
Greenhouse Gas Mitigation Planning:

A Guide for Small Municipal Utilities

APPENDIX B

1. GHG MITIGATION CAPACITY AND ASSOCIATED COSTS AND REVENUES FOR LANDFILL METHANE ELECTRICITY GENERATION PROJECTS.

Electricity Generation-Example Cost Estimates by Project Size (U.S. EPA 1999) converted to 2005 dollars (Sahr 2004).

Size		Total Costs	
<i>WIP</i> (<i>MT 000</i>)	(<i>MW</i>)	<i>Capital</i> (<i>\$000</i>)	<i>O&M</i> (<i>\$000</i>)
318	0.50	\$1,131	\$149
476	0.75	\$1,598	\$191
635	1.00	\$2,049	\$233
953	1.50	\$2,923	\$316
1127	2.00	\$3,768	\$400
1271	3.00	\$5,403	\$552
2918	5.00	\$8,565	\$891

The financial assumptions used to calculate the above estimates are shown below (U.S. EPA 1999).

Parameter	Value
Discount Rate	8 percent real
Depreciation Period	10 years
Marginal Tax Rate	40%
Duration of Project	Electricity: 20 years; Direct Gas Use: 15 years
Collection Efficiency	75%

GHG Abatement Capacity:

Primary GHG Mitigation:

Assuming an engine generator heat rate of 10,000 BTU/kWh (U.S. EPA 1999), a landfill containing 2,918,000 MT WIP and power production of 5 MW will have an associated electricity generating capacity of 43.8×10^6 kWh. This electricity generation corresponds to 4.38×10^8 ft³ methane per year, or **48,187 TCE**.

$$\frac{43.8 \times 10^6 \text{ kWh}}{\text{yr}} \times \frac{10,000 \text{ BTU}}{\text{kWh}} \times \frac{1 \text{ ft}^3 \text{ CH}_4}{1,000 \text{ BTU}} = \frac{4.38 \times 10^8 \text{ ft}^3}{\text{yr}}$$

$$\frac{4.38 \times 10^8 \text{ ft}^3}{\text{yr}} \times \frac{19.2 \text{ g CH}_4}{\text{ft}^3} \times \frac{\text{Tg}}{10^{12} \text{ g}} \times \frac{5.73 \text{ MMTCE}}{\text{Tg CH}_4} \times \frac{10^6 \text{ MTCE}}{\text{MMTCE}} = \frac{48,187 \text{ MTCE}}{\text{yr}}$$

However, when we consider the actual reduction in GHG emissions, during the combustion process, methane is converted to CO₂ through the following stoichiometric equation:



Assuming a 95% methane destruction efficiency (5% of the methane fails to be burned in the combustion process) and remembering that methane has a GWP of 21, the resulting CO₂ equivalent emissions can be calculated as the methane emissions escaping combustion plus CO₂ emissions resulting from the combustion process.

Large landfill:

$$\left[\frac{4.38 \times 10^8 \text{ ft}^3}{\text{yr}} \times \frac{1 \text{ lbmolCH}_4}{379.3 \text{ ft}^3} \times \frac{16 \text{ lbCH}_4}{\text{lbmol}} \times \frac{1 \text{ tonne}}{2205 \text{ lb}} (1 - .95)(21) \right] + \left[\frac{4.38 \times 10^8 \text{ ft}^3}{\text{yr}} \times \frac{1 \text{ lbmolCH}_4}{379.3 \text{ ft}^3} \times \frac{16 \text{ lbCH}_4}{\text{lbmol}} \times \frac{1 \text{ tonne}}{2205 \text{ lb}} \times \frac{44 \text{ g/molCO}_2}{16 \text{ g/molCH}_4} (.95) \right] = 30,689 \text{ TCO}_2\text{E}$$

Since 10 metric tons of CO₂ is equal to 2.727 metric tons of carbon, the emissions from combustion will produce 30,689 tons of CO₂ per year = **8,369 MTCE per year**. Therefore the resulting capacity for carbon abatement (tons of carbon captured minus tons of carbon emitted through combustion) is approximately **39,800 MTCE per year** for a landfill containing 2,918,000 MT WIP. Over a 20 year timeframe, this would correspond to the abatement of **796,000 MTCE**. For every metric ton of carbon captured, approximately **17%** is re-released to the atmosphere during the combustion process.

Secondary GHG Mitigation:

EPA CO₂ emission factors estimate that for every MMBtu produced through the combustion of natural gas, 14.47 kg of carbon is emitted (U.S. EPA 2004c). Therefore, for every MMBtu produced through landfill or other renewable source of methane, the emissions of 14.47 kg of carbon are offset when sold back to the electric grid.

A landfill producing 43.8×10^6 kWh of electricity will therefore offset 6338 MTCE per year. Over 20 years, the electricity generation will offset approximately **126,757 MTCE**.

$$43.8 \times 10^6 \text{ kWh} \times \left(\frac{10,000 \text{ BTU}}{\text{kWh}} \right) \times \frac{\text{MMBTU}}{10^6 \text{ BTU}} \times \frac{14.47 \text{ kgC}}{\text{MMBTU}} \times \frac{\text{MTCE}}{1,000 \text{ kg}} = 6338 \text{ MTCE}$$

Total GHG Mitigation:

The addition of primary GHG mitigation through methane combustion and secondary GHG mitigation through fossil fuel offset leads to a total GHG mitigation potential of approximately **922,757 MTCE** for a landfill containing 2,918,000 MT WIP.

Costs and Revenues as \$/MTCE:

\$/TCE abated can be calculated using methane's GWP of 21 and an engine generator heat rate of 10,000 Btu/kWh (U.S. EPA 1999).

Costs:

A large landfill of 2,918,000 MT WIP, power production of 5 MW and an associated electricity generating capacity of 43.8×10^6 kWh will cost approximately \$9,456,000 over a 20 year time frame, corresponding to a carbon abatement cost of approximately **\$10.25/MTCE abated**.

$$\text{Large landfill costs: } \frac{\$9,456,000 \text{ Cost}}{922,757 \text{ MTCE}} = \frac{\$10.25}{\text{MTCE}}$$

Revenues:

A landfill of 2,918,000 MT WIP, with an associated electricity generating capacity of 43.8×10^6 kWh, the project will realize an annual revenue of \$1.75 million at \$0.04/kWh.

Over a 20 year time period and an 8% discount rate, the present value of the revenue stream for a 5 MW landfill is approximately **\$17.2 million**. The annual electricity generation of 43.8×10^6 is equivalent to 876×10^6 kWh over a 20 year project time period. For all sizes of landfills, the revenue generated from selling electricity to the grid is approximately **\$15/MTCE abated**.

$$\text{Present Value}(5 \text{ MW}) = \$1,752,000 \left[\frac{1 - \left(\frac{1}{(1 + 0.08)^{20}} \right)}{0.08} \right] = \$17,201,000$$

$$\frac{\$17,200,000 \text{ revenue}}{876 \times 10^6 \text{ kWh}} \times \frac{\text{kWh}}{10,000 \text{ BTU}} \times \frac{1,000 \text{ BTU}}{1 \text{ ft}^3 \text{ CH}_4} \times \frac{1 \text{ ft}^3 \text{ CH}_4}{19.2 \text{ g CH}_4} \times \frac{10^{12} \text{ g}}{\text{Tg}} \times \frac{\text{Tg CH}_4}{5.73 \text{ MMTCE}} \times \frac{\text{MMTCE}}{10^6 \text{ MTCE}} \times \frac{(1 - 0.17) \text{ MTCE abated}}{\text{MTCE captured}} = \frac{\$14.81}{\text{TCE}}$$

2: LIST OF CANDIDATE LANDFILLS IN THE U.S. (U.S. EPA 2004B).

Project ID #	Landfill ID #	Landfill Name	Landfill City	Landfill County	State	Waste In Place (tons)	Year Landfill Opened	Landfill Closure Year	Landfill Owner Organization	Project Status
167079	82	Anchorage Regional Landfill Athens/Limestone County SLF MSWLF	Anchorage Athens	Anchorage Limestone	AK AL	4,350,000 1,195,575	1987 1972	1996	Municipality of Anchorage City of Athens	Candidate Candidate
167090	71	Bishop SLF MSWLF Black Warrior Solid Waste Facility	Albertville Coker	Marshall Tuscaloosa	AL AL	1,078,906 1,800,000	1968	2004	Bishop Landfill Company Black Warrior Solid Waste Disposal Authority	Candidate Candidate
61	6	Calhoun County SLF	Anniston	Calhoun	AL	4,350,000	1969	1993	Calhoun County Commission	Candidate
74	19	City of Dothan SLF MSWLF	Dothan	Houston	AL	4,299,512	1969	2005	City of Dothan	Candidate
64	9	Coffee County Regional SLF MWSLF	Elba	Coffee	AL	1,800,000	1993		Coffee County Commission	Candidate
87	32	Colbert County SLF		Colbert	AL	1,000,000	1970	1989	Colbert County Commission	Candidate
70	15	Eastern SLF MSWLF	Birmingham	Jefferson	AL	2,750,000	1975	2050	City of Birmingham	Candidate
90	35	Florence SLF MSWLF	Florence	Lauderdale	AL	275,643	1988	2015	City of Florence Public Works	Candidate
89	34	Florence SLF MSWLF (Old)	Florence	Lauderdale	AL	1,461,912	1969	1988	City of Florence	Candidate
60	5	Highway 70 (Sheela) SLF	Columbiana	Shelby	AL	2,460,000	1981	2050	Shelby County	Candidate
75	20	Magnolia SLF MSWLF	Magnolia Springs	Baldwin	AL	1,800,000	1980	2030	Baldwin County Commission	Candidate
86	31	Monroe County SLF	Monroeville	Monroe	AL	1,205,385	1982	1998	Monroe County Commission	Candidate
80	25	Mt. Olive SLF MSWLF	Mt. Olive	Jefferson	AL	2,071,034	1969	1997	Jefferson County Commission	Candidate
78	23	Onyx Cedar Hill LF	Ragland	St. Clair	AL	1,000,000	1974	2032	Onyx Waste Services, Inc.	Candidate
62	7	Onyx Starr Ridge Landfill	Moody	St. Clair	AL	1,660,000	1984	2050	Onyx Waste Services, Inc.	Candidate
101877	22	Pine View SLF MSWLF	Dora	Walker	AL	681,184	1993		Allied Waste Industries	Candidate
72	17	Salem Waste Disposal, Inc. MSWLF	Opelika	Lee	AL	6,000,000	1975	2060	Waste Management, Inc.	Candidate
67	12	Shannon SLF	Homewood	Jefferson	AL	9,324,502	1972	1993	Jefferson County Solid Waste Admin.	Candidate
84	29	Southside Storage, Inc.	Chickasaw	Mobile	AL	4,550,396	1978	2008	Southside Storage, Inc.	Candidate
180288	2204	Three Corners Landfill		Cherokee	AL	1,200,000	1998	2075	Waste Management, Inc.	Candidate
68	13	Turkey Creek SLF MSWLF		Jefferson	AL	4,657,815	1972	1997	Jefferson County	Candidate
180152	2093	City of Little Rock Landfill	Little Rock	Pulaski	AR	799,244	1993	2067	City of Little Rock	Candidate
180383	2291	Craighead County SWDA LF	Jonesboro	Craighead	AR	1,600,000	1991		Craighead County Solid Waste Disposal Authority	Candidate
180372	2282	Tontitown Landfill	Springdale	Washington	AR	3,500,000	1979	2006	Waste Management of Arkansas, Inc.	Candidate
167128	2043	Two Pine Landfill	North Little Rock	Pulaski	AR	3,825,000	1980	2009	Waste Management of Arkansas, Inc.	Candidate
101801	1768	27th Avenue Landfill	Phoenix	Maricopa	AZ	10,900,000	1978	1995	City of Phoenix	Candidate
101807	1773	Apache Junction LF	Apache Junction	Pinal	AZ	1,000,000	1999	1999	Allied Waste Industries Inc.	Candidate
101835	1782	Cinder Lake MSW LF	Flagstaff	Coconino	AZ	2,150,000	1965	2042	City of Flagstaff	Candidate
101840	1787	City of Glendale Municipal Landfill	Glendale	Maricopa	AZ	5,000,000		2045	City of Glendale	Candidate
180273	2194	Grey Wolf Landfill	Dewey	Yavapai	AZ	3,000,000	1979	2014	Waste Management of Arizona, Inc. (WMA)	Candidate

101838	1785	Huachuca City Landfill	Huachuca	Cochise	AZ	1,200,000		2005	City of Huachuca	Candidate
101855	1800	North Center Street Landfill	Phoenix	Maricopa	AZ	2,000,000	1970	1992	Pima Maricopa Indian Community	Candidate
101839	1786	Northwest Regional MSW Landfill	Phoenix	Maricopa	AZ	1,000,000		2042	WMI	Candidate
101804	1771	Painted Desert Landfill	Joseph City	Navajo	AZ	1,500,000		2046	WMI	Candidate
101841	1788	Queen Creek MSW Landfill	Queen Creek	Maricopa	AZ	1,500,000		2005	Maricopa County	Candidate
101842	1789	Rio Rico MSW Landfill	Rio Rico	Santa Cruz	AZ	1,000,000	1981	2013	Santa Cruz County	Candidate
180212	1798	Salt River Landfill	Phoenix	Maricopa	AZ	3,000,000		2008	Pima Maricopa Indian Community	Candidate
101843	1790	Skunk Creek Landfill	Phoenix	Maricopa	AZ	12,000,000	1972	2005	City of Phoenix	Candidate
101844	1791	Tangerme Road MSW Landfill	Tucson	Pima	AZ	2,100,000		1999	Pima County	Candidate
97	41	Amador County SLF	Ione	Amador	CA	1,013,553		2006	Amador County	Candidate
98	42	American Avenue Disposal Site	Kerman	Fresno	CA	4,857,000	1970	2031	Fresno County	Candidate
103	47	Antelope Valley Public LF	Palmdale	Los Angeles	CA	2,678,000		2000	Palmdale Disposal Company, Inc.	Candidate
106	50	Arvin SLF	Arvin	Kern	CA	4,000,000	1971	2004	County Of Kern-Truxtun AV	Candidate
180154	1774	Bonsall Landfill		San Diego	CA				County of San Diego	Candidate
131	75	Bonzi SLF	Modesto	Stanislaus	CA	1,800,000		2017	Rudi Bonzi Inc	Candidate
180318	78	Bradley Avenue West SLF and Bradley East LF	Sun Valley	Los Angeles	CA	31,000,000	1959	2003	WMI	Candidate
166996	83	Buena Vista Disposal Site	Watsonville	Santa Cruz	CA	2,040,000	1966	2021	County of Santa Cruz	Candidate
161	105	Chiquita Canyon SLF	Castaic	Los Angeles	CA	6,434,424		2019	Republic Services, Inc.	Candidate
162	106	City Garbage Company LF	Eureka	Humboldt	CA	1,005,000		2000		Candidate
169	113	City of Santa Maria Refuse Disposal Site	Santa Maria	Santa Barbara	CA	1,651,000		2004	City Of Santa Maria	Candidate
171	115	City of Ukiah Solid Waste Disposal Site	Ukiah	Mendocino	CA	2,200,000	1955	2000	City Of Ukiah	Candidate
172	116	City of Whittier-Savage Canyon LF	Whittier	Los Angeles	CA	1,091,000		2027	City of Whittier	Candidate
176	120	Coachella Valley Disposal Site	Coachella	Riverside	CA	3,238,000	1972	1997	Riverside County	Candidate
178	122	Cold Canyon LF Solid Waste Disposal Site	San Luis Obispo	San Luis Obispo	CA	2,254,575		2003	Corral De Piedra Land Company	Candidate
200	144	Edom Hill Disposal Site	Desert Hot Springs	Riverside	CA	6,100,000	1967	2004	Riverside County	Candidate
206	150	Fairmead Solid Waste Disposal Site	Chowchilla	Madera	CA	1,091,000			Madera County Engineering Department	Candidate
207	151	Fink Road LF	Crows Landing	Stanislaus	CA	1,511,000		2038	Stanislaus County	Candidate
210	153	Foothill SLF	Linden	San Joaquin	CA	2,551,000		2075	San Joaquin County	Candidate
166965	62	Frank R. Bowerman SLF	Irvine	Orange	CA	18,000,000	1990	2028	Orange County	Candidate
222	165	Hanford SLF	Hanford	Kings	CA	1,668,000		2000	Kings County WM Authority	Candidate
110	54	Hay Road LF	Vacaville	Solano	CA	1,521,000		2040	B&J Drop Box SLF Inc.	Candidate
180433	265	Kiefer LF	Sacramento	Sacramento	CA	18,000,000	1967		Sacramento County	Candidate
245	188	Kirby Canyon Recycling & Disposal Facility	Morgan Hill	Santa Clara	CA	3,800,000		2022	Waste Management of California	Candidate
248	191	Lamb Canyon Disposal Site	Beaumont	Riverside	CA	3,000,000	1970	2024	Riverside County	Candidate
277	220	Near Road LF	Paradise	Butte	CA	1,975,000	1970	2034	Butte County	Candidate
101852	1796	North County LF	Lodi	San Joaquin	CA	1,394,000		2027	San Joaquin County	Candidate

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284	227	North County Recycling Center and Sanitary LF	Lodi	San Joaquin	CA	8,000,000	1991	2035	San Joaquin County Public Works	Candidate
167060	1976	Ostrom Road Landfill	Wheatland	Yuba	CA	1,157,000	1995	2025	Yuba-Sutter Disposal Inc. (Norcal Waste Systems)	Candidate
296	238	Ox Mountain SLF	Half Moon Bay	San Mateo	CA	9,128,242	1976	2022	Allied Waste Industries	Candidate
297	239	Pacheco Pass SLF	Gilroy	Santa Clara	CA	1,067,000	1999	1999	South Valley Refuse	Candidate
309	250	Potrero Hills SLF	Suisun City	Solano	CA	4,514,000	1992	2016	Potrero Hills Landfill, Inc. (Republic Services, Inc.)	Candidate
312	253	Ramona LF	Ramona	San Diego	CA	947,800	1969	2004	San Diego County	Candidate
319	260	Ridgecrest-Inyokern SLF	Ridgecrest	Kern	CA	1,837,000	1969	2004	Kern County	Candidate
329	270	San Timoteo Solid Waste Disposal Site	Redlands	San Bernardino	CA	2,300,000	1992	2016	San Bernardino County	Candidate
101848	1792	Santa Monica Landfill	Santa Monica	Los Angeles	CA					Candidate
332	273	Santiago Canyon SLF	Irvine	Orange	CA	17,100,000	1968	2004	Orange County	Candidate
334	275	Shafter-Wasco SLF	Shafter	Kern	CA	1,748,050	1972	2005	Kern County	Candidate
166995	286	Sunshine Canyon/North Valley LF	Sylmar	Los Angeles	CA	27,000,000	1961	2004	Allied Waste Industries	Candidate
350	290	Teapot Dome Disposal Site	Porterville	Tulare	CA	1,614,000	1970	2008	Tulare County - Solid Waste Div.	Candidate
193	137	Tri-Cities Landfill	Fremont	Alameda	CA	7,915,544	1968	2001	Waste Management Inc	Candidate
368	308	Vandenber Air Force Base LF	Vandenber Air Force	Santa Barbara	CA	1,500,000	1945	2040	30 SW/CEV	Candidate
369	309	Vasco Road SLF	Livermore	Alameda	CA	9,067,500		2015	Republic Services, Inc.	Candidate
400	340	Visalia Disposal Site LF	Visalia	Tulare	CA	3,837,500		2002	Tulare County	Candidate
379	319	West Central LF	Redding	Shasta	CA	1,490,000		2022	Shasta County Public Works Department	Candidate
399	339	Western Regional LF	Marysville	Placer	CA	3,368,000	1980	2008	Placer County Department of Public Works	Candidate
389	329	Yuba-Sutter Landfill	Marysville	Yuba	CA	2,200,000	1967	1996	Yuba-Sutter Disposal Inc.	Candidate
6400	1721	BFI/Fountain Landfill	Fountain	El Paso	CO	5,218,297	1968	2002	Allied Waste Industries	Candidate
6404	1725	BFI/RPS Landfill-Golden	Golden	Jefferson	CO	3,394,539	1986	2022	Allied Waste Industries	Candidate
6397	1718	Denver Arapahoe Disposal Site-DADS	Aurora	Arapahoe	CO	11,499,652	1990	2002	City of Denver	Candidate
6416	1737	Denver Regional Landfill (South)	Erie	Weid	CO	7,036,984	1988		Allied Waste Systems (old LWS)	Candidate
6405	1726	Larimer County Landfill	Fort Collins	Larimer	CO	12,558,321	1963	2008	Larimer County, Fort Collins, and Loveland	Candidate
6413	1734	Milner Landfill	Milner	Routt	CO	1,125,701	1979		Twin Landfill Company	Candidate
6408	1729	Montrose East End SWDS	Montrose	Montrose	CO	2,054,466	1976		Montrose County	Candidate
6406	1727	Orchard Mesa SWDS	Grand Junction	Mesa	CO	8,688,255	1955	2007	Mesa County	Candidate
6410	1731	Pitkin County Resource Recovery LF	Aspen	Pitkin	CO	2,465,911	1969	2015	Pitkin County	Candidate
6403	1724	South Canyon Landfill	Glenwood Springs	Garfield	CO	1,798,154	1953	2002	City of Glenwood Springs	Candidate
6414	1735	Summit County Solid Waste Disposal Site	Dillon	Summit	CO	2,680,410	1966	2030	Summit County	Candidate
6401	1722	Waste Management Midway Landfill	Fountain	El Paso	CO	1,059,137	1991	2025	Landfill Services, Inc.	Candidate

6399	1720	WMI/Colorado Springs SWDS	Colorado Springs	El Paso	CO	15,562,598	1968	2002	Waste Management, Inc.	Candidate
427	363	East Windsor LF	East Windsor	Hartford	CT	837,000	1976	1999	Botisello, Inc.	Candidate
424	360	Manchester LF	Manchester	Hartford	CT	1,000,000		2004	City of Manchester	Candidate
429	361	Middletown Avenue Landfill	New Haven	New Haven	CT	2,500,000	1953	1999	City of New Haven	Candidate
435	375	Waterbury-North End LF	Waterbury	New Haven	CT	1,600,000		1994	Town of Waterbury	Candidate
432	368	Windsor LF	Windsor	Hartford	CT	1,754,676	1973	2007	Town of Windsor	Candidate
166403	1831	Central Solid Waste Management Center (CSWMC) Landfill	Sandtown	Kent	DE	2,310,000	1980	2023	Delaware Solid Waste Authority	Candidate
166402	1830	Pigeon Point Landfill	Wilmington	New Castle	DE	6,000,000		1985	Delaware Solid Waste Authority	Candidate
166404	1832	Southern Solid Waste Management Center (SSWMC) Landfill	Jones Crossroads	Sussex	DE	2,430,000	1984	2004	Delaware Solid Waste Authority	Candidate
480	415	Baseline Landfill	Ocala	Marion	FL	3,432,000	1977	2010	Marion County	Candidate
495	430	Bee Ridge LF	Sarasota	Sarasota	FL	4,978,200	1972	1998	Sarasota County, Solid Waste Department	Candidate
457	392	Bridgeway Acres LF	St. Petersburg	Pinellas	FL	2,850,000	1975	2020	Pinellas County, Solid Waste Management	Candidate
464	399	Citrus County Landfill	Lecanto	Citrus	FL	1,000,000	1975	2030	Citrus County Solid Waste Management Division	Candidate
472	407	DeSoto County SLF	Sebring	Highlands	FL	413,432	1989	1995	Highlands County Solid Waste	Candidate
488	423	Dyer Boulevard LF	West Palm Beach	Palm Beach	FL	15,598,440	1968	1987	Palm Beach County	Candidate
475	410	Gulf Coast LF	Fort Myers	Lee	FL	2,125,340	1976	2008	WMI	Candidate
473	408	Indian River County LF Class I	Vero Beach	Indian River	FL	3,266,617	1978	2020	Indian River County Solid Waste Disposal District	Candidate
467	402	Medley LF Expansion	Miami	Miami-Dade	FL	18,018,000	1955	2010	WMI	Candidate
466	401	Naples SLF Collier County	Naples	Collier	FL	4,992,000	1977	2023	Collier County	Candidate
170803	2053	NCARF (Site 7)	West Palm Beach	Palm Beach	FL	4,418,356	1989	2023	Palm Beach County	Candidate
496	431	Osceola Road LF	Geneva	Seminole	FL	4,800,000	1978	2040	Seminole County	Candidate
493	428	Saint Lucie County SLF Phase I	Fort Pierce	St. Lucie	FL	1,287,000	1978	2040	St. Lucie County	Candidate
180397	2304	Sarasota Central Landfill Complex	Nokomis	Sarasota	FL	1,400,000	1998	2028	Sarasota County	Candidate
469	404	South Dade Solid Waste Disposal Facility	Gouids	Miami-Dade	FL	10,000,000	1978	2012	Metro-Dade Solid Waste Management	Candidate
487	422	Southport Road SLF Phase I & II	Osceola	Osceola	FL	1,029,000	1985	2004	Osceola County Solid Waste	Candidate
474	409	Springhill Regional Landfill	Campbellton	Jackson	FL	3,245,441	1955	2055	Waste Management, Inc.	Candidate
470	405	Trail Ridge LF	Maxville	Duval	FL	4,677,128	1992	2016	Duval County Public Utilities	Candidate
476	411	U.S. South 27 LF	Tallahassee	Leon	FL	1,680,000	1977	2015	Leon County	Candidate
520	455	Arnold Road LF	Lawrenceville	Gwinnett	GA	1,282,907	1989	1999	WMI	Candidate
504	439	Atlanta-Gun Club Road	Atlanta	Fulton	GA	2,371,617	1977	1994	City of Atlanta	Candidate
517	452	Atlanta-Key Road	Atlanta	Fulton	GA	2,341,823	1974	1994	City of Atlanta	Candidate
512	447	Baker Place Road Landfill	Grovetown	Columbia	GA	2,395,800	1982	2004	Columbia County SWM	Candidate

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167070	1985	Bartow County Landfill	Cartersville	Bartow	GA	1,800,000	2001	2010	Bartow County Department of Solid Waste	Candidate
514	449	BFI-Hickory Ridge	Conley	DeKalb	GA	982,305	1992		Allied Waste Industries	Candidate
180386	453	Chambers-Bolton Road	Atlanta	Fulton	GA	543,050	1991	2001	WMI	Candidate
525	460	Columbus-Schatuiga Road W Fill Phase 2	Columbus	Muscoogie	GA	2,354,569	1983	2028	City of Columbus	Candidate
515	450	Fleming/Gaisert Road	Albany	Dougherty	GA	1,700,000	1982	2015	Dougherty County	Candidate
509	444	Little Neck Road Phases I & II	Savannah	Chatham	GA	643,608	1983	2020	Waste Management of Georgia, Inc.	Candidate
180223	2154	Marble Top Road Landfill	Chickamauga	Walker	GA	1,050,000	1977	1998	Walker County	Candidate
527	462	Old Dixie Highway MSW Landfill	Dalton	Whitfield	GA	2,695,000	1980	2030	Dalton-Whitfield Regional Solid Waste Management Authority (DWRSWMA)	Candidate
523	458	Onyx Pecan Row MSW LF	Valdosta	Lowndes	GA	2,657,359	1991	2015	Onyx Waste Services, Inc.	Candidate
513	448	Seminole Road MSW Landfill	Ellenwood	DeKalb	GA	7,194,141	1977	2019	DeKalb County Public Works Dept Sanitation Division	Candidate
180386	466	Southern States-Bolton Road	Atlanta	Fulton	GA	1,667,108	1987	1995	WMI	Candidate
507	442	Speedway-SR 324 Site I	Winder	Barrow	GA	2,838,500	1988	1997	Republic Services, Inc.	Candidate
530	465	Watts Road LF	Atlanta	Fulton	GA	6,000,000	1970	1987	Allied Waste Industries	Candidate
532	467	WMI-Live Oak LF	Conley	DeKalb	GA	5,266,000	1985	2050	WMI	Candidate
180135	2079	Central Maui Landfill	Puunene	Maui	HI	2,450,000	1987	2004	Maui County	Candidate
180393	2299	Kailua Landfill	Kealahou	Hawaii	HI	500,000	1975	1993	Hawaii County	Candidate
180392	2298	Kalahou Landfill	Waimanalo	Honolulu	HI	1,310,000	1987	1990	City and County of Honolulu	Candidate
180391	2297	Kapaa LF Site No. 2	Honolulu	Honolulu	HI	2,122,147	1982	1998	City and County of Honolulu	Candidate
180137	2081	Kekaha Landfill/Phase II	Kekaha	Kauai	HI	1,492,886	1953	2004	Kauai County	Candidate
180143	2087	South Hilo Landfill	Hilo	Hawaii	HI	2,000,000	1975	2004	Hawaii County	Candidate
180145	2089	Waimanalo Gulch Landfill & Ash Monofill	Kapolei	Honolulu	HI	5,070,000	1989	2010	City and County of Honolulu	Candidate
180146	2090	West Hawaii Landfill/Puuanahulu	Waikoloa	Hawaii	HI	900,000	1993	2040	Hawaii County	Candidate
684	614	Black Hawk County SLF (Area E)	Waterloo	Black Hawk	IA	1,821,820	1990	2050	Black Hawk County Solid Waste Mgmt. Comm.	Candidate
693	623	Central Disposal Landfill	Lake Mills	Winnebago	IA	4,528,000	1981	2054	WMI	Candidate
686	616	Clinton County SLF (East)	Clinton	Clinton	IA	3,697,808	1974	2006	Clinton County Area Solid Waste Agency	Candidate
687	617	Des Moines County SLF	West Burlington	Des Moines	IA	2,597,642	1965	2017	Des Moines County Regional Solid Waste Comm.	Candidate
689	619	Dubuque Metropolitan SLF	Dubuque	Dubuque	IA	1,600,000	1976	2010	Dubuque Metro Area Solid Waste Agency	Candidate
180150	2092	Fayette County Landfill	Fayette	Fayette	IA	275,484	1984	2014	Fayette County Solid Waste Management Commission	Candidate
170806	2055	Ft. Dodge LF	Ft. Dodge	Webster	IA	1,000,000	1980	2007	City of Ft. Dodge	Candidate
700	630	Lee County SLF	Fort Madison	Lee	IA	1,099,900	1980	2007	Lee County Solid Waste Management Commission	Candidate
692	622	Marion County SLF	Tracy	Marion	IA	1,127,560	1977	2092	South Central Iowa Solid Waste Agency	Candidate
697	627	Northwest Iowa SLF	Sheldon	Sioux	IA	1,092,500	1974	2012	Northwest Iowa Solid Waste Agency	Candidate

691	621	Sioux City SLF	Sioux City	Woodbury	IA	1,144,000	1981	2007	Siouxland Environmental Services, Inc.	Candidate
167131	2046	Winneshiek County Sanitary Landfill	Decorah	Winneshiek	IA	1,000,000	1973	2015	Winneshiek County	Candidate
167073	1988	Fort Hall Mine Landfill	Pocatiello	Bannock	ID	2,000,000	1943	2008	Bannock County Solid Waste Dept.	Candidate
180255	2178	Franklin County Sanitary Landfill	Dayton	Franklin	ID		1968	2007	Franklin County	Candidate
166905	1859	31st Street LF	Westchester	Cook	IL	1,922,000			Catholic Charities/Sexton	Candidate
586	521	Beecher Development Company	Beecher	Will	IL	5,500,000	1973	1997	Beecher Development Company	Candidate
166907	1861	Bloomington LF	Bloomington	McLean	IL	1,000,000			Sexton	Candidate
546	481	Clinton LF #2	Clinton	De Witt	IL	1,223,000	1990	2009	Peoria Disposal Company	Candidate
535	470	D & L LF	Greenville	Bond	IL	1,581,904	1974	2040	D & L Landfill, Inc.	Candidate
545	480	De Kalb County LF	Dekalb	Dekalb	IL	4,176,117	1974	2018	WMI	Candidate
166920	1872	EDC Landfill - Hoopeson	Hoopeson	Vermilion	IL		1992	2082	Allied Waste Industries	Candidate
536	471	Five Oaks RDF	Taylorville	Christian	IL	10,200,000	1979	2037	Waste Management, Inc.	Candidate
553	488	IL Waste Systems	Milford	Iroquois	IL	13,736,372	1975	2013	Allied Waste Industries	Candidate
166912	1865	Kewanee LF	Kewanee	Henry	IL	1,000,000			City of Kewanee	Candidate
180405	2308	Knox County LF #3	Oneida	Knox	IL	1,256,000	1982	2017	Knox County Landfill Committee	Candidate
580	515	Laidlaw Waste Systems Incorporated		St. Clair	IL	1,699,012	1977	2044	Laidlaw Waste Systems	Candidate
180406	2309	LandComp Landfill	Ottawa	La Salle	IL	1,674,800	1998	2036	LandComp Corporation (Allied Waste Industries)	Candidate
180407	2310	Landfill 33	Effingham	Effingham	IL	1,152,200	1981	2024	Landfill 33 Ltd.	Candidate
166925	1877	Litchfield-Hilsborough LF	Litchfield	Montgomery	IL	2,037,840	1976	2014	Envotech Illinois (Allied Waste Industries)	Candidate
166913	1866	Maryville LF	Des Plaines	Cook	IL	1,000,000			Catholic Charities/Sexton	Candidate
547	482	Multi-County LF	Villa Grove	Douglas	IL	1,307,103	1975	1991		Candidate
166914	1867	Ottawa LF	Ottawa	La Salle	IL	910,000			States Land Improvement	Candidate
543	478	Paxton LF Corporation #2	Chicago	Cook	IL	9,766,782	1978	1992	Stryker International	Candidate
166915	1868	Peoria City/County LF #2	Brimfield	Peoria	IL	1,415,680	1998	2019	Peoria City/County	Candidate
180410	2313	Pike County Landfill	Baylis	Pike	IL	1,862,000	1976	2021	Pike County Landfill, Inc.	Candidate
180411	2314	Prairie Hill RDF	Morrison	Whiteside	IL	1,827,000	1996	2042	Whiteside County	Candidate
166921	1873	RCS - Jerseyville	Jerseyville	Jersey	IL	584,700	1995	2031	RCS, Inc. (Allied Waste Industries)	Candidate
180414	2317	Saline County Landfill	Harrisburg	Saline	IL	1,249,000	1983	2006	Saline County Landfill, Inc.	Candidate
569	504	South Chain of Rocks RDF	Granite City	Madison	IL	5,850,000	1978	2004	WMI	Candidate
555	490	Southern Illinois Regional LF	Desoto	Jackson	IL	1,491,000	1975	2006	Southern Illinois Regional Landfill, Inc. (Allied Waste Industries)	Candidate
180415	2318	Spoon Ridge Landfill	Fairview	Fulton	IL	11,237,000	1993	2046	BFI (Allied Waste Industries)	Candidate
166916	1869	Taylor Ridge LF	Taylor Ridge	Rock Island	IL	4,500,000	1972	1998	ESG Watts	Candidate
166917	1870	Viola LF	Viola	Mercer	IL	900,000	1973	1992	ESG Watts, Inc.	Candidate
180416	2319	Wayne County Landfill	Fairfield	Wayne	IL	1,309,600	1989	2032	Wayne County Landfill, Inc. (Allied Waste Industries)	Candidate
180418	2321	Wheatland Prairie RDF	Plainfield	Will	IL	2,068,400	1988	2001	Waste Management, Inc.	Candidate
180420	2323	Winnebago Reclamation Service	Rockford	Winnebago	IL	10,845,380	1972	2006	Winnebago Reclamation Services, Inc.	Candidate

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600	533	Caldwell LF	Morristown	Shelby	IN	2,437,688	1975	1997	Caldwell	Candidate
602	535	Clark-Floyd LF	Clarksville	Clark	IN	4,033,944	1973	2001	Clark-Floyd	Candidate
609	542	Elkhart County - CR 7 LF	Goshen	Elkhart	IN	2,624,888	1978	2014	Elkhart County	Candidate
611	544	Hancock County LF	Carthage	Hancock	IN	1,500,000	1971	2000	Caldwell's Gravel Company	Candidate
612	545	Hayes LF	Portland	Henry	IN	1,801,536	1975	2001	Hayes Landfill, Inc.	Candidate
614	547	Jay County LF	Portland	Jay	IN	1,770,714	1975	2004	WMI	Candidate
631	562	Medora Landfill	Medora	Jackson	IN	1,594,000	1975	2005	Rumpke Waste Inc.	Candidate
669	599	Northside LF		Boone	IN	3,712,324	1975	1991		Candidate
625	556	Oak Ridge RDF	Logansport	Cass	IN	3,930,000	1986	2026	Indiana Waste Systems	Candidate
599	532	Onyx Blackfoot LF	Winslow	Pike	IN	1,021,300	1988	2030	Onyx Blackfoot LF	Candidate
672	602	Rumpke (Uniontown)	Crothersville	Jackson	IN	1,639,263	1975	1993		Candidate
632	563	Rumpke-Milan LF		Ripley	IN	1,538,482	1975	1995		Candidate
180371	2300	Sycamore Ridge Landfill	Pimento	Vigo	IN	595,000	2003		Republic Services, Inc.	Candidate
638	568	United Refuse LF	Fort Wayne	Allen	IN	7,125,327	1970	2005	National Serv-All, Inc.	Candidate
180371	2281	Victory Environmental Services Landfill	Terre Haute	Vigo	IN	5,000,000	1990	2003	Republic Services, Inc.	Candidate
640	570	Wabash Valley LF	Wabash	Wabash	IN	4,488,770	1975	2018	Republic Services, Inc.	Candidate
644	574	Worthington LF	Worthington	Greene	IN	2,115,000	1982	2015	Republic Services of IN	Candidate
720	650	Finney County LF	Garden City	Finney	KS	1,339,005	1986	2012	Finney County	Candidate
723	653	Harvey County LF	Newton	Harvey	KS	1,511,401	1976	2002	Harvey County	Candidate
734	664	N.R. Hamm LF		Jefferson	KS	1,904,204	1976	2092	N.R. Hamm Quarry	Candidate
713	643	Reno County LF	Hutchinson	Reno	KS	2,624,021	1976	2006	Reno County	Candidate
705	635	Salina County LF	Salina	Saline	KS	2,797,917	1976		City of Salina	Candidate
708	638	Wheatland LF	Columbus	Cherokee	KS	1,514,421	1976		Allied Waste industries, Inc.	Candidate
745	675	BF/IFranklin LF	Frankfort	Franklin	KY	4,142,152	1983	2012	Allied Waste Industries	Candidate
767	697	City of Hopkinsville LF	Hopkinsville	Christian	KY	2,439,142	1960	1997	City of Hopkinsville	Candidate
768	698	City of Owensboro LF	Owensboro	Daviess	KY	2,599,178	1971	1993	City of Owensboro	Candidate
741	671	Cooksey Brothers Disposal Company LF	Ashland	Boyd	KY	4,500,516	1970	2004	Cooksey Brothers Disposal Company, Inc.	Candidate
769	699	Daviess County LF	Owensboro	Daviess	KY	1,900,000	1968	2032	Daviess County	Candidate
748	678	Dozit Company Landfill	Morganfield	Union	KY	1,235,835	1982	2001	Dozit Company, Inc. (Republic Services, Inc.)	Candidate
754	684	Epperson Waste Disposal Company LF	Williamstown	Grant	KY	1,857,438	1992	2050	Epperson Waste Disposal (Republic Services, Inc.)	Candidate
750	680	Glasgow Regional Landfill	Glasgow	Barren	KY	1,414,608	1971	2031	City of Glasgow	Candidate
755	685	Local Sanitation LF	Morehead	Rowan	KY	782,676	1973	2026	Local Sanitation, Inc.	Candidate
180229	2158	Maysville/Mason County LF	Maysville	Mason	KY	1,500,000	1981	2070	Mason County	Candidate
180147	2091	Perry County	Hazard	Perry	KY		1986	1992	Perry County Fiscal Court	Candidate
759	689	Pulaski Grading LF	Jeffersonville	Pulaski	KY	1,255,031	1980	2012	Pulaski Grading, Inc.	Candidate
749	679	Rumpke/Montgomery County LF	Jeffersonville	Montgomery	KY	1,266,307	1972	2012	Rumpke Waste, Inc.	Candidate
752	682	Rumpke/Pendleton County LF	Butler	Pendleton	KY	1,423,548	1970		Rumpke Waste, Inc.	Candidate
764	694	Southern Sanitation LF		Logan	KY	2,000,000	1973	2020	Waste Management, Inc.	Candidate
760	690	Tri-K Landfill, Inc.	Stanford	Lincoln	KY	3,502,499	1971	2032	Republic Services, Inc.	Candidate
740	670	Valley View LF	Sulphur	Henry	KY	4,664,272	1986	2030	Republic Industries, Inc.	Candidate
761	691	Williams LF	Taylorsville	Spencer	KY	1,295,153	1973	2022	Williams Sanitation Service	Candidate

743	673	WMI/Lexington-Fayette LF	Fayette	KY	5,691,119	1976	1999	Waste Management of Kentucky, Inc.	Candidate
790	720	Colonial LF	Ascension	LA	1,609,759	1973	2007	Allied Waste Industries	Candidate
802	732	Greater New Orleans LF	Jefferson	LA	3,066,630	1969	1999	Southern Recovery Management, Inc.	Candidate
782	712	Jefferson Davis Parish Sanitary Landfill	Jefferson Davis	LA	3,723,948	1988	2025	Jefferson Davis Parish Sanitary Landfill Commission	Candidate
795	725	Jefferson Parish LF	Jefferson	LA	7,153,000	1982	2020	Jefferson Parish	Candidate
779	709	Lasalle-Grant Parish Landfill	La Salle	LA	257,455	1986		IESI, Inc.	Candidate
777	707	Magnolia Sanitary Landfill	Ouachita	LA	3,600,000	1985	2026	Waste Management of Louisiana, LLC	Candidate
803	733	N. Dugas LF	Lafayette	LA	2,000,000	1980	1988	City of Lafayette	Candidate
800	730	North Landfill	East Baton Rouge	LA	5,564,250	1993	2045	City of Baton Rouge/Parish of East Baton Rouge	Candidate
180379	2289	River Birch Landfill	Jefferson	LA	3,300,000			River Birch, Inc.	Candidate
784	714	St. Landry Parish LF	St. Landry	LA	1,000,000	1985	2032	St. Landry Parish Solid Waste Commission	Candidate
787	717	Tangipahoa Regional LF	Tangipahoa	LA	1,000,000	1988		Tangipahoa Parish Police Jury	Candidate
786	716	Woodside LF & Recycling Center	Livingston	LA	1,126,745	1987	2088	Waste Management, Inc.	Candidate
844	774	Bourne LF	Barnstable	MA	1,000,000	1968	2012	Town of Bourne	Candidate
846	776	Dartmouth LF	Plymouth	MA	1,259,650	1942	1995	Town of Dartmouth	Candidate
870	800	South Meadow Road LF	Middlesex	MA	1,500,000	1988	1988	Town of Clinton	Candidate
804	734	Alpha Ridge SLF	Howard	MD	3,518,784	1980	2008	Howard County	Candidate
808	738	Central SLF	Worcester	MD	900,000	1990	2065	Worcester County	Candidate
815	745	Eastern SLF	Baltimore	MD	3,800,000	1982	2050	Baltimore County	Candidate
817	747	Fort Meade SLF	Anne Arundel	MD	1,074,376	1976	2015		Candidate
812	742	Hog Hill/Central SLF	Cecil	MD	1,286,642	1978	2046	Cecil County	Candidate
824	754	Millersville SLF	Anne Arundel	MD	6,300,000	1975	2038	Anne Arundel County	Candidate
826	756	Newland Park SLF	Wicomico	MD	2,765,002	1955	2045		Candidate
180398	759	Oaks SLF	Montgomery	MD	6,874,060	1982	1997	Montgomery County	Candidate
833	763	Quarantine Road SLF	Baltimore City	MD	7,640,000	1983	2014	Baltimore City Bureau of Solid Waste	Candidate
834	764	Reichs Ford SLF	Frederick	MD	3,400,000	1969	2017	Board of County Commissioners	Candidate
835	765	Resh Road II SLF	Washington	MD	2,055,978	1982	2001	Washington County	Candidate
837	767	Saint Andrews SLF	St. Mary's	MD	2,250,266	1960	2007	St. Mary's County	Candidate
180338	2250	Crossroads LF	Somerset	ME	2,500,000	1985	2013	WMI	Candidate
180342	2254	Hatch Hill LF	Kennebec	ME	677,167	1991	2015	City of Augusta	Candidate
180347	2259	Pinetree LF	Penobscot	ME	2,820,619	1976	2017	Casella Waste Systems, Inc.	Candidate
180320	2232	Central Sanitary LF	Montcalm	MI	1,620,000		2048	Allied Waste Industries	Candidate
180330	2242	City of Midland Sanitary LF	Midland	MI	1,100,000	1963	2055	City of Midland Utilities Dept.	Candidate
180325	2237	Kent County- South Kent LF	Kent	MI	2,850,000	1987	2030	Kent County	Candidate
180327	2239	Michigan Environs, Inc.	Menominee	MI	1,500,000	1995	2029		Candidate
167075	1990	Muskegon DPW Type II Landfill	Muskegon	MI	1,360,000	1980	2014	Muskegon County	Candidate
180328	2240	Northern Oaks Recycling & Disposal Facility	Clare	MI	1,260,000	1992	2050		Candidate

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167076	1991	Saginaw Valley Landfill	Saginaw	MI	1,440,000	1982	2000	WMI	Candidate
180274	2195	Smith's Creek LF	Smiths Creek	St. Clair	MI	2,880,000	1967	St. Clair County	Candidate
167077	1992	Southeast Berrien County Landfill	Buchanan	Berrien	MI	2,794,000	1973	Southeast Berrien County Authority	Candidate
166946	1896	Whitewater Landfill	Pinconning	Bay	MI	1,868,900	1991	Republic Services, Inc.	Candidate
880	810	Blue Earth County	Mankato	Blue Earth	MN	1,165,560	1973	Ponderosa of Blue Earth County	Candidate
884	814	Crow Wing County SLF (new)	Brainerd	Crow Wing	MN	337,671	1992		Candidate
888	818	Kandiyohi County SLF	New London	Kandiyohi	MN	1,300,000	1970		Candidate
875	805	Louisville		Scott	MN	1,125,000	1968		Candidate
892	822	Rice County SLF	Dudas	Rice	MN	1,555,267	1970		Candidate
167078	1993	Spruce Ridge Landfill	Glencoe	McLeod	MN	2,920,000	1973	WMI	Candidate
877	807	Woodlake SLF	Hamel	Hennepin	MN	2,100,000	1971	Minnesota Pollution Control Agency	Candidate
897	827	Black Oak Recycling & Disposal SLF	Hartville	Wright	MO	1,994,000	1992	Hartville Sanitary Landfill	Candidate
898	828	Butler County SLF	Poplar Bluff	Butler	MO	1,950,000	1979	Allied Waste Industries	Candidate
899	829	Central Missouri SLF	Sedalia	Pettis	MO	1,417,442	1975	WMI	Candidate
900	830	City of Columbia SLF	Columbia	Boone	MO	1,600,000	1986	City of Columbia	Candidate
905	835	Jefferson City Sanitary Landfill	Jefferson City	Cole	MO	1,600,000	1979	Allied Waste Industries Inc.	Candidate
977	907	Joplin Sanitary Landfill	Joplin	Jasper	MO	1,324,368	1974	Joplin City Hall	Candidate
906	836	Lee's Summit SLF	Lees Summit	Jackson	MO	1,423,910	1982	City of Lee's Summit	Candidate
908	838	Lemonis SLF, incorporated	Dexter	Stoddard	MO	1,200,000	1994	Allied Waste Industries Inc.	Candidate
918	848	Missouri Pass SLF	Maryland Heights	St. Louis	MO	11,939,306	1976	Allied Waste Industries	Candidate
910	840	Newton-McDonald County SLF	Joplin	Newton	MO	900,500	1975	Newton-McDonald LF Board	Candidate
911	841	Northside SLF	Washington	Franklin	MO	900,000	1989	Allied Waste Industries Inc.	Candidate
962	892	Onyx Maple Hill Landfill	Macon	Macon	MO	833,524	1976	Onyx Maple Hill Landfill	Candidate
904	834	Prairieview Landfill	Lamar	Barton	MO	5,889,917	1977	Allied Waste Industries	Candidate
914	844	Show Me Regional SLF	Warrensburg	Johnson	MO	1,017,600	1992	Allied Waste Industries	Candidate
915	845	Southeast SLF	Kansas City	Jackson	MO	8,071,606	1974	Allied Waste (old LWS)	Candidate
916	846	Springfield SLF	Springfield	Greene	MO	3,600,000	1974	City of Springfield	Candidate
958	888	St. Francois County SLF	Park Hills	St. Francois	MO	894,820	1974	St. Francois Environmental Corporation	Candidate
917	847	St. Joseph City SLF	St. Joseph	Buchanan	MO	2,995,346	1978	City of St. Joseph	Candidate
919	849	Washington County SLF	Mineral Point	Washington	MO	1,091,900	1980	Washington County	Candidate
921	851	West Lake SLF	Bridgeton	St. Louis	MO	9,692,739	1976	Allied Waste	Candidate
167034	1952	Big River Landfill	Leland	Washington	MS	3,500,000	1987	BFI Waste Systems of North America, Inc. (Allied Waste Industries)	Candidate
180213	2144	Central Landfill (New)	McNeill	Pearl River	MS	562,201	1999	Trans American Waste Central Landfill, Inc.	Candidate
167039	1957	Clearview Environmental Control Facility	Lake	Scott	MS	1,538,740	1991	Chambers of Mississippi, Inc. (Waste Management, Inc.)	Candidate
167040	1958	Golden Triangle Regional Landfill	Starkville	Clay	MS	725,000	1996	Golden Triangle Regional Solid Waste Management Authority	Candidate
167043	1961	Little Dixie Landfill	Ridgeland	Madison	MS	12,000,000	1979	BFI Waste Systems of North America, Inc. (Allied Waste Industries)	Candidate

167045	1963	Pecan Grove Sanitary Landfill	Pass Christian	Harrison	MS	4,009,297	1981	2022	Waste Management of Mississippi, Inc.	Candidate
167046	1964	Pine Belt Regional Landfill	Ovett	Perry	MS	752,000	1997	2019	Pine Belt Regional Solid Waste Management Authority	Candidate
167047	1965	Pine Ridge Sanitary Landfill	Meridian	Lauderdale	MS	1,754,865	1988	2034	Waste Management of Mississippi, Inc.	Candidate
167048	1966	Plantation Oaks Sanitary Landfill	Sibley	Adams	MS	1,005,696	1989	2053	Waste Management of Mississippi, Inc.	Candidate
167049	1967	Prairie Bluff Sanitary Landfill	Houston	Chickasaw	MS	3,465,834	1987	2161	Waste Management of Mississippi, Inc.	Candidate
167050	1968	Three Rivers Regional Landfill	Pontotoc	Pontotoc	MS	1,471,872	1995	2043	Three Rivers Regional Solid Waste Management Authority	Candidate
167051	1969	Tunica County Landfill	Robinsonville	Tunica	MS	744,600	1998	2020	Trash Hunters of Tunica, Inc. (USA Waste Services, Inc.)	Candidate
167074	1989	City of Bozeman Landfill	Bozeman	Gallatin	MT	945,000	1969	2003	City of Bozeman	Candidate
180377	2287	Flathead County Solid Waste District Central Landfill	Kalispell	Flathead	MT	1,000,000	1972	2028	Flathead County Solid Waste District	Candidate
180207	2140	High Plains Disposal Landfill	Great Falls	Cascade	MT	6,665,766	1980	2100	Montana Waste Systems	Candidate
180206	2139	Missoula Landfill	Missoula	Missoula	MT	3,900,000	1968	2019	BFI Waste Systems of North America	Candidate
1115	1042	Alleghany County LF	Sparta	Alleghany	NC	237,899	1981	2001	Alleghany County	Candidate
1118	1045	Ashe County	Crumpler	Ashe	NC	438,069	1972	1999		Candidate
1124	1051	Brunswick County LF	Bolivia	Brunswick	NC	1,063,573	1983	1999		Candidate
180210	2142	Buncombe County LF (New)	Alexander	Buncombe	NC	850,000	1997	2031	Buncombe County	Candidate
1127	1054	Cabarrus County LF	Concord	Cabarrus	NC	1,368,822	1974	2008	Cabarrus County	Candidate
1128	1055	Caldwell County Mt. Herman Landfill	Hudson	Caldwell	NC	1,214,795	1977	1999	Caldwell County	Candidate
1135	1062	City of Albemarle LF	Albemarle	Stanly	NC	1,523,736	1973	2007	City of Albemarle	Candidate
1142	1069	Cleveland County LF	Shelby	Cleveland	NC	1,135,140	1970	2010	Cleveland County	Candidate
1147	1074	CRSWMA-Interim Regional LF	New Bern	Craven	NC	1,300,000	1993	2001	Coastal Regional Solid Waste Management Authority	Candidate
1150	1077	Davidson County LF	Lexington	Davidson	NC	856,860	1994		Davidson County	Candidate
1153	1080	East Carolina Regional LF	Aulander	Bertie	NC	3,272,685	1993	2035	Republic Services, Inc.	Candidate
1155	1082	Edgecombe County LF	Tarboro	Edgecombe	NC	1,870,499	1971	2007	Edgecombe County	Candidate
1157	1084	Gaston County LF	Dallas	Gaston	NC	1,634,228	1986	2004	Gaston County	Candidate
1163	1090	Harnett County LF	Dunn	Harnett	NC	1,154,018	1976	2017	Harnett County	Candidate
1172	1098	Iredell County LF	Statesville	Iredell	NC	2,280,900	1993	2030	Iredell County	Candidate
1173	1099	Jackson County	Dillsboro	Jackson	NC	419,054	1974	1996		Candidate
1174	1100	Johnston County LF	Smithfield	Johnston	NC	1,780,000	1973		Johnston County	Candidate
1177	1103	Lenoir County LF	La Grange	Lenoir	NC	1,200,000	1981	1998		Candidate
1187	1113	New Hanover County LF	Wilmington	New Hanover	NC	1,500,000	1981	2050	New Hanover County	Candidate
180277	1915	Newton LF	Newton	Catawba	NC	1,600,000	1981	1989	Catawba County	Candidate
1190	1116	Orange Regional Landfill	Chapel Hill	Orange	NC	1,600,000	1972	2009	Orange County	Candidate
1195	1121	Piedmont SLF	Kernersville	Forsyth	NC	959,464	1995	2016	WMI	Candidate
1201	1127	Robeson County LF	St. Pauls	Robeson	NC	1,009,134	1982	2012		Candidate
1202	1128	Rockingham County LF	Madison	Rockingham	NC	1,357,483	1972	1995	Rockingham County	Candidate

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1206	1132	Sampson County LF	Roseboro	Sampson	NC	3,000,000	1974	2001	Allied Waste Industries, Inc.	Candidate
1206	2336	Sampson County LF #2	Roseboro	Sampson	NC	2,780,000	2000	2030	Sampson County Disposal (Waste Industries)	Candidate
1210	1136	Surry County LF 1	Mt. Airy	Surry	NC	1,243,631	1972	2002	Surry County	Candidate
1216	1142	Union County LF	Union	Union	NC	30,000	2002		Republic Services, Inc.	Candidate
180282	2199	Upper Piedmont Environmental Landfill	Rougemont	Person	NC	1,000,000	1994	2030	Republic Services	Candidate
1217	1143	US Army Fort Bragg	Fort Bragg	Cumberland	NC	763,800	1981	2002		Candidate
1218	1144	US Marine Corps Camp Lejeune	Jacksonville	Onslow	NC	1,299,515	1972	1998	U.S. Marine Corps	Candidate
1184	1110	Uwharrie Environmental Regional LF	Mount Gilead	Montgomery	NC	3,600,000	1980	2019	Republic Services, Inc.	Candidate
180285	2201	Watauga County	Boone	Watauga	NC		1950	1994	Watauga County	Candidate
1224	1150	Wayne County LF	Dudley	Wayne	NC	2,416,380	1973	2033	Wayne County	Candidate
1226	1152	Wilkes County LF 1	Wilkesboro	Wilkes	NC	1,127,341	1972	1993	Wilkes County	Candidate
1230	1156	Wilkes County LF 2	Roaring River	Wilkes	NC	500,000	1993		Wilkes County	Candidate
1227	1153	Wilson County LF	Wilson	Wilson	NC	2,080,436	1975	1997	Wilson County	Candidate
180395	2302	City of Grand Forks Landfill	Grand Forks	Grand Forks	ND	2,600,000	1974	2008	City of Grand Forks	Candidate
6438	1759	Community Refuse Disposal, Incorporated - Fremont	Fremont	Dodge	NE	1,106,263	1965	1993	Allied Waste Industries/Community Refuse Disposal	Candidate
6427	1748	L.P. Gill LF	Jackson	Dakota	NE	2,292,240	1981	2060	L.P. Gill	Candidate
6433	1754	Lincoln Bluff Road LF	Lincoln	Lancaster	NE	3,039,054	1998	2022	City of Lincoln	Candidate
170809	2058	Norfolk Landfill	Norfolk	Madison	NE				Allied Waste Industries	Candidate
6436	1757	Sarpy County LF	Papillion	Sarpy	NE	1,320,587	1990	2008	Sarpy County	Candidate
180315	2231	Atlantic County Utilities Authority Landfill	Egg Harbor Township	Atlantic	NJ	900,000	1992	2018	Atlantic County Utilities Authority	Candidate
1013	942	Cumberland County SLF	Deerfield	Cumberland	NJ	2,970,590	1985	2021	Cumberland County	Candidate
1014	943	Gloucester County SLF	Woodbury	Gloucester	NJ	2,889,947	1985	2010	Gloucester County	Candidate
1023	952	Pennsauken LF	Pennsauken	Camden	NJ	3,011,986		2013	Pollution Control Financing Auth. of Camden County	Candidate
1026	955	Towanda Electric Facility			NJ	1,000,000			Browning Ferris Industries	Candidate
180105	2062	Cerro Colorado LF	Albuquerque	Bernalillo	NM	3,700,000	1990	2020	City of Albuquerque	Candidate
101849	1793	Las Vegas-New Mexico Landfill	Las Vegas-New Mexico	San Miguel	NM	1,000,000		1999	City of Las Vegas-New Mexico	Candidate
180134	2061	Los Angeles LF	Albuquerque	Bernalillo	NM	2,800,000	1978	1983	City of Albuquerque	Candidate
1000	930	Apex Regional LF	Apex	Clark	NV	5,211,913	1993	2093	Republic Services, Inc.	Candidate
1007	936	Boulder City LF	Boulder City	Clark	NV	2,319,518	1930	2017	Boulder Disposal Company	Candidate
1003	932	Elko City LF	Elko	Elko	NV	1,528,208	1953	2024	Elko City	Candidate
1001	931	Lockwood LF	Sparks	Washoe	NV	9,200,000	1987	2092	Waste Management, Inc.	Candidate
1006	935	Ormsby SLF	Carson City	Carson City	NV	5,276,832	1965	2012	City of Carson City	Candidate
1080	1008	Auburn SLF #1	Auburn	Cayuga	NY	700,000	1978	1993	City of Auburn	Candidate
1081	1009	Auburn SLF #2	Auburn	Cayuga	NY	756,000	1992	2010	City of Auburn	Candidate
1096	1024	Austro Brothers LF	Middlegrove	Saratoga	NY	1,406,308	1972	1994	Austro Brothers, Inc.	Candidate
1059	987	Chaffee (CID) LF	Sardinia	Erie	NY	4,026,200	1958	2005	WMI	Candidate
1058	986	Chemung County SWMD SLF	Elmira	Chemung	NY	1,500,000	1973	2032	Chemung County SWMD	Candidate
1071	999	Clinton County Landfill	Morrisville	Clinton	NY	1,500,000	1972	2030	Clinton County	Candidate

1061	989	DANC/Solid Waste Management Facility (Rodman)	Rodman	Jefferson	NY	1,500,000	1992	2018	Development Authority of the North County (DANC)	Candidate
1055	983	Delaware County LF	Walton	Delaware	NY	795,236		2014	Delaware County Department of Public Works	Candidate
1062	990	Ellery SLF	Ellery	Chautauqua	NY	3,200,000	1981	2016	Chautauqua County	Candidate
1075	1003	Formso SLF	Perry	Wyoming	NY	2,000,000	1960	1992	Formso, Incorporated	Candidate
1056	984	Fulton County LF	Johnstown	Fulton	NY	998,486	1989	2069	Fulton County	Candidate
1063	991	Haverstraw SLF	Fairport	Rockland	NY	1,200,000	1970	1996	Rockland County	Candidate
167084	1999	High Acres Landfill #2	Fairport	Monroe	NY	2,000,000	1971	2006	WMI	Candidate
167082	1997	Hyland LF	Angelica	Allegany	NY	500,000	1998		Casella Waste Systems, Inc.	Candidate
167083	1998	Madison County Landfill	Lincoln	Madison	NY	1,260,000	1974	2024	Madison County	Candidate
1064	992	Mill Seat LF	Bergen	Monroe	NY	1,200,000	1993	2003	Monroe County D.E.S.	Candidate
1073	1001	Niagara Recycling Facility	Niagara Falls	Niagara	NY	2,633,473	1970		Niagara County	Candidate
1051	979	North Sea LF	North Sea	Suffolk	NY	1,102,714	1963	1995	Town of Southampton	Candidate
1067	995	Sullivan County LF	Thompson	Sullivan	NY	1,359,000	1994	2008	Sullivan County	Candidate
166419	1841	Tonawanda Landfill	Tonawanda	Erie	NY	1,000,000			Allied Waste Industries	Candidate
1060	988	Town of Colonie SLF	Cohoes	Albany	NY	3,112,000	1970	2020	Town of Colonie	Candidate
180240	2163	Town of Lake George Landfill	Lake George	Warren	NY	403,000	1960	1991	Village of Lake George	Candidate
1235	1161	Athens-Hocking Reclamation Center	Nelsonville	Athens	OH	1,200,000	1983	2080	Kilbarger Construction, Inc.	Candidate
180331	2243	AWS Mahoning LF	New Springfield	Mahoning	OH	1,228,735	1969	2015	Waste Management, Inc.	Candidate
1273	1199	Bigfoot Run SLF	Morrow	Warren	OH	10,107,852	1970	1996	Allied Waste Industries	Candidate
1237	1163	Brown County Landfill	Georgetown	Brown	OH	2,784,000	1966	2010	Rumpke Waste, Inc.	Candidate
166948	1898	Celina Sanitary Landfill	Celina	Mercer	OH	684,000	1971	2005	Allied Waste Industries	Candidate
180336	2248	Central Wastes, Inc. LF	Alliance	Mahoning	OH	1,053,492	1967	2006	Allied Waste Industries	Candidate
1239	1165	City of East Liverpool LF	East Liverpool	Columbiana	OH	1,037,357	1960	2012	East Liverpool LF, Inc.	Candidate
1278	1204	County Environmental - Wyandot LF	Carey	Wyandot	OH	3,700,000	1968	2033	Allied Waste Industries	Candidate
1270	1196	Countywide Recycling & Disposal LF	East Sparta	Stark	OH	8,238,436	1968		Republic Services, Inc.	Candidate
1240	1166	Crawford County Sanitary LF	Bucyrus	Crawford	OH	1,562,265	1969	2011	Crawford County Board of Commissioners	Candidate
1245	1171	Defiance County LF	Defiance	Defiance	OH	1,320,000	1971	2008		Candidate
1246	1172	Erie County SLF	Huron	Erie	OH	2,920,000	1969	2040	Erie County	Candidate
1247	1173	Fairfield Sanitary LF	Amanda	Fairfield	OH	3,014,323	1981		WMI	Candidate
1249	1175	Franklin County SLF	Grove City	Franklin	OH	7,632,104	1985	2030	Solid Waste Authority of Central Ohio	Candidate
1233	1159	Geneva Landfill	Geneva	Ashtabula	OH	1,927,180	1978	2008	WMI	Candidate
1253	1179	Hancock County Sanitary LF	Findlay	Hancock	OH	2,295,000	1969	2068	Hancock County Commissioners	Candidate
1260	1186	Hoffman Road Sanitary LF	Toledo	Lucas	OH	5,416,000	1975	2026	City of Toledo	Candidate
1256	1182	Huron County LF	Willard	Huron	OH	1,464,341	1969	2008	Huron County Commissioners	Candidate
1272	1198	Kimble Sanitary LF	Dover	Tuscarawas	OH	11,739,500	1950	2027	Kimble Clay & Limestone Company	Candidate
1257	1183	Lake County Solid Waste LF	Painesville	Lake	OH	3,742,878	1973	2017	Lake County	Candidate
1274	1200	Mt. Eaton East LF	Navarre	Wayne	OH	3,484,027	1978	2001	Norton Environmental Company	Candidate
180333	2245	Noble Road LF	Shiloh	Richland	OH	1,440,000	1997	2026	Allied Waste Systems	Candidate
1264	1190	Pike Sanitation LF	Waverly	Pike	OH	1,438,000	1987	2062	Pike Sanitation Company	Candidate
180337	2249	Pine Grove Regional Facility LF	Amanda	Fairfield	OH	1,544,082	1997	2050	Republic Services, Inc.	Candidate

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1243	1169	Royalton Road Sanitary LF	Broadview Heights	Cuyahoga	OH	5,627,995	1969	2030	Norton Environmental Company	Candidate
180334	2246	RWS Beech Hollow LF	Wellston	Jackson	OH	1,600,000	1995	2072	Rumpke	Candidate
1275	1201	Williams County LF	Bryan	Williams	OH	2,362,036	1969	2075	Allied Waste	Candidate
180335	2247	WMI Suburban R&D LF	Glenford	Perry	OH	5,088,000	1992	2018	Waste Management, Inc.	Candidate
1277	1203	Wood County Landfill	Bowling Green	Wood	OH	858,259	1972	2014	Wood County Solid Waste District	Candidate
1304	1229	51 B LF		Wagoner	OK	3,736,131	1988		Allied Waste Industries	Candidate
1303	1228	Broken Arrow LF	Broken Arrow	Wagoner	OK	3,736,131	1976	1998	Allied Waste Industries	Candidate
1295	1221	Canadian County SWDA LF	El Reno	Canadian	OK	1,800,000	1974	2053	Canadian County	Candidate
1302	1227	East Oak SLF/Mosley Road LF	Oklahoma City	Oklahoma	OK	6,589,455	1986	2003	WMI	Candidate
1297	1223	Enid Municipal LF	Enid	Garfield	OK	2,392,871	1987	2017	City of Enid	Candidate
1296	1222	Lawton LF	Lawton	Comanche	OK	2,950,368	1971	2012	City of Lawton	Candidate
1305	1230	Longview Waste Systems LF	Alex	Grady	OK	1,849,055	1987	2000	Waste Management Inc.	Candidate
1309	1234	Muskogee Community LF	Muskogee	Muskogee	OK	2,093,541	1987	2002	Waste Management Inc.	Candidate
180203	2136	Osage Landfill	Bartlesville	Washington	OK	1,000,000	1981	2044	Waste Connections, Inc.	Candidate
1307	1232	Pottawatomie County LF	Shawnee	Pottawatomie	OK	1,526,225	1984	2009	Allied Waste Industries	Candidate
1311	1236	Quarry LF	Tulsa	Tulsa	OK	4,354,126	1989	2012	WMI	Candidate
1299	1225	Southern OK Regional Disposal LF	Ardmore	Carter	OK	1,195,397	1979	2002	Southern Oklahoma Regional Disposal, Inc.	Candidate
180204	2137	Southern Plains Landfill	Alex	Grady	OK	1,201,200	1987	2030	Waste Connections, Inc.	Candidate
1316	1241	Columbia Ridge LF	Arlington	Gilliam	OR	20,000,000	1990	2060	WM Disp. Services of OR	Candidate
180125	2073	Dry Creek Landfill	Medford	Jackson	OR	1,650,000	1972	2048	Waste Connections	Candidate
1317	1242	Finley Buttes Regional Landfill	Boardman	Morrow	OR	4,000,000	1990	2060	Waste Connections	Candidate
1314	1239	Klamath Falls LF	Bonanza	Klamath	OR	1,000,000	1911	2001	Klamath County	Candidate
1313	1238	Knott Pit LF	Bend	Deschutes	OR	700,000	1972	2008	Deschutes County	Candidate
1315	1240	Northern Wasco County LF	The Dalles	Wasco	OR	1,600,000	1972	2075	Waste Connections	Candidate
1320	1245	Roseburg LF	Roseburg	Douglas	OR	1,200,000	1975	2021	Douglas County Southwest Administration	Candidate
1351	1276	Arden LF	Washington	Washington	PA	2,347,954	1920	2008	WMI	Candidate
1368	1293	Bethlehem LF	Bethlehem	Northampton	PA	3,115,000			IESI, Inc.	Candidate
1345	1270	Blue Ridge Landfill	Chambersburg	Franklin	PA	5,500,000		2028	IESI, Inc.	Candidate
1328	1253	Chrin Brothers LF	Easton	Northampton	PA	5,000,000	1961	2011	Chrin Brothers, Inc.	Candidate
1369	1294	Commonwealth Environmental Systems (CES) LF	Hegins	Schuylkill	PA	2,500,000	1997	2008	DeNaples Brothers	Candidate
1364	1289	County LF	Clarton	Clarton	PA	\$29,812	1990	2007	Allied Waste Industries	Candidate
1335	1260	Cumberland County LF	Newburg	Cumberland	PA	4,000,000		2007	WSI International	Candidate
1337	1262	Frey Farm LF	Crestwell	Lancaster	PA	3,300,000	1986	2050	Lancaster County Solid Waste Management Authority	Candidate
1353	1278	Imperial LF	Imperial	Allegheny	PA	8,400,000	1950	2023	Allied Waste Industries	Candidate
1370	1295	Kelly Run SLF	Elizabeth	Allegheny	PA	7,187,741		2023	WMI	Candidate
1367	1292	Northwest SLF	West Sunbury	Butler	PA	2,000,000	1991	2002	WMI	Candidate
1352	1277	Onyx Chestnut Valley Landfill	McClellandtown	Fayette	PA	570,000	1985	2003	Onyx CBF, Inc. LF	Candidate
1332	1257	Pine Grove LF	Pine Grove	Schuylkill	PA	2,000,000		2005	WMI	Candidate

167019	1263	Pioneer Crossing LF	Birdsboro	Berks	PA	5,100,000	1975	2018	J.P. Mascaro & Sons	Candidate
1325	1250	Secra LF	West Grove	Chester	PA	1,000,000	1986	2009	Southeastern Chester County Refuse Authority	Candidate
1373	1298	Seneca Landfill	Evans City	Butler	PA	3,000,001	1995	2002	Vogel Disposal Service Incorporated	Candidate
1357	1282	Shade LF (RCC LF)	Cairnbrook	Somerset	PA	3,500,000	1992	2012	WMI	Candidate
166422	1843	South Hills Landfill	Library	Allegheny	PA	1,500,000		2040	WMI	Candidate
1376	1301	Vogel Disposal Service Incorporated	Mars	Butler	PA				Vogel Disposal Services Incorporated	Candidate
166423	1844	Westmoreland Waste Landfill	Greensburg	Westmoreland	PA	1,000,000			Westmoreland County	Candidate
167001	1930	Cagey LF	Cagey		PR	1,000,000			Commonwealth of Puerto Rico	Candidate
167002	1931	Fajardo LF	Fajardo	Fajardo	PR	1,000,000			Commonwealth of Puerto Rico	Candidate
167003	1932	Guaynabo LF	Guaynabo	Guaynabo	PR	1,100,000			Commonwealth of Puerto Rico	Candidate
167004	1933	Majaquez LF	Majaquez		PR	1,000,000			Commonwealth of Puerto Rico	Candidate
167005	1934	San Juan LF	San Juan	San Juan	PR	5,000,000	1965		Commonwealth of Puerto Rico	Candidate
167006	1935	Toa Baja LF	Toa Baja	Toa Baja	PR	1,000,000			Commonwealth of Puerto Rico	Candidate
167138	2051	Anderson Regional Landfill	Belton	Greenville	SC	1,260,000	1973	2019	Allied Waste Industries	Candidate
180159	2098	Bees Ferry Road LF	Johns Island	Charleston	SC	2,300,000	1977	2006	Charleston County	Candidate
166977	1921	Berkeley County LF	Moncks Corner	Berkeley	SC	1,215,200	1975	2000	Berkeley County Water and Sanitation Authority	Candidate
180170	2109	Berkeley County Subtitle D LF	Moncks Corner	Berkeley	SC	467,700	2000	2020	Berkeley County Water and Sanitation Authority	Candidate
166974	1919	Camp Croft LF	Spartanburg	Spartanburg	SC	1,100,000	1972	1997	County of Spartanburg	Candidate
180156	2095	Cherokee County Landfill	Gaffney	Cherokee	SC	2,400,000	1972	1998	Allied Waste Industries, Inc.	Candidate
180215	2145	Enoree LF	Greer	Greenville	SC				Greenville County	Candidate
166427	1848	Enoree LF Phase II	Greer	Greenville	SC	2,800,000	1995	2005	Greenville County	Candidate
166429	1849	Georgetown County Landfill	Georgetown	Georgetown	SC	971,000	1977	1998	Georgetown County Public Works Dept.	Candidate
180176	2115	Greenwood County Subtitle D LF	Greenwood	Greenwood	SC	710,899	1993	2043	Greenwood County Public Works	Candidate
166968	1913	Greenwood Landfill	Greenwood	Greenwood	SC	752,734	1970	1993	Greenwood County Public Works	Candidate
180157	2096	Hickory Hill MSWLF	Ridgeland	Jasper	SC	2,867,263	1997	2025	Waste Management, Inc.	Candidate
180178	2117	Kershaw County	Camden	Kershaw	SC	1,048,021	1978	2000	Kershaw County	Candidate
180185	2124	Northeast Sanitary Landfill	Eastover	Richland	SC	1,987,890	1988	2035	Allied Waste Industries	Candidate
167085	2000	Oakridge Landfill Inc.	Dorchester	Dorchester	SC	3,183,595	1987	2019	WMI	Candidate
180161	2100	Orangeburg County Landfill	Orangeburg	Orangeburg	SC	1,093,022	1972	1996	Orangeburg County	Candidate
180158	2097	Pendleton Sanitary Landfill	Pendleton	Anderson	SC	600,000	1973	1993	Anderson County	Candidate
166434	1854	Screaming Eagle Road LF	Elgin	Richland	SC	15,250,000	1971	2023	WMI	Candidate
180182	2121	Seneca MSWLF	Seneca	Oconee	SC	749,266	1945	1998	Oconee County	Candidate
180158	2130	Starr Sanitary Landfill	Starr	Anderson	SC	1,120,000	1973	1993	Anderson County	Candidate
180166	2105	Three Rivers Regional Subtitle D MSWLF	Jackson	Aiken	SC	900,000	1998	2050	Three Rivers Solid Waste Authority	Candidate
166973	1918	Wellford LF	Spartanburg	Spartanburg	SC	1,824,500	1977	2008	County of Spartanburg	Candidate
166971	1916	York County LF	York	York	SC	2,955,847	1960	1998	York County	Candidate
180387	2294	City of Sioux Falls Sanitary Landfill	Sioux Falls	Minnehaha	SD	3,410,463	1979	2040	City of Sioux Falls	Candidate

180427	2331	Rapid City Landfill	Rapid City	Pennington	SD	3,000,000	1960	2053	City of Rapid City	Candidate
1402	1326	Alcoa/ Maryville/ Blount County Landfill	Friendsville	Blount	TN	2,535,096	1974	2015	City of Alcoa, City of Maryville, Blount County	Candidate
1403	1327	BFI North Shelby LF	Millington	Shelby	TN	5,500,000	1988	2052	Allied Waste Industries	Candidate
1516	1440	BFI Twin Oaks LF	Knoxville	Knox	TN	1,670,000	1981	1993	Allied Waste Industries	Candidate
1408	1332	Bi-County LF	Clarksville	Montgomery	TN	1,000,000	1974	2010	Bi-County Solid Waste System	Candidate
1413	1337	Bradley County LF	McDonald	Bradley	TN	1,595,853	1972	2010	Bradley County	Candidate
1528	1452	Carter Valley Landfill	Church Hill	Hawkins	TN	3,400,000	1983	2039	Allied Waste Industries	Candidate
1419	1343	Cedar Ridge LF	Lewisburg	Marshall	TN	2,500,000	1990	2013	Waste Management	Candidate
1464	1388	Iris Glen Environmental Center	Johnson City	Washington	TN	2,358,439	1994	2024	Johnson City Solid Waste	Candidate
1466	1390	Jefferson County LF	Dandridge	Jefferson	TN	1,065,797	1972	2032	Jefferson County	Candidate
1404	1328	Northwest Tennessee Landfill	Union City	Obion	TN	2,000,000	1995	2015	Republic Services, Inc.	Candidate
1509	1433	Shelby County Millington LF	Millington	Shelby	TN	2,300,000	1979	1989	Shelby County	Candidate
180375	1437	Summitt LF	Ooltewah	Hamilton	TN	7,300,000	1976	1999	City of Chattanooga	Candidate
1463	1387	West Camden Sanitary Landfill	Camden	Benton	TN	1,200,000	1994	2007	Waste Management, Inc.	Candidate
1524	1448	Williamson County LF	Franklin	Williamson	TN	1,454,272	1974	2033	Williamson County	Candidate
1567	1490	Abilene Regional LF	Abilene	Jones	TX	7,921,300	1982	2067	Allied Waste Industries	Candidate
101874	1814	Amarillo LF	Amarillo	Potter	TX	7,031,400	1976	2050	City of Amarillo	Candidate
180432	1464	Austin Community LF	Austin	Travis	TX	10,380,188	1977	2001	Waste Management of Texas	Candidate
1554	1477	Beaumont LF	Beaumont	Jefferson	TX	2,310,400	1991	2021	Allied Waste Industries	Candidate
101871	1812	Blue Ridge LF	Houston	Fort Bend	TX	4,113,900	1993	2025	Allied Waste Industries	Candidate
1574	1497	Brazoria County Disposal LF	Angleton	Brazoria	TX	6,279,700	1993	2050	Republic Services, Inc.	Candidate
101881	1818	Brazos Valley Swma	Brian & College Station	Brazos	TX	3,009,600	1981	2005	Brazos Valley SWMA	Candidate
101861	1803	C&T Landfill	Linn	Hidalgo	TX	3,844,000	1976	2004	Republic Waste Services of Texas	Candidate
180365	2275	Charter Waste Landfill	Odessa	Ector	TX	1,300,000	1983	2021	Republic Services, Inc.	Candidate
1569	1492	City of Beaumont LF	Beaumont	Jefferson	TX	2,868,800	1981	2019	City of Beaumont	Candidate
1557	1480	City of Farmers Branch LF	Hebron	Denton	TX	6,044,700	1981	2019	City of Farmers Branch	Candidate
1539	1463	City of Fort Worth LF	Fort Worth	Tarrant	TX	5,299,400	1976	2036	City of Fort Worth	Candidate
1552	1475	City of Grand Prairie LF	Grand Prairie	Dallas	TX	2,835,800	1977	2021	City of Grand Prairie	Candidate
101892	1828	City Of Irving	Irving	Dallas	TX	2,063,900	1981	2065	City of Irving	Candidate
1578	1501	City of Laredo LF	Laredo	Webb	TX	3,180,000	1986	2015	City of Laredo	Candidate
1591	1514	City of Lubbock LF	Lubbock	Lubbock	TX	2,177,800	1975	2008	City of Lubbock	Candidate
1547	1470	City of McKinney LF	McKinney	Collin	TX	3,957,000	1980	2004	City of McKinney	Candidate
101877	1498	City Of Midland LF	Midland	Midland	TX	3,053,200	1990	2170	City of Midland	Candidate
101891	1827	City Of Nacogdoches	Nacogdoches	Nacogdoches	TX	1,296,200	1977	2033	City of Nacogdoches	Candidate
1594	1517	City of Pampa LF	Pampa	Gray	TX	1,176,200	1975	2007	City of Pampa	Candidate
101888	1824	City Of Peryton	Peryton	Ochiltree	TX	1,631,100	1979	2006	City of Peryton	Candidate
101860	1802	City Of Port Arthur	Port Arthur	Jefferson	TX	1,802,100	1986	2044	City of Port Arthur	Candidate
101890	1826	City Of Sweetwater LF	Sweetwater	Nolan	TX	1,283,800	1976	2040	City of Sweetwater	Candidate
167133	2048	City of Temple Landfill	Temple	Bell	TX	3,600,000	1982	2040	City of Temple	Candidate
101879	1816	City Of Victoria	Bloomington	Victoria	TX	2,556,000	1982	2040	City of Victoria	Candidate
101880	1817	City Of Weatherford LF	Weatherford	Parker	TX	1,079,000	1976	2060	IESI	Candidate
101884	1821	City of Wichita Falls LF	Wichita Falls	Wichita	TX	4,073,200	1982	2021	City of Wichita Falls	Candidate
1568	1491	Clint LF	Clint	El Paso	TX	4,904,400	1983	2006	City of El Paso	Candidate

101875	1815	Colorado City Landfill	Colorado City	Mitchell	TX	1,545,200	1975	2020	City of Colorado	Candidate
101866	1807	Comal County LF	New Braunfels	Comal	TX	3,817,620	1975	2010	WMI	Candidate
1555	1478	CSC Disposal and Landfill	Avalon	Ellis	TX	4,254,250	1985	2100	Republic Services, Inc.	Candidate
101863	1805	Denton Sanitary Landfill	Denton	Denton	TX	2,266,664	1984	2028	City of Denton	Candidate
167134	2049	Eastside Landfill	Fort Worth	Tarrant	TX				WMI	Candidate
101869	1810	Galveston County LF	Galveston	Galveston	TX	7,822,500	1973	2025	Allied Waste Industries	Candidate
1580	1503	Greenwood Farms	Tyler	Smith	TX	3,087,300	1988	2001	Allied Waste Industries	Candidate
101868	1809	Hillside Landfill	Sherman	Grayson	TX	2,526,400	1981	2023	WMI	Candidate
1576	1499	Lacy-Lakeview LF	Waco	Mclennan	TX	1,306,200	1985	2020	WMI	Candidate
1571	1494	Laidlaw Environmental SLF	Altair	Colorado	TX	9,195,000	1988	2004	Clean Harbors	Candidate
1548	1471	McCombs LF	El Paso	El Paso	TX	4,137,100	1984	2046	City of El Paso	Candidate
1538	1462	Mill Creek LF	Fort Worth	Tarrant	TX	4,815,500	1973	2002	Allied	Candidate
180352	2285	Nelson Gardens LF	San Antonio	Bexar	TX	11,800,000	1980	1993	City of San Antonio	Candidate
1533	1457	North Texas Waste/Maxwell Creek LF	Piano	Collin	TX	6,083,700	1982	2004	North Texas Municipal Water District	Candidate
1549	1472	Pine Hill LF	Longview	Gregg	TX	12,141,700	1982	2060	Allied Waste Industries	Candidate
101818	1779	Royal Oaks	Jacksonville	Cherokee	TX	1,044,200	1983	2030	Allied Waste Industries	Candidate
1532	1456	Skyline LF	Ferris	Ellis	TX	8,191,000	1942	2040	WMI	Candidate
101873	1813	Southwest LF	Canyon	Randall	TX	3,393,200	1987	2025	Allied Waste Industries	Candidate
101862	1804	Sprint Fort Bend County LF	Houston	Fort Bend	TX	1,664,372	1981	2020	Sprint Fort Bend County	Candidate
1584	1507	Sprint LF	Sugarland	Harris	TX	2,041,600	1987	2005	Laidlaw Waste Systems Inc.	Candidate
1588	1511	Texas Disposal Systems LF	Austin	Travis	TX	4,408,900	1990	2050	Texas Disposal Systems	Candidate
1595	1518	Tricel Environmental Response/Altair SLF	Altair	Colorado	TX	1,980,400	1976	2002	Safety Clean (formerly Laidlaw)	Candidate
101857	1801	Trinity Oaks Landfill	Mesquite	Dallas	TX	6,838,600	1969	2003		Candidate
1562	1485	Turkey Creek LF	Alvarado	Johnson	TX	3,733,200	1983	2025	Allied Waste Industries	Candidate
1596	1519	Westside Sanitary LF	Aledo	Tarrant	TX	9,955,600	1977	2005	Waste Management of Texas, Incorporated	Candidate
101870	1811	Whispering Pines LF	Houston	Harris	TX	6,405,000	1978	2017	Allied Waste Industries	Candidate
101882	1819	Williamson County	Hutto	Williamson	TX	2,134,700	1981	2040	WMI	Candidate
1579	1502	WMI/E & D Waste Systems Inc. LF	Alvin	Galveston	TX	3,202,900	1994	2022	Waste Management of Texas, Incorporated	Candidate
1617	1540	Bountiful City Sanitary LF	West Bountiful	Davis	UT	2,171,531	1960	2058	City of Bountiful	Candidate
1604	1527	City of Logan Sanitary Landfill	Logan	Cache	UT	1,400,000	1961	2016	City of Logan	Candidate
1616	1539	South Utah County SSD/Bayview LF	Utah	Utah	UT	1,100,000	1991	2094	South Utah Valley Solid Waste District	Candidate
1620	1543	Trans-Jordan LF	South Jordan	Salt Lake	UT	5,600,000	1958	2017	Trans-Jordan Cities	Candidate
1643	1566	Utah County/Vernal City LF	Vernal	Utah	UT	2,773,000	1950	2008	Utah County and Vernal City	Candidate
1636	1559	Washington County Solid Waste SSD #1 LF	Washington	Washington	UT	1,292,000	1978	2067	Washington County	Candidate
1647	1570	Abemarle Ivy SF	Charlottesville	Abemarle	VA	2,519,088	1973	2013		Candidate
180429	2333	Brunswick Waste Management Facility	Lawrenceville	Brunswick	VA	7,500,000	1997	2023	Allied Waste Industries	Candidate
1654	1577	Chesterfield County Northern Area LF	Midlothian	Chesterfield	VA	858,000	1981	1993	Chesterfield County	Candidate
1656	1579	Danville City SLF	Danville	Danville	VA	2,745,600	1973			Candidate

180122	2071	King George LF	King George	King George	VA	4,100,000	1996	2026	King George County	Candidate
1664	1585	Loudoun County LF	Loudoun	Loudoun	VA	1,487,200	1971	2010	Loudoun County	Candidate
1667	1588	Martinsville City LF	Martinsville	Martinsville	VA	2,323,750	1972	2005	City of Martinsville	Candidate
180123	2072	Middle Peninsula	Glenns	Gloucester	VA	1,500,000			WMI	Candidate
1668	1589	Newport News Solid Waste Disposal Facility No. 2	Newport News	Newport News	VA	1,800,000	1984	1996		Candidate
180230	2159	Northampton County Sanitary Landfill	Northampton	Northampton	VA				Northampton County	Candidate
1680	1601	Nuckols Road LF	Glen Allen	Henrico	VA	2,400,000	1966	2010	Henrico County	Candidate
1670	1591	Petersburg City LF	Petersburg	Petersburg	VA	1,144,000	1977	2002	City of Petersburg	Candidate
180195	2131	Rockingham County	Harrisonburg	Rockingham	VA	1,200,000			Rockingham County	Candidate
1672	1593	Smith Gap Regional Landfill	Roanoke	Roanoke	VA	5,262,400	1974	1995	Roanoke Valley RA	Candidate
167130	2045	Tazewell County Landfill	Tazewell	Tazewell	VA	873,841	1972	2039	Tazewell County Board of Supervisors	Candidate
180389	2295	Anguilla Landfill	Christiansted	St. Croix	VI	2,200,000	1966	2002		Candidate
180390	2296	Bovoni Landfill	St. Thomas	St. Thomas	VI	1,500,000	1980	2021		Candidate
167126	2041	Coventry Landfill	Newport	Orleans	VT	3,600,000	1991	2012	New England Waste Services of Vermont (Casella Waste)	Candidate
167127	2042	Waste Systems International (WSI 3) - Moretown	Moretown	Washington	VT	1,950,000	1993	2006		Candidate
1712	1633	Cathcart LF	Snohomish	Snohomish	WA	3,258,989	1980	1992	Snohomish County Solid Waste Division	Candidate
1685	1606	Cedar Hills LF	Maple Valley	King	WA	24,135,629	1962	2012	King County	Candidate
1687	1608	Cheyne Road LF	Yakima	Yakima	WA	1,198,976	1968		Yakima County Solid Waste Division	Candidate
1693	1614	Greater Wenatchee LF		Douglas	WA	2,008,248	1975		WMI	Candidate
1694	1615	Hawks Prairie LF	Olympia	Thurston	WA	750,000	1970	2001	Thurston County	Candidate
1736	1656	Kent Highlands LF	Kent	King	WA	8,000,000	1968	1986	City of Seattle	Candidate
1707	1628	Sudbury Road LF	Walla Walla	Walla Walla	WA	1,102,317	1972	2007	City of Walla Walla	Candidate
1708	1629	Terrace Heights LF	Yakima	Yakima	WA	3,727,219	1974	2012	Yakima County	Candidate
1753	1673	BFI Waste Systems of N.A., Inc.	Sarona	Washburn	WI	469,302	1973	2020	BFI Waste Systems of N.A., Inc.	Candidate
1738	1658	Brown County East LF	Green Bay	Brown	WI	5,400,000	1976	2003	Brown County Port & Solid Waste	Candidate
1739	1659	Brown County West LF	Greenbay	Brown	WI	3,800,000	1977	1996	Brown County Port & Solid Waste	Candidate
1751	1671	La Crosse County LF	Medary	La Crosse	WI	697,680	1977	1991	La Crosse County	Candidate
1790	1710	Mallard Ridge Northern Expansion LF	Delavan	Walworth	WI	742,428	1994	2001	Republic Services, Inc.	Candidate
1758	1678	Marathon County LF- Area B	Ringle	Marathon	WI	1,060,000	1993	2012	Marathon County Solid Waste Department	Candidate
1766	1686	Oneida County SLF and Demolition	Rhinelander	Oneida	WI	456,458	1979	2001	Oneida County	Candidate
1782	1702	Onyx Cranberry Creek LF	Wisconsin Rapids	Wood	WI	890,000	1988	2003	Onyx Cranberry Creek LF	Candidate
1792	1712	Onyx Emerald Park LF	Muskego	Walworth	WI	3,500,000	1994	2011	Onyx Emerald Park LF	Candidate
180221	2152	Onyx Hickory Meadows Landfill	Chilton	Calumet	WI	1,100,000			Onyx Hickory Meadows Landfill	Candidate
1744	1664	Onyx Seven Mile Creek LF #1	Eau Claire	Eau Claire	WI	960,000	1978	1989	Onyx Seven Mile Creek LF #1	Candidate
1784	1704	Onyx Valley Meadows LF	Fort Atkinson	Jefferson	WI	1,800,000	1978	2000	Onyx Valley Meadows LF	Candidate
180310	2226	Brooke County Landfill	Colliers	Brooke	WV	1,325,118	1975	2045	J.P. Mascaro & Sons	Candidate

180290	2206	Meadowfill Landfill	Bridgeport	Harrison	WV	2,250,000	1970	2050	WMI	Candidate
180296	2212	Northwestern Company Disposal Landfill	Parkersburg	Wood	WV	4,100,000	1975	2060	WMI	Candidate
180220	2150	Raleigh County SWA	Beckley	Raleigh	WV	1,600,000	1964	2075	Raleigh County Solid Waste Authority	Candidate
180309	2225	Wetzel County Landfill	New Martinsville	Wetzel	WV	1,000,000	1970	2250	J.P. Mascaro & Sons	Candidate
180279	2196	Cheyenne Landfill	Cheyenne	Laramie	WY	4,189,263	1968	2008	City of Cheyenne	Candidate

3: LIVESTOCK MANURE MANAGEMENT (COVERED LAGOON)

Manure Characteristics (EPA 1999)

	Weight (lbs)	Manure (lbs/day)	VS%	B ₀
Dairy				
Milk cow	1,400	112	7	3.8
Dry cow	1,300	107	11	3.8
Heifers	900	77	6	3.8
Calves	500	43	6	3.8
Swine				
Sow	400	24	9	5.8
Nursery	30	3.2	8	7.5
Grower	70	4.4	9	7.5
Finisher	180	11.4	9	7.5

Methane Conversion Factors (EPA 1999)

	Warm 30 C	Temperate 20 C	Cool 10 C
Liquid/Slurry	.65	.35	.10
Pits < 30 days retention	0.1	0.2	0.4
Pits > 30 days retention	0.2	0.4	0.8
Tanks	0.2	0.4	0.8
Pasture, Range	.02	.015	.01
Drylots, Corrals	.05	.015	.01
Daily Spread	.01	.005	.0001
Average Annual MCF			
Anaerobic Lagoons	.90		
Litter	.10		
Deep Pit Stacking	.05		

VS% is the percent volatile solids in the manure. Methane is only generated from the volatile solids portion.

B₀ is the manure methane potential based on laboratory measurements and is in units of [ft³ methane/lb VS].

A large farm is assumed to be a 500 or more cows or 1000 or more swine. For a 500 cow dairy the total potential for methane generation would be approximately 14,896 ft³ per day.

$$500 \text{ cows} \times \frac{112 \text{ lb manure}}{\text{day}} \times \frac{0.07 \text{ lb VS}}{\text{lb manure}} \times \frac{3.8 \text{ ft}^3 \text{ CH}_4}{\text{lb VS}} = \frac{14,896 \text{ ft}^3 \text{ CH}_4}{\text{day}}$$

However the actual amount of methane produced is a function of both climate and management practice. The EPA estimates that the average annual methane generated using anaerobic lagoons is 90% of the methane generation potential and therefore actual methane emissions from a 500 cow dairy is expected to be 13,406 ft³ CH₄ per day, corresponding to a carbon generation of 538.33 MTCE per year from methane emissions.

$$\frac{13,406 \text{ ft}^3 \text{ CH}_4}{\text{day}} \times \frac{365 \text{ days}}{\text{yr}} \times \frac{19.2 \text{ g CH}_4}{\text{ft}^3} \times \frac{\text{Tg}}{10^{12} \text{ g}} \times \frac{5.73 \text{ MMTCE}}{\text{Tg CH}_4} \times \frac{10^6 \text{ MTCE}}{\text{MMTCE}} = \frac{538.33 \text{ MTCE}}{\text{yr}}$$

Likewise, a 1000 head swine farm could expect methane generation of approximately 5,355.7 ft³ methane per day, much less than that from dairy cows.

$$1000 \text{ swine} \times \frac{11.4 \text{ lb manure}}{\text{day}} \times \frac{0.09 \text{ lb VS}}{\text{lb manure}} \times \frac{5.8 \text{ ft}^3 \text{ CH}_4}{\text{lb VS}} \times 90\% = \frac{5,355.7 \text{ ft}^3 \text{ CH}_4}{\text{day}}$$

GHG Abatement Capacity:

Primary GHG Mitigation:

Referring to appendix 5.2.1, for every metric ton of carbon combusted, 17% is re-released to the atmosphere due to the creation of CO₂ during the combustion process. Assuming a 20 year operating timeframe, the total GHG emissions abated through the combustion of methane at a 500 cow dairy is approximately 8,936 MTCE per project.

$$\frac{538.33 \text{ TCE}}{\text{yr}} \times 20 \text{ yrs} \times (1 - 0.17) = 8,936 \text{ MTCE}$$

Secondary GHG Mitigation:

Again referring to appendix 5.2.1, secondary GHG reduction occurs because of electricity generation that would have otherwise been produced through the combustion of natural gas, thus offsetting the associated GHG emissions. Secondary GHG reductions for a 500 cow dairy farm over a 20 year time frame are approximately 1,416 MTCE

$$\frac{13,406 \text{ ft}^3 \text{ CH}_4}{\text{day}} \times \frac{365 \text{ days}}{\text{yr}} \times 20 \text{ yr} \times \frac{1000 \text{ BTU}}{\text{ft}^3 \text{ CH}_4} \times \frac{\text{MMBTU}}{10^6 \text{ BTU}} \times \frac{14.47 \text{ kg C}}{\text{MMBTU}} \times \frac{\text{MTCE}}{1,000 \text{ kg}} = 1,416 \text{ MTCE}$$

Total GHG Mitigation:

Over a 20 year time frame, a 500 cow dairy farm can expect to abate approximately **10,352 MTCE**.

Costs:

Livestock Manure Methane Recovery and Utilization Costs-Covered Anaerobic Digester (EPA 1999).

Lagoon Costs		Utilization Equipment Costs	
Component	Cost	Component	Cost
Excavation (\$/yd)	\$1.75	Electricity gen w/heat rec (\$/kW cap)	\$750
Attachment wall (\$/yd)	\$200	Electricity gen O&M (\$/kWh produced)	\$0.015
Pipe and influent box	\$1,700	Electricity gen building (\$/unit)	\$10,000
Soil test	\$1,200	Switch gear (\$/unit)	\$5,000
Foam trap	\$75	Boiler cost (\$/unit)	\$10,000
Very high durability cover material (\$/ft ²)	\$0.85	Boiler shed (\$/unit)	\$3,500
Cover install labor (\$/ft ²)	\$0.35	Chiller (\$/ton cap)	\$1,050
		Flare (\$/unit)	\$1,500
Gas Handling Costs		Labor and Services Costs	
Component	Cost	Component	Cost
Gas filter (\$/unit)	\$700	Labor crew (\$/hr)	\$150
Gas pump (\$/unit)	\$900	Engineering (\$/job)	\$25,000
Gas meter (\$/unit)	\$800	Backhoe (\$/hr)	\$60
Gas pressure regulator (\$/unit)	\$500		
J-trap (\$/unit)	\$100	Pipe Costs	
Manhole (\$/unit)	\$300	Component	Cost
Manometer (\$/unit)	\$500	2 in. Diameter PVC pipe (\$/ft)	\$1.00
		3 in. Diameter PVC pipe (\$/ft)	\$1.50
		4 in. Diameter PVC pipe (\$/ft)	\$2.00
		6 in. Diameter PVC pipe (\$/ft)	\$2.25
		7 in. Diameter PVC pipe (\$/ft)	\$4.00
Typical Project Costs (including labor)			
500 cow dairy (CA)		1000 sow swine farm (NC)	
Lagoon Costs	\$42,579	Lagoon Costs	\$14,400
Gas Handling Costs	\$2,380	Gas Handling Costs	\$2,380
Piping Costs	\$3,306	Piping Costs	\$3,306
Utilization Equipment Costs	\$57,306	Utilization Equipment Costs	\$27,925
Engineering Costs	\$25,000	Engineering Costs	\$25,000
TOTAL	\$135,571	TOTAL	\$73,011

EPA estimates that the cost for a typical project involving a covered anaerobic lagoon at a 500 cow dairy in California will cost about \$135,571 including labor (O&M) in 1996 dollars. In 2005 dollars, that would be approximately \$158,852 (Sahr 2004).

Therefore the carbon abatement cost is approximately **\$15.35/MTCE** abated for a 20 year project.

$$\frac{\$158,852}{10,352TCE} = \frac{\$15.35}{TCE} \text{ abated}$$

Revenues:

The annual electricity generated from a 500 cow dairy is approximately 4.89×10^5 kWh.

$$\frac{13,406 \text{ ft}^3 \text{ CH}_4}{\text{day}} \times \frac{365 \text{ days}}{\text{yr}} \times \frac{1000 \text{ BTU}}{\text{ft}^3 \text{ CH}_4} \times \frac{\text{kWh}}{10,000 \text{ BTU}} = \frac{4.89 \times 10^5 \text{ kWh}}{\text{yr}}$$

At \$0.04/kWh, the annual revenue is expected to be \$19,572.80. At an 8% discount rate, the total revenue is expected to be \$192,168 over a 20 year project timeframe, corresponding to \$18.56/MTCE.

$$\text{Present Value}(500\text{cows}) = \$19,572.80 \left[\frac{1 - \left(\frac{1}{(1 + 0.08)^{20}} \right)}{0.08} \right] = \$192,168$$

$$\frac{\$192,168\text{revenue}}{10,352\text{TCEabated}} = \frac{\$18.56}{\text{MTCE}}$$

4: CALCULATION OF CO₂ EMISSION REDUCTIONS FROM EL ESTERO WASTEWATER TREATMENT PLANT, SANTA BARBARA, CA.

The indirect carbon abatement is estimated to be about 634 TCE per year. Over a 20 year time frame, this becomes an abatement of **12,676 MTCE**.

$$500kW \times \frac{365days}{yr} \times \frac{24hr}{day} \times \left(\frac{10,000BTU}{kWh} \right) \times \frac{MMBTU}{10^6 BTU} \times \frac{14.47kgC}{MMBTU} \times \frac{MTCE}{1,000kg} = 633.8MTCE$$

A grant from Southern California Edison of \$2,250,000 is assumed to be the total cost. Therefore the cost of carbon abatement over a 20 year time frame is expected to be approximately \$177/MTCE. However, El Estero Wastewater Treatment Plant was not responsible for the costs.

Because the electricity is sold to the treatment plant at \$0.02/kWh less than what they were previously paying, the revenues are assumed to be \$87,600 per year.

$$500kW \times \frac{365days}{yr} \times \frac{24hr}{day} \times \frac{\$0.02}{kWh} = \frac{\$87,600}{yr}$$

At an 8% discount rate and assuming a 20 year project lifetime, \$87,600 per year is approximately equivalent to \$860,070 over 20 years.

$$PresentValue = \$87,600 \left[\frac{1 - \left(\frac{1}{(1 + 0.08)^{20}} \right)}{0.08} \right] = \$860,070$$

This is approximately equivalent to revenue of \$9/MTCE

$$\frac{\$860,070revenue}{87.6 \times 10^6 kWh} \times \frac{kWh}{10,000BTU} \times \frac{1,000BTU}{1ft^3CH_4} \times \frac{1ft^3CH_4}{19.2gCH_4} \times \frac{10^{12}g}{Tg} \times \frac{TgCH_4}{5.73MMTCE} \times \frac{MMTCE}{10^6 MTCE} = \frac{\$8.92}{MTCE}$$

5: ESTIMATION OF CO₂ EMISSIONS LIABILITY BURBANK WATER AND POWER MUNICIPALITY, BURBANK, CA

5.1: Estimation of onsite CO₂ emissions:

Estimates for BWP onsite emissions were derived from process data provided by BWP via email 06 May 2004. Process data was for calendar years 1995 and 2000 through April 2004. Recorded data included fuel use in thousand standard cubic feet (kcf), gross and net generated electricity in megawatt hours (MWh), online hours, continuous emissions monitoring data for oxides of nitrogen (NO_x) and sulfur dioxide (SO₂), and estimated carbon dioxide (CO₂). Two natural gas fueled steam boilers, Olive I & II and a natural gas fueled turbine, Lake One, were provided for.

The estimation methodology used was retrieved from the GHG Protocol Initiative (www.ghgprotocol.org/standard/tools.htm) and consisted of calculation worksheets (Feb 2004, Version 2.0) for Stationary Combustion Sources – *worksheet 1, Direct*. Selected data was a three-year average of 2000, 2001, and 2003 (2002 was not considered as the two steam boilers were inoperable for emission control upgrades and therefore deemed non-representative). The methodology for direct emissions is summarized as follows:

$$\text{Annual CO}_2 \text{ emissions } \left(\frac{\text{metric tons}}{\text{yr}} \right) = \frac{\text{annual fuel use} \left(\frac{\text{kcf}}{\text{yr}} \right) * \frac{121.6 \text{ lbs CO}_2}{\text{kcf}}}{\frac{2204.62 \text{ lbs}}{\text{metric ton}}}$$

The following tables provide a summary of the annual CO₂ emissions and natural gas fuel use by BWP. Additionally, an electronic copy of the GHG Protocol Initiative worksheets for stationary combustion and uncertainty calculations is provided on the accompanying compact disc (worksheets with red tabs were specifically used for this project's estimate).

Calendar Year Emissions (tons) (Estimated from fuel use)							
CO ₂ (tons)	CY 2000	CY 2001	CY 2002	CY 2003	3-yr. total	3-yr average	
Olive 1	65795	62260	14547	29772	172,374	52,609	
Olive 2	54328	37578	34547	12169	138,622	34,692	
Lake 1	0	0	0	43868	43,868	14,623	
Total	120,123	99,838	49,094	85,809		101,923	tons CO₂

Fiscal Year Emissions (tons) (Estimated from fuel use)							
CO2 (tons)	CY 2000	FY 2001	FY 2002	FY 2003	3-yr. total	3-yr average	
Olive 1	incomplete data	86067	24813	17744	128,624	51,906	tons CO2
Olive 2	incomplete data	35049	50039	20586	105,674	27,818	
Lake 1	-	-	-	13065	13,065	13,065	
Total		121,116	74,852	51,395		86,256	

Calendar Year Fuel Use (thousand cubic feet)							
Fuel (kcf)	CY 2000	CY 2001	CY 2002	CY 2003	3-yr. total	3-yr average	
Olive 1	1,094,638	1,028,006	238,482	478,505	2,839,631	867,050	kcf
Olive 2	906,920	620,586	565,952	221,605	2,315,063	583,037	
Lake 1	-	-	-	703,016	703,016	234,339	
Total	2,001,558	1,648,592	804,434	1,403,126		1,684,425	

Fiscal Year Fuel Use (thousand cubic feet)							
Fuel (kcf)	CY 2000	FY 2001	FY 2002	FY 2003	3-yr. total	3-yr average	
Olive 1	incomplete data	1426982	411947	287053	2,125,982	857,018	kcf
Olive 2	incomplete data	587202	821358	336512	1,745,072	461,857	
Lake 1	-	-	-	209388	209,388	104,694	
Total		2,014,184	1,233,305	832,953		1,423,569	

5.2: Estimation of offsite CO₂ emissions:

BWP's offsite emission liability was assumed to be exclusive to power acquired from the Intermountain Power Project (IPP), which generates an approximate average of 14,000 gigawatt hours (gWh) per year, 3.371% (471 gWh) of which is allocated to BWP. According to BWP annual reports, other offsite power purchases are from sources with no GHG emissions (e.g., nuclear and hydro). Fuel use data was obtained from IPP's Annual Reports for fiscal years 2001-2003 (July 2000 through June 2003). It should be noted that a direct correlation between BWP's calendar year fuel use that excludes 2002 is lacking due to the use of IPP's fiscal year fuel use data. However, it is assumed that a reasonably assumed correlation can be made due to the

relative consistent annual fuel use by IPP (represented by a mean annual fuel use of 5322.6 thousand tons of coal with a standard deviation of 59.2).

The estimation methodology used was retrieved from the GHG Protocol Initiative (www.ghgprotocol.org/standard/tools.htm) and consisted of calculation worksheets (Feb 2004, Version 2.0) for Stationary Combustion Sources – *worksheet 2, Indirect (Purchase)*. The methodology for direct emissions is summarized as follows:

$$\text{Annual CO}_2 \text{ emissions } \left(\frac{\text{metric tons}}{\text{yr}} \right) = \frac{\text{annual power generation} \left(\frac{\text{MWh}}{\text{yr}} \right) * \frac{1942.4 \text{ lbs CO}_2}{\text{MWh}}}{\frac{2204.62 \text{ lbs}}{\text{metric ton}}}$$

6: COSTS OF GHG MITIGATION STRATEGIES.

Table 8.2 in the main report is based on the cost table presented below. Literature values of costs have been adjusted to reflect 2005 dollars (in parentheses).

Strategy	General cost per MTCE	Notes
Forest Sequestration		
Forest plantation, forest management, and forest preservation	\$10 (\$10) to \$150 (\$150) (Richard & Stokes, 2004)	To sequester 250MMT annually. U.S. and globally
Forest plantation, forest management, and forest preservation	(A) \$7.50 to \$22.50 (B) \$30-\$90 (Pew, 2005)	(A) To sequester 330MMT annually. (B) To sequester 500MMT annually. U.S. only. Econometric analysis used.
Agricultural Sequestration		
Conservation tillage, conversion to grassland, afforestation	\$10 to \$125 (Lewandrowski, 2004)	Annual, U.S. only.
Conservation tillage, conversion to grassland, afforestation	(A) \$85 (\$104) (B) \$465 (\$569) (Parks & Hardie, 1995)	(A) To sequester 18MMT annually. (B) To sequester 91 MMT annually. U.S. only. This analysis did not address permanence or leakage.
Conservation tillage, conversion to grassland, afforestation	\$10 (\$10.15) (McCarl & Schneider, 2001)	To sequester 52 MMT annually) Annual, U.S. only.
CO₂ capture and Separation Technologies		
1. Pre-Combustion Technology	\$140 (\$142) to \$150 (\$152) (Anderson & Newell, 2003)	Costs reflect installation of IGCC technology
2. Post-Combustion Technology	\$230 (\$234) - new facilities and \$190 (\$193) - retrofitted (Anderson & Newell, 2003)	Assumed to be chemical absorbent technology

Geologic Sequestration		
1. Oil and gas reservoir injection		
a. Oil and gas reservoir injection <i>without</i> enhanced recovery	\$5 (\$5) to \$70 (\$71) (Anderson & Newell, 2003)	Cost includes capture and separation technology
b. Oil reservoir injection <i>with</i> enhanced oil recovery (EOR)	-\$30 (-\$30) to -\$15 (-\$15) (Anderson & Newell, 2003)	Cost includes capture and separation technology
c. Gas reservoir injection <i>with</i> enhanced gas recovery	Assume a similar CPT range to 1.a.	Cost includes capture and separation technology
2. Coal bed injection (enhanced coal bed methane recovery)	-\$95 (\$96) to \$70 (\$71) (Anderson & Newell, 2003)	Cost includes capture and separation technology
3. Saline aquifer injection	\$5 (\$5) to \$45 (\$46) (Anderson & Newell, 2003)	Cost includes capture and separation technology
Methane Capture and Use		
1. Landfill methane capture		
a. Capture and combustion without electricity sale to grid	\$8 (\$9) to \$12 (\$13) (EPA, 1999)	
b. Capture and combustion with electricity sale to grid	-\$30 (-\$33) to \$0 (EPA, 1999)	Based on revenue from electricity sales.
2. Livestock manure management		
a. Biogas capture and combustion without electricity sale to grid	\$10 (\$11) to \$20 (\$22) (EPA, 1999)	For a 500 head dairy farm.
b. Biogas capture and combustion with electricity sale to grid.	-\$25 (-\$27) (at \$0.09/kWh) to \$0 (EPA, 1999)	For a 500 head dairy farm.
3. Wastewater treatment biogas capture with electricity generation	~\$160 (Fuel Cell Energy Co.)	Based on El Estero Wastewater Treatment Plant Case Study.
Biomass to Energy		
Biofuel switching for power plant (general)	\$25 (\$29) to \$55 (\$64) (McCarl & Schneider, 2000)	U.S. only. Based on replacement of coal powered generation.
Ethanol switching for gasoline	\$250 (\$290) to \$330 (\$384) (McCarl & Schneider, 2000)	U.S. only. Based on corn crop production of ethanol.

Industrial Process Modifications		
1. Fuel Switching	Increases to fuel costs estimated at 9-16%	Does not consider improved fuel efficiency
2. Efficiency improvements (industrial)	-\$137 (-158) to -\$429 (-588) (Mills, et al., 1991)	Net benefit assumed due to decreases in fuel costs and reduced pollution rates
Renewable Energy		
National RPS Program	~\$95 (\$113) (UCS, 2005)	Based on RPS target of 10%
National RPS Program	up to \$50 (\$60) (UCS, 2005)	Based on DOE RPS target of 10%
(Demand Side) Efficiency Improvements		
Electricity demand reduction programs (general)	\$20 (\$24.5) (Chomitz, 2000)	U.S. only. Based on government-subsidized programs, not GHG related.