that includes contextualized English and Math courses. The B2B can feed W/WW as well as biotechnology and other fields.
8	Create new courses to address changing trends in the industry	Ongoing The program underwent a major overhaul and completely restructured in 2009, and several courses have been added since: Pumps and Motors; Water Conservation. In addition, the Water/Wastewater Fundamentals certificate is going through the approval process.

Table 3. Program Review Recommendations

	Program Review Recommendations (2010)	Status
1	Solano College must follow through with assisting the Bay Area Consortium for Water and Wastewater Education (BACCWE) with administration of the program. The college has worked with BACCWE to establish a website hosted on the school servers and that must completed and have it linked to registration procedures.	The BACWWE program has largely moved to Gavilan College. Solano College has shifted its focus to its on-campus program.
2	In the fall of 2009, all the courses and the program were reviewed by the faculty and the advisory committee. This review	As a result of recommendations of

	resulted in the development of four new courses: WATR 101, Basic Chemistry for Water/Wastewater; WATR 103, Biological Principles of Water/Wastewater; WATR 108, Water Treatment II; and WATR 112, Wastewater Treatment II. Several existing courses were also revised. The program was revised and an additional option for completion was created. The curriculum and program changes should be monitored to see if they satisfy expectations.	the Industry Advisory Committee, Solano College has designed the new Water/Wastewater Fundamentals certificate and is moving this through the approval process.
3	Working with BACCWE, internship programs should be expanded as this is necessary for students to begin the state certification process.	The internship effort has largely been dropped.
4	A long-range schedule of course offerings at the Fairfield campus should be established to ensure that on-campus students have the opportunity to complete the program in a timely manner.	Scheduling on the campus occurs alongside other courses in the Math/Science division every year. The program rotates the courses offered.

1.6 Future Outlook. Describe both internal and external conditions expected to affect the future of the program in the coming years. Include labor market data as relevant for CTE programs (*limit to one page or less*).

Internal conditions: The future success of the program is dependent on hiring full-time faculty and getting access to the necessary equipment and facilities to train students.

External conditions: Following is labor market data from the "Summary Guide for Water and Liquid Waste Treatment Plant and System Operators in California":

> The median wage in 2016 for Water and Liquid Waste Treatment Plant Workers in California was $65,093 annually, or $31.30 hourly. The median is the point at which half of the workers earn more and half earn less.
>
> California
> Annual Wages for 2016
> Low (25th percentile): $52,313
> Median (50th percentile): $65,093
> High (75th percentile): $81,211
> Source: EDD/LMID Occupational Employment Statistics Survey, 2016 at
> www.labormarketinfo.edd.ca.gov/data/wages.html
> Wages do not reflect self-employment.

The future demand for water/wastewater operators is projected to increase, according to the Summary Guide:

> An increasing population, the retirement of the baby boomer generation, and an increased focus on environmentally sustainable business practices are expected to boost demand for

water and wastewater treatment services. As new treatment plants are constructed to meet this increased demand, new Water and Wastewater Treatment Plant and System Operator jobs will become available.
("Summary Guide for Water and Liquid Waste Treatment Plant and System Operators in California,"
http://www.labormarketinfo.edd.ca.gov/OccGuides/SummaryPrint.aspx?Soccode=518031&Geography=0601000000)

This information will be updated shortly. The Bay Region Center of Excellence (headquartered at City College of San Francisco) is in the process of completing a comprehensive review of Labor Market Information for Water and Wastewater technicians in the Bay Area. Preliminary data suggests a major labor shortage as seasoned workers retire. This report should be finalized and released at the end of Spring 2017. Afterwards, the COE will convene a Bay Area wide conference to discuss and coordinate Water/Wastewater education and training between the colleges that carry it out.

Curriculum Development, Assessment, and Outcomes

Program Learning Outcomes

2.1 Using the chart provided, list the Program Learning Outcomes (PLOs) and which of the "core four" institutional learning outcomes (ILOs) they address. In the same chart, specifically state (in measurable terms) how your department assesses each PLO. For example, is there a capstone course (which one), is it a passing grade on certain assignments or exams that demonstrate acquisition of the PLO, is it acquiring specific skills necessary for a licensing exam, completing a portfolio, etc.?

Table 4. Program Learning Outcomes

Program Learning Outcomes	ILO (Core 4)	How PLO is assessed
1. Treatment methods and technology (Understanding of the various treatment methodologies and technologies applicable to water and waste water treatment as approved by the California State Water Resources Control Board)	IV C: Workplace Skills	90% of students demonstrate knowledge of the subject material by achieving a 70% minimum overall subject aptitude related to the short quiz and final examination.
2. Technology, laws, and regulations (Understand the fundamentals of water and waste water treatment and related technologies, laws and regulations as approved by the California State Water	IV C: Workplace Skills	90% of students demonstrate knowledge of the subject material by achieving a 70% minimum overall subject aptitude related to the short quiz and final examination.

Resources Control Board)		
3. Certification of plant operators (Satisfy the requirements of certification of water and wastewater treatment operators)	IV C: Workplace Skills	90% of students demonstrate knowledge of the subject material by achieving a 70% minimum overall subject aptitude related to the short quiz and final examination.

2.2 Report on how courses support the Program Learning Outcomes at which level (introduced (I), developing (D), or mastered (M))

Table 5. Program Courses and Program Learning Outcomes

Course	PLO 1	PLO 2	PLO 3
WATR101	I	I	I
WATR103	I	I	I
WATR104	I	I	I
WATR106	D	D	D
WATR107	I	I	I
WATR108	M	M	M

2.3 Utilizing table 6, describe the results of program learning assessments and any planned actions to increase student success where deficits were noted. Results should be both quantitative and qualitative in nature, describing student strengths and areas of needed improvement. Action plans should be specific and link to any needed resources to achieve desired results.

There is no record of PLO assessment for this program. This is a consequence of running a program with solely adjuncts and without leadership. Assignments and/or exams in capstone courses need to be identified, and assessments made and analyzed.

2.4 Describe any changes made to the program or courses that were a direct result of program learning assessments.

No PLO assessments have been recorded; therefore, there are no changes to report at this time.

Student Learning Outcomes

2.5 Describe the current status of SLOs in your program. Are SLOs being updated as necessary? What is the planned assessment cycle (need to be assessed at least twice during the program review cycle)? Are assessment results driving course level planning? If deficiencies are noted, describe planned actions for change. Address how courses with multiple sections have been

aligned so that a common tool is utilized to assess student learning outcomes; describe any steps taken to standardize measures.

In 2013, full time faculty member Jim DeKloe offered a workshop for the BACCWE water/wastewater faculty on Student Learning Outcomes and assessments. This session served two purposes. The subject matter experts critiqued and improved the SLOs, and faculty members were trained in SLO assessment.

SLOs with measurable success criteria have been identified and assessed at least once in all WATR courses except 125 and 126.

2.6 Review the course level SLOs completed by the program in the last year to ensure accuracy of information provided (core four, level of mastery, assessment tool, etc.). Note if any changes are needed.

The PLOs listed in each course assessment differ from the PLOs listed in Table 4 above, and need to be updated.

2.7 Describe any changes made to the program or courses that were a direct result of student learning outcomes assessments.
No changes to report.

Curricular Offerings

2.8 Course offerings. Attach a copy of the course descriptions from the most current catalog. Describe any changes to the course offering since the last program review cycle (course content, methods of instruction, etc.) and provide rationale for deletion or addition of new course offerings. Also state whether a transfer degree has been establish in accordance with SB 1440. Include a discussion of courses offered at Centers (Vacaville, Vallejo, Travis) and any plans for expansions/contraction of offerings at the Centers.

WATR 100 **4.0 Units**
Wastewater Treatment I
Course Advisory: SCC minimum English and Math standards. Study of municipal and industrial wastewater collection and wastewater treatment methods, protection of ground water and receiving waters, and effects of pollutants on receiving waters. *Four hours lecture.*

WATR 101 **4.0 Units**
Basic Chemistry for Water and Wastewater
Course Advisory: SCC minimum English and Math standards. Through lecture and demonstrations, the student will develop the ability to analyze and determine if proper levels of purification, content of acidity, alkalinity, hardness, and other water quality criteria have been achieved for water or wastewater treatment. *Four hours lecture.*

WATR 103 **3.0 Units**
Biological Principles of Water and Wastewater
Course Advisory: SCC minimum English and Math standards. This course examines the biological and ecological properties of the bacteria, protozoa, fungi, algae, viruses, and animals whose control is important to the provision of safe drinking water supplies and environmentally safe wastewater. The course emphasizes the microbiology of drinking water, wastewater, and activated sludge, and examines the microbial sampling, analysis, and treatment strategies important in this industry. *Three hours lecture.*

WATR 104 **3.0 Units**
Water Treatment I
Course Advisory SCC minimum English and Math standards. This course examines the elementary engineering aspects of the design, operation, process control, and facilities of a plant designed to treat and purify drinking water. *Three hours lecture.*

WATR 105 **3.0 Units**
Wastewater Treatment II
Prerequisite: WATR 100. Course Advisory: SCC minimum English and Math standards. Study of the elementary engineering aspects of design, operation process control, and maintenance of wastewater treatment plants and facilities. *Three hours lecture.*

WATR 106 **3.0 Units**
Instrumentation and Control
Course Advisory: SCC minimum English and Math standards. Study of pneumatic, mechanical and electronic control systems and components. Includes a basic description and explanation of the operation of instruments and controls for water and wastewater plants. Typical performance characteristics, accuracy, and applications of instruments are studied. *Three hours lecture.*

WATR 107 **4.0 Units**
Mathematics of Water and Wastewater Treatment
Course Advisory: SCC minimum English and Math standards. A study of calculations - hydraulics, chemicals, solids - used in the design, operation, process control, and maintenance of treatment plants and facilities. *Four hours lecture.*

WATR 108 **3.0 Units**
Water Treatment II
Prerequisite: WATR 104 with a minimum grade of C. Course Advisory: SCC minimum English and Math standards. This course covers advanced topics in the control of ions and disinfecting chemicals in drinking water. In addition it covers the issues of safety, regulation, administration, and maintenance of a water treatment plant. This course will often be taught at an off-campus site. *Three hours lecture.*

WATR 112 **2.0 Units**
Wastewater Treatment III
Prerequisite: WATR 105. Course Advisory: SCC minimum English and Math standards. This course will cover advanced topics appropriate to a wastewater treatment facility including activated sludge, residual solids management, solids removal from secondary effluents, phosphorus and nitrogen removal, enhanced biological (nutrient) control, wastewater reclamation and recycling, and odor control. This course is often taught off-site. *Two hours lecture.*

WATR 120 **2.0 Units**
Distribution Systems Maintenance
Course Advisory: SCC minimum English and Math standards. Study of the operation and maintenance of water distribution systems covering the design, construction and the functioning of these systems. *Two hours lecture.*

WATR 121 **2.0 Units**
Collection Systems Maintenance
Course Advisory: SCC minimum English and Math standards. Study of the operation and maintenance of wastewater collection systems covering the design, construction and functioning of these systems. *Two hours lecture.*

WATR 125 **2.5 Units**
Water Conservation
Course Advisory: SCC minimum English and Math standards. Water conservation includes the study of methods to reduce water use, loss, and waste, and methods to increase water efficiency in an effort to minimize the amount of water used to accomplish a function or task. This course combines subject matter lectures and planned learning experiences so students learn the principles involved in the conservation and efficient use of water resources for economic, environmental, and regulatory purposes. Students will learn about water supply and demand, utility water demand characteristics and water rates, residential, commercial, and landscape water use measurements, water management planning, and how to perform various types of water audits. *Two and one-half hours lecture.*

WATR 126 **3.0 Units**
Pumps and Motors
Course Advisory: SCC minimum Math standard. This course examines the design and operation of pumps and motors with special emphasis on the types of pumps used in the water and wastewater industries. *Three hours lecture.*

Course and Program Modifications

As stated in Table 3 (Previous Program Review recommendations), above, courses and programs were reviewed and modified in 2009: "This review resulted in the development of four new courses: WATR 101, Basic Chemistry for Water/Wastewater; WATR 103, Biological Principles of Water/Wastewater; WATR 108, Water Treatment II; and WATR 112, Wastewater Treatment II. Several existing courses were also revised. The program was revised and an additional option for completion was created."

The other major change was the design, development, (and ongoing) approval of the Water/Wastewater Fundamentals certificate. The current certificate will be able to be stacked upon this, and the Associates degree will be able to be stacked upon that. This provides a career pathway with multiple exit points.

Some math may be assigned in courses other than the W/WW Math 107 if the instructor chooses. Water and /or wastewater treatment plant operations and distribution systems math should be made mandatory in more than the WATR 107 course. However, no instructional time allotment or course outline proposes to close this gap. Several courses that would benefit students from a

math component during instruction are WATR 104: Water Treatment I; WATR 108: Water Treatment II; WATR I20: Distribution Systems. All come to mind but are not necessarily exclusive within the W/WW Program curriculum as possibly needing a math component as well.

All of the aforementioned courses cited above are supported by a Ken Kerri/CSUS published series of texts currently in use at SCC. The texts are structured to include a math component within the material but are no longer used in some cases due to shortened class instruction time. However, discarding a critical building block for student success in the math area is detrimental to a majority of the students preparing for a professional career as a water or waste water treatment plant operator. Professional operators are required to obtain CA State licensing, through a written exam that relies heavily on the math component. More discussion is needed at the program management and administrative levels at SCC to determine how to best address this issue.

Several years ago during the financial crisis and subsequent recession, SCC saw a reorganization that included reducing instruction hours for some courses, without including relevant SCC employed instructors in the conversation, these hours need to be restored. Specifically, WATR 104 was cut from 4 hrs to 3 hrs lecture per week. To accommodate the instructional time reduction, WATR 104 can no longer support the math component of the curriculum and that is really unacceptable for the long run and does a disservice to our students. Overall, however, the program realignment has been positive in the respect that students now have additional elective, chemistry and bio courses to choose from.

The state has approved C-IDs for W/WW courses. During curriculum review, courses should be altered in a way that matches the state C-ID descriptors, and submitted for Curriculum Committee approval.

Scheduling at the Fairfield Campus and Centers, and BACWWE facilities (off site)

Most of our students work during the day so the evening curriculum availability is essential. 90% of students surveyed in 2015 preferred the SCC campus site vs Vacaville, Vallejo or BACWWE facilities. Campus-held classes typically had higher enrollment and retention than the BACWWE sponsored classes off site. Location being 59% vs reputation 41%, as the dominant reason for choosing the main campus. 39% of the students are satisfied with the availability of courses while 7% were dissatisfied and 4% were very dissatisfied. 25%were neutral. 90% of the students returning surveys prefer evening classes after 5 pm.

2.9 Fill rates/Class size. Based on data from ITRP, discuss the trends in course fill rates and possible causes for these trends (include comparison/analysis of courses by modality if applicable). Address how the size of classes affects courses and if there are any necessary adjustments to course classroom maximums. If there are courses that are historically under-enrolled, discuss strategies that might increase enrollment.

Due to very little to non-existent communications amongst the W/WW program faculty, it is difficult to assess why fill rates may rise and fall. Typically, when the economy turns down and people lose their jobs, or work hours are reduced, they tend to gravitate to college as a way to continue any public assistance such as unemployment until the economy improves. These observations are based on conversations with a few individuals in classes. Increasing enrollment

may be as simple as hiring a part time retired W/WW professional for outreach and promotion of the program with high school students in the Solano, Yolo, Napa areas.

Section 2.9 - Fill Rates and Class Size

Table shows average fill rate and average max enrollment by course id

		Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	**Calc % Fill R**	82	83	82	86	69	77	76	70	76	426
	Calc Max E	30	28	29	26	28	26	28	27	29	16
WATR 100	**% Fill Rate**	110	87	108	93	75	64	87	26	65	30
	Class Size	30	30	30	27	30	27	30	23	30	23
WATR 101	**% Fill Rate**	67		53	96	43	92	50	117	58	129
	Class Size	24		30	24	23	24	24	24	24	24
WATR 103	**% Fill Rate**		80		75		117	76	79	108	67
	Class Size		25		24		24	25	24	25	24
WATR 104	**% Fill Rate**	130	80		89		90	93	65	97	
	Class Size	30	20		27		25	30	20	30	
WATR 105	**% Fill Rate**	63	93	47	80	57	53	43	60		1,400
	Class Size	30	30	30	30	23	30	30	30		
WATR 106	**% Fill Rate**	70	123	90		93	100	90	93	43	97
	Class Size	30	30	30		30	30	30	30	30	30
WATR 107	**% Fill Rate**		83	113	90	100	63	107	57	100	
	Class Size		30	30	30	30	30	30	30	30	
WATR 108	**% Fill Rate**	58		67		56		63	58		83
	Class Size	24		24		27		24	24		24
WATR 112	**% Fill Rate**		72								1,500
	Class Size		25								
WATR 120	**% Fill Rate**	66			96		57			79	
	Class Size	40			23		23			32	
WATR 120 x-	**% Fill Rate**								50		
	Class Size								30		
WATR 121	**% Fill Rate**	80	97		71		70			65	
	Class Size	25	30		27		27			23	

2.10 Course sequencing. Report on whether courses have been sequenced for student progression through the major, how students are informed of this progression, and the efficacy of this sequencing. Report on whether curriculum is being offered in a reasonable time frame (*limit to one or two paragraphs*).

The WATR 100 class assists in fulfilling the necessary educational requirements for students to participate in the State exam for Operators Certification, so in addition to being a first step in the certificate program at the college, it is crucial for students trying to get into the field and achieve Grade I state certification.

Sequencing of the course offerings is difficult to accomplish due to no permanent laboratory/lecture room for the W/WW program. Another obstacle to sequencing and offering courses in a reasonable time frame is the fact that the program relies on current industry professionals to teach the courses. Availability of knowledgeable instructors is sometimes problematic in this regard.

***2.11 College Preparedness/Basic skills*.** Describe the basic skills component of the program, including how the basic skills offerings prepare students for success in transfer-level courses. If your program doesn't have designated basic skills courses, then explain how your courses support fundamental writing and/or mathematic competencies. Analyze courses with course advisories, prerequisites and/or co-requisites to see whether this level of preparation supports student success.

All courses have minimum English and Math skills as a course advisory, which is sufficient. See Section 2.8, Course Offerings, for a discussion related to Math basic skills.

2.12 Student Survey. Describe the student survey feedback related to course offerings. In terms of the timing, course offerings, and instructional format, how does what your program currently offer compare to student responses?

Of those students surveyed, 64% report they are satisfied or very satisfied with the availability of W/WW courses. 11% report dissatisfaction with course availability. 20 of 29 respondents indicated that they would like to take an online/hybrid W/WW course, and 26 of 29 would consider taking an 8-week summer course. Please see Section 2.8, Course Offerings, for further details.

***2.13 Four-year articulation* (if applicable).** Utilizing the most current data from the articulation officer, and tools such as ASSIST.org, state which of your courses articulate with the local four year institutions and whether additional courses should be planned for articulation (*limit to one or two paragraphs*).

Not applicable.

***2.14 High school articulation* (if applicable).** Describe the status of any courses with articulation/Tech Prep agreements at local high schools. What (if any) are your plans for increasing/strengthening ties with area high schools and advertising your program to prospective students? (*limit to one or two paragraphs*).

During the implementation of the Department of Labor grant, there was a major outreach program to the high schools. Benicia High, for example, incorporated water/wastewater curriculum into their environmental biology course. Major conversations occurred with the Solano County Office of Education, the Vallejo Unified School District, the Fairfield-Suisun Unified School District, and others. This effort largely evaporated after the termination of the grant.

Currently, instructors are typically working full time within the W/WW industry. With no part time/full time faculty to conduct outreach, the prospects of increasing/strengthening ties with area high schools is practically non-existent.

***2.15 Distance Education* (if applicable).** Describe the distance education courses offered in your program, and any particular successes or challenges with these courses. Include the percentage of courses offered by modality and the rationale for this ratio.

Then:

1) Discuss your program's plans to expand or contract distance education offerings;

2) State how you ensure your online courses are comparable to in-class offerings

No online or hybrid courses are offered in the program at this time. Given the interest shown in the survey, an online or hybrid WATR course would be desirable, but developing such a course would be difficult. Once again, W/WW program instructors are working full time jobs already in the industry and typically have had to create their course instructions without compensation already.

***2.16 Advisory Boards/Licensing (CTE)* (if applicable).** Describe how program curriculum has been influenced by advisory board/licensing feedback. How often are advisory board meetings held, provide membership information and what specific actions have been taken. Attach minutes from the past two years.

During the time of the Department of Labor grant and before (2008 – 2016), the Industry Advisory Committee met regularly as part of the BACCWE effort; these meetings occurred at least once a month, and there were all-day "retreats" to discuss curriculum revisions and trends in the industry several times a year. The overhaul of the program and the design of the Water/Wastewater Fundamentals Certificate came out of these retreats. Since the grant ended, there has been no one to organize the meetings and the Advisory Committee has not met since. There have been many email exchanges between the members of the committee – to discuss curriculum.

Advisory Board meeting minutes are attached as Appendix A.

3.1 Student Success. Anecdotally describe how the program works to promote student success. Include teaching innovations, use of student support services (library, counseling, DSP, etc), community partnerships, etc.

Then, utilizing data from the office of Institutional Research and Planning, report on student success through course completion and retention data. Then, analyze by discipline success by gender, age, ethnicity, and on-line (may analyze other variables such as disability, English as a second language, day vs. night courses, etc. as appropriate).

Provide possible reasons for these trends *AND planned action to equalize student success*.

Students enrolled in the program typically move through the course offerings in "pods"/cohorts due to the limited offerings times and days of the week of instruction. This assists in student/instructor interaction as well as seems to alleviate some anxiety students feel when in a learning environment where all faces are new from class to class and semester to semester. This allows instructors to become familiar with the typical "mood" of the group and as a result the students appear more comfortable with classroom interaction between instructor and peers alike. Class sizes range from around 20-30 per class, which is ok except when we get crammed into smaller size classrooms.

Students are encouraged to participate in lecture sessions and openly discuss any work or customer experience that is relevant to the core instruction, water and waste water treatment, storage and community distribution. When students are encouraged to openly interact within the class structure, they can buy in to the concept that their contribution matters. When students feel they are an important participant during lecture they will share experiences they may otherwise deem unimportant or insignificant. These teaching strategies are not new but worthy of inclusion on the topic of quality teaching.

For community partnerships, see Section 3.4, Career Technical Programs.

		Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	Success	95.0%	92.0%	85.4%	84.6%	84.2%	87.8%	83.6%	86.7%	85.3%	89.7%
	EOT Retnetion	97.9%	96.4%	91.4%	93.4%	92.4%	95.1%	95.3%	97.3%	92.0%	97.2%
WAT R 100	Success	94%	85%	73%	70%	64%	67%	73%	83%	69%	86%
	EOT Retention	95%	92%	86%	92%	82%	86%	94%	100%	83%	100%
WAT R 101	Success	100%		94%	91%	100%	95%	100%	79%	100%	90%
	EOT Retention	100%		94%	96%	100%	95%	100%	96%	100%	97%
WAT R 103	Success		90%		89%		86%	53%	95%	93%	88%
	EOT Retention		95%		94%		96%	79%	100%	96%	100%
WAT R 104	Success	92%	90%		82%		91%	89%	100%	90%	
	EOT Retention	100%	100%		92%		98%	93%	100%	97%	
WAT R 105	Success	100%	88%	100%	92%	93%	88%	100%	80%		100%
	EOT Retention	100%	96%	100%	96%	93%	100%	100%	95%		100%
WAT R 106	Success	95%	92%	93%		100%	87%	100%	75%	100%	83%
	EOT Retention	95%	95%	93%		100%	93%	100%	96%	100%	97%
WAT R 107	Success		96%	82%	85%	83%	95%	84%	91%	84%	
	EOT Retention		96%	91%	93%	90%	100%	100%	96%	94%	
WAT R 108	Success	100%		97%		90%		87%	81%		80%
	EOT Retention	100%		97%		100%		97%	94%		90%
WAT R 112	Success		95%								100%
	EOT Retention		100%								100%
WAT R 120	Success	92%			100%		100%		100%	83%	
	EOT Retention	98%			100%		100%		100%	88%	
WAT R 121	Success	100%	97%		89%		94%			94%	
	EOT Retention	100%	97%		92%		94%			94%	
WAT R 125	Success		100%								100%
	EOT Retention		100%								100%
WAT R 126	Success								96%		
	EOT Retention								100%		

Students in the program are more successful than the college as a whole. Student success has wavered in the past five years but student retention remains relatively strong.

3.1a - Success by Gender

Table shows success rate of students by student gender

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	95%	92%	85%	85%	84%	88%	84%	87%	85%	90%
Female	96%	97%	76%	93%	85%	84%	89%	87%	87%	100%
Male	95%	92%	87%	83%	84%	89%	83%	87%	85%	88%
Not Reported	100%	50%	75%	88%	80%	86%	80%	89%	100%	75%

With the exceptions of Spring 2013 and Spring 2016, male and female success rates have been nearly equal.

3.1b - Success by Age Group

Table shows success rate of students by student age group

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	95%	92%	85%	85%	84%	88%	84%	87%	85%	90%
17 or less										
18 & 19	83%	86%	100%	58%	71%	89%	73%	78%	80%	100%
20 - 24	89%	94%	81%	73%	74%	86%	80%	80%	90%	91%
25 - 29	92%	94%	89%	91%	86%	93%	75%	93%	83%	87%
30 - 34	96%	95%	75%	93%	100%	83%	87%	78%	76%	86%
35 - 39	97%	94%	88%	86%	90%	88%	91%	92%	71%	90%
40 - 49	97%	89%	83%	81%	81%	90%	91%	96%	93%	91%
50 and over	100%	91%	89%	94%	89%	83%	100%	90%	93%	93%

Students have been successful across all age groups; younger students have succeeded at a rate that is higher than the college average.

3.1c - Success by Ethnicity

Table shows success rate of students by student ethnicity

	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
Total	95%	92%	85%	85%	84%	88%	84%	87%	85%	90%
Am. Indian or Alaskan Native	100%	100%		100%	100%	60%	100%		88%	100%
Asian or Pacific Islander	87%	83%	72%	89%	94%	97%	98%	96%	89%	96%
Black Non-Hispanic	89%	100%	69%	78%	71%	71%	65%	69%	53%	75%
Hispanic	95%	100%	89%	73%	96%	91%	71%	81%	93%	93%
Other	95%	94%	100%	94%	70%	91%	89%	67%	86%	86%
White Non-Hispanic	98%	90%	89%	89%	79%	90%	86%	93%	86%	87%

Overall, students of color have a higher success rate in WATR courses than in SCC courses, as a whole. Hispanic students have a significantly higher success rate than the SCC average. Black non-Hispanic students were more successful in 2011-2012, but the success rate for this demographic has dropped in recent years. ALL students would enjoy an increased rate for success in a lab/lecture environment.

***3.2 Degrees/Certificates Awarded* (if applicable).** Include the number of degrees and certificates awarded during each semester of the program review cycle. Describe the trends observed and any planned action relevant to the findings.

		Academic Year				
		2010/2011	**2011/2012**	**2012/2013**	**2013/2014**	**2014/2015**
Water & Wastewater Tech	Associates Degree	2	6	11	5	5
	Certificate of Achieve..	6	11	11	10	8

There was a spike in the number of degrees and certificates awarded in 2013. Otherwise, there have been no discernable trends in the awards data.

***3.3 Transfer* (if applicable).** Describe any data known about students in your program who are transfer eligible/ready (have 60 transferable units with English and math requirements met). Include how your program helps students become aware of transfer opportunities (*limit to one or two paragraphs*).

Not applicable.

***3.4 Career Technical Programs* (if applicable).** For career technical programs, describe how graduates are prepared with the professional and technical competencies that meet employment/

licensure standards. State if there are any efforts made to place students in the workforce upon graduation, including any applicable placement data.

Students are provided treatment plant operations opportunity through volunteer and paid internships at various treatment plants throughout the SF Bay and North Bay areas. These programs of paid and unpaid internships and volunteer opportunities are run by individual districts and through outreach to instructors working in the SCC environment. SCC's work experience program also offers opportunities for W/WW program students whenever possible.

Once students gain enough units for state exams and licensing, their names are placed on a State of CA Operator License list and mailed upon request to agencies wishing to hire W/WW treatment plant operators. Based on experience and licensing, students submit applications and are invited to test and interview for open positions throughout the State of CA. No feedback exists from the State of CA or hiring agencies. Most hiring brought to the instructors' attention is from students making contact with instructors and informing them.

PROGRAM RESOURCES

4.1 Human Resources. Describe the adequacy of current staffing levels and a rationale for any proposed changes in staffing (FTES, retirements, etc.). Address how current staffing levels impact the program and any future goals related to human resources.

Section 4.1 - Human Resources

Table shows sum of FTEF by different classifications of faculty contract type

		Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
	Total FTEF	2.00	1.96	1.86	2.46	1.86	2.46	2.26	2.60	2.06	1.63
	FTEF Full Time										
	FTEF PT Hourly	0.73	0.53	1.40	1.73	0.73	1.27	1.13	1.47	1.07	0.67
	FTEF Overload										
	FTEF FT 50%										
	FTEF Contract Ed	1.27	1.43	0.47	0.73	1.13	1.20	1.13	1.13	1.00	0.96
	FTEF Unknown										

The W/WW program has the advantage and disadvantage of being staffed solely by adjunct faculty. The advantage has been to bring current expertise into the program by staffing it with professionals immersed in the field. The disadvantage has been coordination. When the BACCWE program was run out of the Workforce Development department, and during the time of the Department of Labor grant, staff from that department coordinated industry advisory

committee meetings, workshops, retreats, and coordinated the introduction of new and the updating of curriculum. Since the end of the grant, this organization structure has not been present and the program has suffered.

The W/WW program currently does not have a full time, or even part time, professional that could put these ideas forward within the business structure at SCC. Recently a proposal to hire a full time faculty member to lead the W/WW program at SCC was removed from consideration.

4.2 Current Staffing. Describe how the members of the department have made significant contributions to the program, the college, and the community. Do not need to list all the faculty members' names and all their specific activities, but highlight the significant contributions since the last program review cycle.

Since 2010, multiple deans have cycled through the School of Math and Science. All of these deans have listened to the concerns of some faculty in the W/WW curriculum; however, no reliable resources have ever been allocated to follow through with a stable environment to teach these courses. W/WW faculty feel that the program has been neglected since its move to the School of Math and Science. Formerly, the W/WW program was located within the Career Technical Education division, and the feeling is that this program would thrive with a return to that environment. It is possible that CTE/Perkins funds that might have been allocated over the years to the W/WW program has been redirected to other programs due to the unstable environment. Moving the program back to CTE (School of Applied Technology and Business) might be a step forward.

4.3 Equipment. Address the currency of equipment utilized by the program and how it affects student services/success. Make recommendation (if relevant) for technology, equipment, and materials that would improve quality of education for students.

A huge component that is missing within the SCC W/WW program is a stable lecture and lab environment. Quality teaching is somewhat lacking due to our programs' inability to be represented during budget and division meetings to discuss the many aspects surrounding staffing, classroom and lab area assignments, equipment and basic instruments for students to acquaint themselves with. Such instruments as turbidimeter, pH, temperature, chlorine and fluoride residual analyzers.

96% of students surveyed indicated that a permanent W/WW classroom with displays of instrumentation equipment, valves, etc. would be beneficial. An overwhelming majority of students wanted to see display models of operational instrumentation, operating mechanical devices, and a functional water quality test lab.

4.4 Facilities. Describe the facilities utilized by your program. Comment on the adequacy of the facilities to meet program's educational objectives.

On a larger scale of quality instruction, we would be having students practice using microbial sampling stations and learning how to set up water quality testing samples for incubation and analysis. If we had an adequate SCC W/WW program our students would have access to a variety of valves, pumps, motors and other examples of the infrastructure that supports W/WW

systems and facilities. Most of these components could be recycled from W/WW treatment plants within Solano and Napa counties.

Students indicated in the survey that they would overwhelmingly benefit from a Chemistry/Science learning center/computer lab.

4.5 Budget/Fiscal Profile. Provide a five year historical budget outlook including general fund, categorical funding, Perkins, grants, etc. Discuss the adequacy of allocations for programmatic needs. This should be a macro rather than micro level analysis.

Since we have no laboratory/lecture accommodations, any grant funding or budget funding for equipment would be useless, as there would be no place to install it. We do not even have any permanent room assignments to set up any displays or stations for hands on instruction. See Section 1.1, Introduction, for a discussion of grants in the past. As noted above, a move back to the School of Applied Technology and Business might help set the program on the right course to receive Perkins funds in the future.

PROGRAMMATIC GOALS & PLANNING

This section will be submitted to the governing board as an overview of programmatic strengths and areas of growth.

5.1 Summarize what you believe are your program's strengths and major accomplishments in the last 5 years. Next, state the areas that are most in need of improvement.

The student survey comments highlight the strengths of the program:

- Instructor quality and experience
  - "The Water/Wastewater's greatest strength are by far its instructors. I have taken every course in Water/Wastewater at Solano Community College and I would not have had such a good experience if it wasn't for the instructors"
  - "Having instructors that are working in the field"
  - "The instructors with their real life experiences"
  - "Professor and students are passionate"
  - "Teachers with experience"
  - "The professor of the W/WW course was the greatest strengths"
  - "The instructors explanation and the stories of their experiences"
  - "Instructor Knowledge"
  - "The instructors"
  - "Professor actually work at the treatment plants"
  - "Professors are great"
  - "First hand experienced instructors"
  - "Good/Experienced instructors"
  - "Quality Professors, in depth teaching"
  - "Knowledgeable teachers in the industry"
  - "Great teachers"
  - "Usable knowledge, helps with the state requirement and tests"
- Course scheduling in Fall and Spring
  - "Consistent offering of classes every fall and spring"

- "class availability"
- "Class, times, availability of class"
- "courses are offered in the evenings, great way to network with other in field"

Weaknesses of the program are also indicated by students' volunteered responses:

- Lack of sufficient equipment and facilities for hands-on work
  - "there isn't hands on learning and that is how many people learn"
  - "No displays or hands on training"
  - "The course could use more lab and hands on equipment"
  - "Lab for conducting tests for water quality"
  - "Lack of test equipment"
  - "Lack of equipment, more hands on learning required"
  - "Classrooms in 1500 are in poor shape"
- Need for additional math in the curriculum
  - "Lack of Math problems in class or homework"

5.2 Based on the self-study analysis, prioritize the program's short (1-2 years) and long term goals (3+ years). Check whether the goal requires fiscal resources to achieve.

Table 7. Short-Term and Long-Term Goals

Without any permanent staffing, these goals will be difficult if not impossible to achieve, and the program will never reach full potential.

Short-Term Goals	Planned Action	Target Date	Person Responsible	Source
Investigate flow of BACWWE funds	Clarify what money is coming in, and how/if it's being allocated	**2018**	**Dean, VPAA**	n/a
Hire full-time instructor	Submit program review with evidence; advocate for position	**Spring 2018**	**Dean**	Possibly Perkins funds
Upgrade equipment and facilities	Investigate use of Perkins funds	**2018**	**Faculty, dean**	**P**
Assess PLOs	Determine which course(s) and assignments/exams will be used to assess PLOs	**2018**	**Faculty**	**n/a**
Have all course SLOs assessed	Complete SLO assessments	**2018**	**Faculty**	**n/a**
Modify course(s) to include math component	Consult with dean; modify courses in CurricUNET	Submit in Fall 17, effective Fall 18	**Faculty, dean, liaison**	**n/a**

Long-Term Goals	Planned Action	Target Date	Person Responsible	Source
Investigate	Possibly move the W/WW program	uncertain	Academic	n/a

changing the affiliation of the program back into CTE	from the School of Math/Science back into the School of Applied Technology and Business		Senate, School Deans, VPAA	
Find permanent home for program	Investigate plans for 300 building remodel	uncertain	uncertain	

In the source column denote “SP” for Strategic Proposals, “DB” for Department Budget, “P” for Perkins or “NR” for No Additional Resources Needed.

SIGNATURE PAGE

6.1 Please include a signature page with all full-time faculty and as many part-time faculty as you are able. The signature page should include lines with the signatures and then typed names of the faculty members.

Example:

The undersigned faculty in the Water/Wastewater program, have read and concur with the finding and recommendations in the attached program review self-study, dated 3/27/17.

_____
Jim DeKloe

_____
Roger Keener

_____
Paul Zolfarelli

APPENDIX A: ADVISORY BOARD MINUTES

Plant Operator Training Program
Task Force Meeting
October 16, 2009

Task Force Members: Mike Yeraka – GM, Diablo Water District
Barbra Hockett – Board Member, CCCSD
David Livingston – GM, Union Sanitary District
Greg Baatrup – GM, Fairfield-Suisun Sewer District
Gail Chesler – CCCSD and program instructor
Jim Smith – GM, EBMUD – Orinda Water
E.J. Shalaby – GM, WCWD (via phone conferencing)
Deborah Mann – Solano Community College Rep
Deborah Hill – CCCSD, program registrar

Action Items:

Who	What	When
David Livingston	Secure classroom for January 2010 – Water 100 and provide info to Deborah Hill	ASAP - Urgent
Task Force chair	Schedule meeting to report out to sponsor agencies.	Early November?
Deborah Mann	Provide to this task force the faculty requirements and links through the Solano website so that all agencies can help identify candidates to increase the instructor pool.	Before next agency meeting.
Greg Baatrup Jim Smith to provide template info from BayWorks	Draft a charter to address the governance and define the agency commitment for current and additional sponsors.	Before next agency meeting.
Gail Chesler	Research viable Contact Management Software (CMS) cost and website requirements	Before next agency meeting.
Doug Craig Barbra Hockett	Contact BACWA and propose hosting the CMS link on their website	Before next agency meeting.

Sponsoring agencies were invited to send representatives to a retreat on October 9 to discuss a variety of issues in regards to the plant operator training program. Out of the retreat, four task force teams were formed to address specific areas of concern for the plant operator training program: curriculum, administration, growth and management. All the Task Force meetings are designed to discuss the options and to bring recommendations to the sponsoring agencies for agreement and direction. This meeting was designed to address the needs of administration and growth for the program.

Administration:
Eliminate Dependency on Single Agency for Program Administration – The program has been administered by Central San entirely up to this point. These suggestions address the current needs as well as provide a foundation for future program administration needs.

- Review Admin Support Summary – (see attached)
- Incentive for agency to manage registration process – not addressed
- Instructor participation in program administration – see below

Student Involvement/Responsibility for registration and administration – The program has grown beyond the limits of the early program constructs. Increased student accountability and instructors' verification with Solano will reduce/eliminate the workload. The website (see topic Website Development & Maintenance) will reduce the phone calls and emails coming into the current registrar.

Charge students a registration fee for program sustainability - Propose that students pay a $50 fee to take classes. This will help reduce the number of uncommitted students and help secure a full classroom.

- Currently, there is no charge for this program. All of the instructors have experienced students not showing the first night of class, or dropping out after one week or so. Students take the book which is costly and keep other students from taking the class.

- Sponsoring agencies would not pay additional funds for their employees in the program. However, if their employee does not show up or drops the class, the instructor will contact the sponsoring agencies to communicate this discourtesy.

Possible registration product software purchase - The January 2010 semester is scheduled for contract to Solano for $40,500 to include three classes. Based on our current contributions from sponsoring agencies, there will be approximately $13,000 remaining in the account. This Task Force promotes using those funds to construct a viable method of managing the contacts as well as the program information.

The proposal is to research the cost of such software and determine if BACWA's website can host the contact management software or if a unique site needs to be constructed. Website and Software Group members: Gail Chesler, Deborah Mann, Deborah Hill, Doug Craig, and Barbara Hockett along with MIS support from sponsoring agency.

Website Development and Maintenance - secure contact management software (CMS) to include, but not limited to the following:

- BACWA, marketing, course descriptions, fees, etc.
- Managing students' data, hires, tracking
- Faculty application and Solano Community College link
- Interested Agency info to partner
- Semester schedule of classes
- Program FAQ's
- General program info
- Links to other related websites; i.e. Office of Water Programs, CWEA, AWWA, CASA, etc.
- Link to PayPal or other options

Waiting List – not addressed. Most likely obsolete with website and CMS

Program Completion Certificates - will be distributed to students upon completion of the entire program. (No longer for completing each class) as of December 2009. Students will be required to access their unofficial or official transcript for proof for testing or employment purposes. In some cases, the instructor may provide a validation document of class grade/completion upon request from student. There can be a lag time from when the transcripts are available and the need for completed testing applications.

Curriculum Note – Solano CC will offer BIOT 160 in January 2010 (limited class size). Program students will be identified based on their eligibility and invited to the class. There is a question regarding the pre-requisites for the class.

Growth & Regionalization:
Vision of the size of the organization - Nine Bay Area counties – East, south, north including Sacramento, and the peninsula, west, etc. This can serve as a model for additional regional growth. Attracting sponsors to the group can be effectively accomplished through developing relationships with all the water & wastewater agencies.

Governance of Organization – Formulate a charter with executive committee members from counties and sponsoring agency representatives. This task force will utilize recently written charters as a model and prepare a draft for approval.

Attracting Instructors – Deborah Mann will detail the faculty requirements and have them available for agency representatives to distribute to interested persons.

Name of Organization – Bay Area Water & Wastewater Operator Training Program or similar name. Remove the word "plant" so as not to eliminate the water industry.