

**Attachment 1**  
**CYLINDRICAL WEDGEWIRE SCREENS**

- Section 1:**           **Oak Creek Intake Design – Bechtel Briefs**  
**Section 2:**           **EPA Compliance Technology Tables**

# DETAIL DESIGN

## Digging Deep for Cooling Water

Wisconsin Electric needed to upgrade the cooling system at its Oak Creek Power Plant, on the western shore of Lake Michigan. When Bechtel was selected to design and build the new Elm Road Generating station, now under construction on the Oak Creek site, engineers came up with an innovative solution for cooling both

plants—take water directly from the lake. The design calls for a tunnel to be dug through the rock underlying the lake, creating an intake/discharge system to serve both power plants that is cleaner, more efficient, and less expensive than the traditional system of using cooling towers to lower the temperature of the water. Here's how it works:

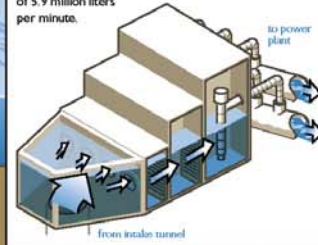
### 1. Water Intake

Two dozen intake screens are placed 9 meters below the surface of the lake, where the water is naturally cool. The intakes draw water in at a very low velocity, effectively allowing aquatic life to swim away from them.



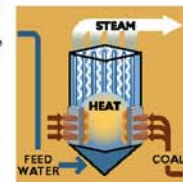
### 2. Circulating Water Pumps

Each pumphouse, such as the one shown here, connects to the intake tunnel via vertical shafts and brings feedwater into both plants at a rate of 5.9 million liters per minute.



### 3. Energy Generation

Feedwater travels from the condenser into the boiler. After being preheated in the economizer, it is piped into the "water walls" of the boiler, where it is heated with fired coal. This produces high-pressure super-heated steam, which drives the steam turbine, generating electricity.



### 4. Cooling Water Discharge

Both plants are open cycle plants. Unlike a closed system in which cooling water is recycled through a cooling tower, an open system uses the cold lake water to condense steam from the steam turbines and returns it slightly warmer to the lake.

### 5. Emergency Intake

A dike wall with manually operated sliding gates is constructed to turn the existing inlet channel into a surface water intake system. In case of any shutdown of the primary intake screens, this system provides full water volume to each plant, old and new.

### Cutting the tunnel

Using drill and blast techniques, a construction shaft is formed through limestone to a depth of 61 meters.



A tunnel-boring machine is assembled in the shaft, and begins cutting an 8-meter-diameter tunnel below the bottom of the lake, extending more than 1.5 kilometers off-shore. The tunnel must be reinforced where ground conditions are poor.



### Using the water

A vertical shaft is sunk to connect to the intake tunnel. A new pumping station servicing the Oak Creek plant will pump water from this forebay. A second shaft and pumping station are created to service the new Elm Road plant.



### Producing new power

The completed project will add two 615-megawatt generating units, with only a 20-percent increase in water usage. Virtually all of the water will be returned to the lake.



Photo illustration courtesy of Bechtel





RESPONSE TO NYSDEC CWA §401 WATER  
 QUALITY CERTIFICATION NOTICE OF DENIAL  
 Attachment 1, Section 2: EPA Technology Determination

Facility ID	Intake ID	EPA assumed design intake flow, gpm (A <sub>SP</sub> ) (\$)	Capital cost (\$)	Baseline O&M annual cost (\$)	Post construction O&M annual cost (\$)	Annualized capital <sup>3</sup> + net O&M using EPA design intake flow <sup>2</sup> (Y <sub>SP</sub> ) (\$)	Net revenue losses from net construction downtime (\$)	Pilot study costs (\$)	Annualized downtime and pilot study costs <sup>2,4</sup> (\$)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) <sup>1</sup>
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0434		400,472	763,363	40,353	138,952	207,284				I	1	1.1604
AUT0435		183,306	483,907	27,166	107,346	149,077				I&E	2	0.8639
AUT0441		108,296	276,983	17,492	57,275	79,220				I	1	1.1604
AUT0446		278,043	3,528,075	28,547	111,202	584,973	1,404,150		113,155	I&E	4	2.5787
AUT0449		487,640	1,738,410	110,263	393,700	530,948				I	1	1.1604
AUT0472		239,620	218,958	453,683	511,926	89,417				I&E	2	0.8639
AUT0476		233,631	489,074	27,565	93,169	135,237				I	1	1.1604
AUT0483		1,146,722	2,715,801	112,654	136,742	410,757		274,363	21,886	I&E	11	0.7352
AUT0489		211,629	1,477,232	84,570	299,177	424,931				I	1	1.1604
AU10490		405,350	3,527,610	73,321	78,027	506,958	3,548,991		286,000	I&E	4	2.5787
AUT0493		257,137	1,429,134	51,159	206,956	359,274		150,000	11,965	I&E	2	0.8639
AUT0496		603,432	1,649,804	57,304	206,130	383,721				I	1	1.1604
AUT0499		45,374	171,551	9,346	48,606	63,685				I&E	2	0.8639
AUT0501		346,213	115,781	205,027	230,840	42,297				I&E	2	0.8639
AUT0513		1,296,772	27,395,451	170,929	603,316	4,332,883	36,923,245		2,975,512	I&E	4	2.5787
AUT0517		98,553	1,040,022	20,976	72,416	199,516				I	1	1.1604
AUT0518		193,413	435,346	28,467	96,388	129,905				I	1	1.1604
AUT0522		237,692	856,098	40,165	162,010	243,734				I&E	2	0.8639
AUT0523		608,373	7,741,521		189,045	1,291,263				I&E	9	5.973
AUT0529		422,181	3,402,665	144,308	530,442	870,598				I	1	1.1604
AUT0534		70,565	230,241	17,175	56,150	71,756				I	1	1.1604
AUT0535		196,084	3,706,263	25,082	66,100	568,710	604,316		48,700	I&E	3	3.4562
AUT0539		1,056,137	13,978,398	183,682	342,369	2,148,896	2,343,730	1,412,165	301,520	I&E	12	3.6581
<b>AUT0541</b>		<b>117,759</b>	<b>3,346,437</b>	<b>108,327</b>	<b>37,393</b>	<b>405,523</b>	<b>27,152,758</b>	<b>169,037</b>	<b>2,201,627</b>	<b>I&amp;E</b>	<b>12</b>	<b>3.6581</b>
AUT0547		780,279	9,747,498	118,281	129,393	1,398,937	17,882,815		1,441,112	I&E	4	2.5787
AUT0551		295,707	823,114	30,125	35,820	122,888		150,000	11,965	I&E	11	0.7352
AUT0552		1,226,625	133,029		80,047	98,987				I	5	0.1286
AUT0553		71,128	230,549	10,379	32,023	54,468				I	1	1.1604
AUT0554		429,991	8,840,925	249,963	170,468	1,179,253	1,498,242		120,738	I&E	3	3.4562
AUT0557		37,500	20,033		19,881	22,734				I	5	0.1286
AUT0564		1,129,749	14,903,816	170,408	396,749	2,348,309	15,236,406		1,227,847	I&E	7	2.504
AUT0567		441,177	5,817,871	67,488	77,963	838,809	4,139,441		333,583	I&E	4	2.5787
AUT0568		584,525	2,308,321	342,703	382,141	368,091		150,000	11,965	I&E	2	0.8639
AUT0570		951,201	4,021,857	164,817	591,048	998,853				I	1	1.1604
AUT0577		741,931	10,647,710	113,337	129,884	1,532,542				I&E	7	2.504
AUT0583		222,087	2,210,305	36,279	51,245	329,663	9,610,528		774,478	I&E	4	2.5787
AUT0585		128,015	1,561,382	49,933	54,853	227,225	1,102,473		88,844	I&E	4	2.5787
AUT0588		396,576	1,788,685	191,759	66,639	129,548		180,701	14,414	I&E	11	0.7352
AUT0590		147,803	315,803	22,592	75,430	97,801				I	1	1.1604
AUT0599		198,681	3,040,887	21,121	104,455	516,288		307,205	24,505	I	4	2.5787
AUT0600		711,801	1,717,012	80,562	284,636	448,508				I	1	1.1604
AUT0601		1,151,214	541,482	677,194	742,753	142,654				I&E	2	0.8639
AUT0603		1,228,633	684,562	720,077	802,140	179,529		150,000	11,965	I&E	2	0.8639
AUT0607		635,364	9,044,216	111,819	226,342	1,402,216	3,693,163	456,845	334,061	I&E	12	3.6581
AUT0611		547,114	3,195,898	88,288	320,973	687,709				I	1	1.1604
AUT0612		186,464	6,614,075		85,670	1,027,365				I&E	13	7.0567
AUT0613		493,923	4,341,494	155,354	572,021	1,034,798				I	1	1.1604
AUT0617		2,292,812	37,040,390	1,403,836	741,877	4,611,760	2,161,531	1,247,332	273,688	I&E	12	3.6581
AUT0619		159,600	62,547	98,454	112,506	22,957				I&E	2	0.8639
AUT0620		551,528	2,198,869	264,319	90,714	139,464		222,140	17,720	I&E	11	0.7352
AUT0621		391,137	2,018,600	70,658	245,595	462,340				I	1	1.1604
AUT0623		73,622	267,379	13,006	49,653	74,715				I	2	0.8639
AUT0625		562,255	2,841,330	104,168	380,113	680,487				I	1	1.1604

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**Appendix B: Facility ID and Facility Name for All Facilities Not Claiming Survey Information CBI**

Facility ID	Facility name	Facility ID	Facility name
AUT0001 ...	Cane Run	AUT0160 ...	L V Sutton
AUT0002 ...	Chesapeake	AUT0161 ...	Valley
AUT0004 ...	Hennepin	AUT0163 ...	Belle River
AUT0010 ...	Bowen	AUT0168 ...	E F Barrett
AUT0011 ...	Shawville	AUT0170 ...	O W Sommers
AUT0012 ...	Diablo Canyon Nuclear	AUT0171 ...	New Madrid
AUT0013 ...	Montville	AUT0173 ...	Fort Calhoun Nuclear
AUT0014 ...	Williams	AUT0174 ...	Herbert a Wagner
AUT0015 ...	Northport	AUT0175 ...	R E Burger
AUT0016 ...	Cholla	AUT0176 ...	Martin Lake
AUT0018 ...	R M Heskett Station	AUT0178 ...	Mt Storm
AUT0019 ...	Charles Poletti	AUT0181 ...	Prairie Creek
AUT0020 ...	B L England	AUT0182 ...	Arsenal Hill
AUT0021 ...	B C Cobb	AUT0183 ...	Schuylkill
AUT0022 ...	St Johns River Power	AUT0185 ...	Gallatin
AUT0024 ...	Bull Run	AUT0187 ...	North Anna Nuclear
AUT0027 ...	Lake Hubbard	AUT0190 ...	Ginna
AUT0033 ...	Muscatine	AUT0191 ...	J H Campbell
AUT0036 ...	Edgewater	AUT0192 ...	R W Miller
AUT0041 ...	Edwin I Hatch	AUT0193 ...	Joliet 29
AUT0044 ...	Hunters Point	AUT0196 ...	Southside
AUT0047 ...	Michoud	AUT0197 ...	Austin-dt
AUT0049 ...	Chalk Point	AUT0201 ...	Cope
AUT0050 ...	Wyandotte	AUT0202 ...	Donald C Cook Nuclear
AUT0051 ...	Suwannee River	AUT0203 ...	Riverside
AUT0053 ...	Nelson Dewey	AUT0205 ...	Joliet 9
AUT0054 ...	Flint Creek	AUT0208 ...	New Castle
AUT0057 ...	Thomas Fitzhugh	AUT0215 ...	Coleto Creek
AUT0058 ...	Mercer	AUT0216 ...	Fort St Vrain
AUT0064 ...	Decordova	AUT0221 ...	Polk
AUT0066 ...	Fermi Nuclear	AUT0222 ...	Marion
AUT0067 ...	Henry D King	AUT0226 ...	Sooner
AUT0068 ...	Scattergood	AUT0227 ...	Silver Lake
AUT0071 ...	Oswego	AUT0228 ...	High Bridge
AUT0072 ...	Sioux	AUT0229 ...	Dan E Kam
AUT0073 ...	Lake Catherine	AUT0230 ...	MWilliams
AUT0078 ...	Missouri City	AUT0232 ...	V H Braunig
AUT0079 ...	Eagle Mountain	AUT0235 ...	Sam Raybum
AUT0080 ...	Lone Star	AUT0238 ...	North Lake
AUT0083 ...	Schiller	AUT0240 ...	Lee
AUT0084 ...	Salem Nuclear	AUT0241 ...	J B Sims
AUT0085 ...	Point Beach Nuclear	AUT0242 ...	Quad Cities Nuclear
AUT0092 ...	Linden	AUT0244 ...	Elk River
AUT0093 ...	Perry Nuclear	AUT0245 ...	Avon Lake
AUT0095 ...	Tyrone	AUT0246 ...	Canaday
AUT0097 ...	Little Gypsy	AUT0248 ...	Sam Bertron
AUT0101 ...	Lakeside	AUT0254 ...	Chamois
AUT0106 ...	Cheswick	AUT0255 ...	Cooper
AUT0110 ...	C P Crane	AUT0257 ...	Gerald Gentleman
AUT0111 ...	Cape Fear	AUT0260 ...	Marshall
AUT0114 ...	Kewaunee Nuclear	AUT0261 ...	Dale
AUT0120 ...	Norwalk Harbor	<b>AUT0264 ...</b>	<b>Indian Point 3 Nucler</b>
AUT0123 ...	Warren	AUT0266 ...	North Omaha
AUT0125 ...	Beaver Valley Nuclear	AUT0268 ...	Cutler
AUT0127 ...	Lake Road	AUT0270 ...	Possum Point
AUT0129 ...	Susquehanna Nuclear	AUT0273 ...	Stanton
AUT0130 ...	Elmer W Stout	AUT0275 ...	Seabrook Nuclear
AUT0131 ...	Hammond	AUT0276 ...	River Rouge
AUT0134 ...	Mount Tom	AUT0277 ...	Dubuque
AUT0137 ...	Mitchell	AUT0278 ...	Morgantown
AUT0139 ...	Albany	AUT0284 ...	Handley
AUT0142 ...	Lauderdale	AUT0285 ...	Connors Creek
AUT0143 ...	Wood River	AUT0286 ...	Welsh
AUT0146 ...	Meredosia	AUT0287 ...	Horseshoe Lake
AUT0148 ...	Tanners Creek	AUT0292 ...	Harris Nuclear
AUT0149 ...	Thomas Hill	AUT0295 ...	Jack McDonough
AUT0151 ...	Decker Creek	AUT0296 ...	W H Zimmer
AUT0152 ...	Duck Creek	AUT0297 ...	Quindaro
AUT0156 ...	Waterford 1 & 2	AUT0298 ...	Harlee Branch
AUT0157 ...	Pulliam	AUT0299 ...	Chesterfield
		AUT0300 ...	Eckert Station
		AUT0302 ...	U.S. DOE SRS (D-area)
		AUT0304 ...	Lansing
		AUT0305 ...	Kahe
		AUT0307 ...	Rodemacher
		AUT0308 ...	W S Lee
		AUT0309 ...	Wilkes
		AUT0310 ...	A B Paterson
		AUT0314 ...	Philip Sporn
		AUT0315 ...	Sabine
		AUT0319 ...	Cliffside
		AUT0321 ...	J E Corette
		AUT0331 ...	Lake Creek
		AUT0333 ...	Hamilton
		AUT0337 ...	Johnsonville
		AUT0341 ...	Montrose
		AUT0343 ...	John E Amos
		AUT0344 ...	Weston
		AUT0345 ...	Summer Nuclear
		AUT0349 ...	McGuire Nuclear
		AUT0350 ...	Clinton Nuclear
		AUT0351 ...	Portland
		AUT0355 ...	Limerick Nuclear
		AUT0356 ...	Byron Nuclear
		AUT0358 ...	H T Pritchard
		AUT0359 ...	Hookers Point
		AUT0361 ...	Hawthorn
		AUT0362 ...	Teche
		AUT0363 ...	Wansley
		AUT0364 ...	Dresden Nuclear
		AUT0365 ...	Arkwright
		AUT0368 ...	Kaw
		AUT0370 ...	Deepwater
		AUT0373 ...	Valmont
		AUT0379 ...	Lake Pauline
		AUT0380 ...	Will County
		AUT0381 ...	Healy
		AUT0384 ...	Somerset
		AUT0385 ...	Hutsonville
		AUT0387 ...	Haynes
		AUT0388 ...	Lewis Creek
		AUT0390 ...	Fort Churchill
		AUT0394 ...	Nebraska City
		AUT0396 ...	Bremo Power Station
		AUT0397 ...	George Neal North
		AUT0398 ...	Iatan
		AUT0399 ...	Boomer Lake
		AUT0401 ...	Fort Myers
		AUT0403 ...	Nine Mile Point Nuclear
		AUT0404 ...	Mitchell
		AUT0405 ...	Fisk
		AUT0406 ...	Merom
		AUT0408 ...	Cameo
		AUT0411 ...	Roseton
		AUT0415 ...	Rochester 7
		AUT0416 ...	Noblesville
		AUT0419 ...	Brunswick Nuclear
		AUT0423 ...	James A Fitzpatrick
		AUT0424 ...	Davis-besse
		AUT0427 ...	Blount Street
		AUT0431 ...	San Angelo
		AUT0433 ...	Mistersky
		AUT0434 ...	Paradise
		AUT0435 ...	Shiras
		AUT0440 ...	Eaton
		AUT0441 ...	Piqua
		AUT0443 ...	Milton L Kapp
		AUT0444 ...	Gibbons Creek
		AUT0446 ...	Richard H. Gorsuch
		AUT0449 ...	Big Brown
		AUT0453 ...	Four Corners
		AUT0455 ...	Seminole
		AUT0459 ...	Vogtle Nuclear
		AUT0462 ...	Warrick
		AUT0463 ...	Rex Brown
		AUT0467 ...	Vero Beach
		AUT0472 ...	Miami Fort
		AUT0473 ...	Palisades Nuclear

Facility ID	Facility name	Facility ID	Facility name	Facility ID	Facility name
AUT0476 ...	Trinidad	AUT0623 ...	Kendall Square	DUT1100 ...	Sewaren
AUT0477 ...	Fair Station	AUT0625 ...	Encina	DUT1103 ...	Milton R Young
AUT0478 ...	Dansby	AUT0630 ...	Lovett	DUT1109 ...	Riverside
AUT0481 ...	Powerlane	AUT0631 ...	Salem Harbor	DUT1111 ...	E D Edwards
AUT0482 ...	Gen J M Gavin	AUT0635 ...	Aes Hickling	DUT1112 ...	Lieberman
AUT0483 ...	Shawnee	AUT0637 ...	Ommond Beach	DUT1113 ...	Sequoyah Nuclear
AUT0489 ...	Nearman Creek	AUT0638 ...	Mandalay	DUT1116 ...	Waiau
AUT0490 ...	Buck	AUT0639 ...	Pittsburg	DUT1117 ...	Columbia
AUT0492 ...	Collins	DMU3244 ..	University of Notre Dame Power Plant	DUT1118 ...	Cooper
AUT0493 ...	E S Joslin	DMU3310 ..	University of Iowa—Main Power Plant	DUT1122 ...	Edgewater
AUT0496 ...	Indian River	DNU2002 ...	Brooklyn Navy Yard Cogenera- tion Partners, L.P.	DUT1123 ...	Waukegan
AUT0499 ...	Bay Front	DNU2011 ...	Long Beach Generation	DUT1132 ...	Cumberland
AUT0500 ...	Big Cajun 2	DNU2013 ...	Maine Energy Recovery Com- pany	DUT1133 ...	J R Whiting
AUT0501 ...	Jack Watson	DNU2014 ...	Baltimore Resco	DUT1138 ...	Harbor
AUT0507 ...	Crawford	DNU2015 ...	Southern Energy-Canal	DUT1140 ...	Morgan Creek
AUT0512 ...	J K Spruce	DNU2017 ...	Westchester Resco Co.	DUT1142 ...	Victoria
AUT0513 ...	Waterford #3 Nuclear	DNU2018 ...	Grays Ferry Cogeneration Part- nership	DUT1143 ...	East River
AUT0515 ...	Rockport	DNU2021 ...	Morgantown	DUT1144 ...	Honolulu
AUT0517 ...	Humboldt Bay	DNU2025 ...	Sparrows Point Div Bethlehem Steel Corp	DUT1145 ...	Devon
AUT0518 ...	James River	DNU2031 ...	Ch Resources—Beaver Falls	DUT1146 ...	Council Bluffs
AUT0521 ...	Menasha	DNU2032 ...	Duke Energy South Bay	DUT1148 ...	Coffeen
AUT0522 ...	Jefferies	DNU2038 ...	Saugus Resco	DUT1152 ...	Mill Creek
AUT0523 ...	Walter C Beckjord	DNU2047 ...	El Segundo Power	DUT1153 ...	McClellan
AUT0529 ...	Gould Street	DUT0062 ...	Leland Olds Station	DUT1154 ...	P H Robinson
AUT0531 ...	Braidwood Nuclear	DUT0576 ...	Sam O. Purdom Generating Station	DUT1155 ...	John Sevier
AUT0534 ...	Crisp	DUT1002 ...	Monroe	DUT1156 ...	Sterlington
AUT0535 ...	Urquhart	DUT1003 ...	Peru	DUT1157 ...	Robert E Ritchie
AUT0536 ...	Rush Island	DUT1006 ...	Martins Creek	DUT1161 ...	Big Bend
AUT0537 ...	Dallman	DUT1007 ...	Presque Isle	DUT1165 ...	Ninemile Point
AUT0538 ...	Genoa	DUT1008 ...	Far Rockaway	DUT1167 ...	Hudson
AUT0539 ...	Edge Moor	DUT1011 ...	Stryker Creek	DUT1169 ...	Carl Bailey
AUT0540 ...	J P Madgett	DUT1012 ...	Grand Tower	DUT1170 ...	Barney M Davis
<b>AUT0541 ...</b>	<b>Indian Point Nuclear</b>	DUT1014 ...	Dolphus M Grainger	DUT1172 ...	Logansport
AUT0544 ...	Eddystone	DUT1021 ...	Alma	DUT1173 ...	Arkansas Nuclear One
AUT0546 ...	Watts Bar Nuclear	DUT1022 ...	Comanche Peak Nuclear	DUT1174 ...	Fox Lake
AUT0547 ...	Muskingum River	DUT1023 ...	Oyster Creek Nuclear	DUT1175 ...	Pirkey
AUT0551 ...	Allen S King	DUT1026 ...	Delaware	DUT1179 ...	Cromby
AUT0552 ...	Kingston	DUT1029 ...	Crystal River	DUT1185 ...	Glenwood
AUT0553 ...	Hunlock Pwr Station	DUT1031 ...	Merrimack	DUT1186 ...	Mountain Creek
AUT0554 ...	Potomac River	DUT1033 ...	J C Weadock	DUT1187 ...	Larsen Memorial
AUT0555 ...	Zuni	DUT1034 ...	South Oak Creek	DUT1189 ...	Monroe
AUT0557 ...	Sayreville	DUT1036 ...	Allen	DUT1191 ...	Meramec
AUT0561 ...	J T Deely	DUT1038 ...	North Texas	DUT1192 ...	Gerald Andrus
AUT0564 ...	Kyger Creek	DUT1041 ...	Elmer Smith	DUT1194 ...	O H Hutchings
AUT0567 ...	F B Culey	DUT1043 ...	Ray Olinger	DUT1198 ...	Manitowoc
AUT0568 ...	Northside	DUT1044 ...	Tradinghouse	DUT1202 ...	Indian River
AUT0570 ...	Peach Bottom Nuclear	DUT1046 ...	Labadie	DUT1206 ...	Widows Creek
AUT0571 ...	Baxter Wilson	DUT1047 ...	Elrama	DUT1209 ...	Surry Nuclear
AUT0573 ...	San Onofre Nuclear	DUT1048 ...	Holly Street	DUT1211 ...	J M Stuart
AUT0575 ...	Trenton Channel	DUT1049 ...	Joppa Steam	DUT1212 ...	Riverside
AUT0577 ...	Middletown	DUT1050 ...	Browns Ferry Nuclear	DUT1213 ...	Charles R Lowman
AUT0580 ...	Sixth Street	DUT1051 ...	Havana	DUT1214 ...	Deepwater
AUT0582 ...	E W Brown	DUT1056 ...	Webster	DUT1217 ...	Port Washington
AUT0583 ...	Dave Johnston	DUT1057 ...	Wateree	DUT1219 ...	Nueces Bay
AUT0585 ...	Burlington	DUT1062 ...	Fayette Power Prj	DUT1222 ...	Burlington
AUT0588 ...	Monticello	DUT1066 ...	F J Gannon	DUT1225 ...	Sibley
AUT0590 ...	C D McIntosh Jr	DUT1067 ...	Paint Creek	DUT1227 ...	Willow Glen
AUT0599 ...	Kearny	DUT1068 ...	Harbor	DUT1228 ...	Riverton
AUT0600 ...	Kincaid	DUT1070 ...	Millstone	DUT1229 ...	Riverside
AUT0601 ...	Bridgeport Harbor	DUT1072 ...	Graham	DUT1235 ...	Cedar Bayou
AUT0602 ...	Mason Steam	DUT1084 ...	Fort Phantom	DUT1238 ...	Knox Lee
AUT0603 ...	Astoria	DUT1085 ...	Petersburg	DUT1248 ...	Oak Creek
AUT0604 ...	C R Huntley	DUT1086 ...	Valley	DUT1249 ...	Vermont Yankee Nuclear
AUT0606 ...	Hmp&I Station 2	DUT1088 ...	Seward	DUT1250 ...	Muskogee
AUT0607 ...	Moss Landing	DUT1093 ...	Bailly	DUT1252 ...	St Clair
AUT0608 ...	Pilgrim Nuclear	DUT1097 ...	Rock River	DUT1255 ...	James De Young
AUT0611 ...	New Boston	DUT1098 ...	Blackhawk	DUT1259 ...	Green River
AUT0612 ...	Huntington Beach			DUT1261 ...	River Crest
AUT0613 ...	Morro Bay			DUT1265 ...	Calvert Cliffs Nuclear
AUT0617 ...	Ravenswood			DUT1268 ...	Dean H Mitchell
AUT0618 ...	New Haven Harbor			DUT1269 ...	Pueblo
AUT0619 ...	William F Wyman			DUT1270 ...	Michigan City
AUT0620 ...	Dunkirk			DUT1271 ...	Monticello
AUT0621 ...	Contra Costa			DUT1272 ...	Sim Gideon
				DUT1273 ...	

The data in Appendix A is keyed to both a facility name and survey ID number. Facilities should be able to determine their ID number from the survey they submitted to EPA during the rule development process.

Step 1: Determine which technology EPA modeled as the most appropriate compliance technology for your facility (§ 125.94(a)(5)(i)(A)). To do this, use the code in column 12 of Appendix A to look up the modeled technology in Table 9-1 below.

TABLE 9-1.—TECHNOLOGY CODES AND DESCRIPTIONS

Technology codes	Technology description
1	Addition of fish handling and return system to an existing traveling screen system.
2	Addition of fine-mesh screens to an existing traveling screen system.
3	Addition of a new, larger intake with fine-mesh and fish handling and return system in front of an existing intake system.
4	Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 1.75 mm.
5	Addition of a fish net barrier system.
6	Addition of an aquatic filter barrier system.
7	Relocation of an existing intake to a submerged offshore location with passive fine-mesh screen inlet with mesh width of 1.75 mm.
8	Addition of a velocity cap inlet to an existing offshore intake.
9	Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 1.75 mm.
10	[Module 10 not used].
11	Addition of dual-entry, single-exit traveling screens (with fine-mesh) to a shoreline intake system.
12	Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 0.76 mm.
13	Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 0.76 mm.
14	Relocation of an existing intake to a submerged offshore location with passive fine-mesh screen inlet with mesh width of 0.76 mm.

Step 2: Using EPA's costing equations, calculate the annualized capital and net operation and maintenance costs for a facility with your design flow using this

technology (§ 125.94(a)(5)(i)(B)). To do this, you should use the following formula, which is derived from the results of EPA's costing equations for a facility like yours using the selected technology:

$$y_f = y_{epa} + m * (x_f - x_{epa}), (1)$$

Where:

- $y_f$  = annualized capital and net O&M costs using actual facility design intake flow,
- $x_f$  = actual facility design intake flow (in gallons per minute),
- $x_{epa}$  = EPA assumed facility design intake flow (in gallons per minute) (column 3),
- $y_{epa}$  = Annualized capital and net O&M costs using EPA design intake flow (column 7), and
- $m$  = design flow adjustment slope (column 13).

Rather than providing the detailed costing equations that EPA used to calculate annualized capital and net O&M costs for facilities to use each of the 14 modeled technologies, EPA has provided the simplified formula above, which collapses the results of those equations for the particular facility and technology into a single result ( $y_{epa}$ ) and then allows the facility to adjust this result to reflect its actual design intake flow, using a technology specific slope for a facility like yours that is derived from the costing equations. This allows facilities to perform the flow adjustment required by § 125.94(a)(5)(i)(B) in a straightforward and transparent manner. Facilities, Directors, or members of the public who wish to review the detailed costing equations should consult the Technical Development Document, Chapter 3.

EPA has provided some additional information in Appendix A, beyond that which is needed to perform the calculations in § 125.95(a)(5)(ii), to facilitate comparison of the results obtained using formula 1 to the detailed costing equations in the TDD, for those who wish to do so. EPA does not expect facilities or permit writers to do this, and has in fact provided the simplified formula to preclude the need for doing so, but is providing the additional information to increase transparency. Thus, for informational purposes, the total capital cost (not annualized), baseline O&M cost, and post construction O&M cost from which the annualized capital and net O&M costs using EPA design intake flow ( $y_{epa}$  in column 7) are derived are listed separately in columns 4 through 6. To calculate  $y_{epa}$ , EPA annualized the total capital cost using a 7 percent discount rate and 10 year amortization period,

and added the result to the difference between the post construction O&M costs and the baseline O&M costs.

Note that some entries in Appendix A have NA indicated for the EPA assumed design intake flow in column 2. These are facilities for which EPA projected that they would already meet otherwise applicable performance standards based on existing technologies and measures. EPA projected zero compliance costs for these facilities, irrespective of design intake flow, so no flow adjustment is needed. These facilities should use \$0 as their value for the costs considered by EPA for a like facility in establishing the applicable performance standards. EPA recognizes that these facilities will still incur permitting and monitoring costs, but these are not included in the cost comparison for the reasons stated above.

Step 3: Determine the annualized net revenue loss associated with net construction downtime that EPA modeled for the facility to install the technology (§ 125.94(a)(5)(i)(C)) and the annualized pilot study costs that EPA modeled for the facility to test and optimize the technology (§ 125.94(a)(5)(i)(D)). The sum of these two figures is listed in column 10. For informational purposes, the total (not annualized) net revenue losses from construction downtime, and total (not annualized) pilot study costs are listed separately in columns 8 and 9. These two figures were annualized using a 7 percent discount rate and 30 year amortization period and the results added together to get the annualized facility downtime and pilot study costs in column 10.

Step 4: Add the annualized capital and O&M costs using actual facility design intake flow ( $y_f$  from step 2), and the annualized facility downtime and pilot study costs (column 10 from step 3) to get the preliminary costs considered by EPA for a facility like yours (§ 125.94(a)(5)(i)(E)).

Step 5: Determine which performance standards in § 125.94(b)(1) and (2) (i.e., impingement mortality only, or impingement mortality and entrainment) are applicable to your facility, and compare these to the performance standards on which EPA's cost estimates are based, listed in column 11 (§ 125.94(a)(5)(i)(F)). If the applicable performance standards and those on which EPA's cost estimates are based are the same, then the preliminary costs considered by EPA for a facility like yours are the final costs considered by EPA for a facility like yours. If only the impingement mortality performance standards are applicable to your facility, but EPA based its cost estimates on