ENVVEST
Semiannual Progress Report

29 January 1999

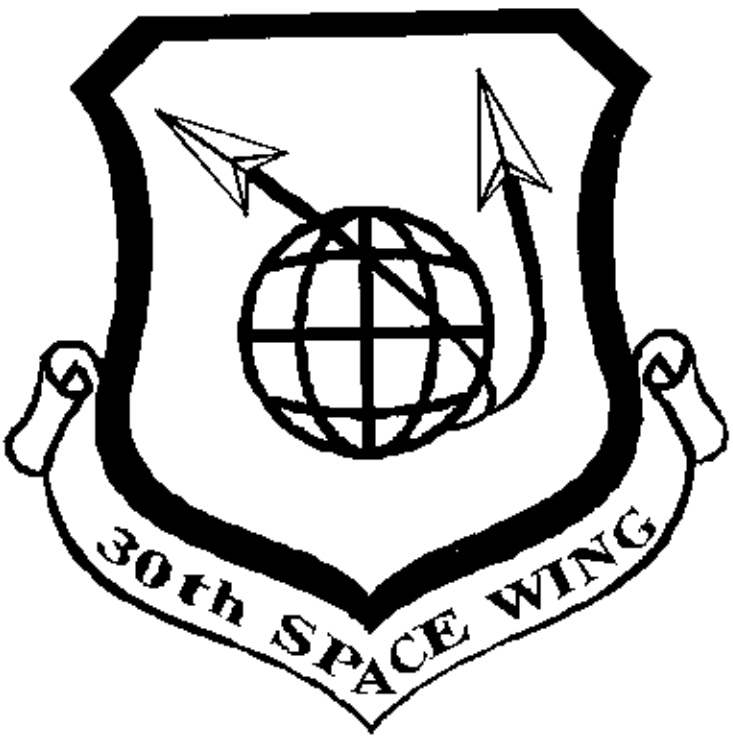

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TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

On 16 March 1995, President Clinton and Vice President Gore announced an initiative titled *Reinventing Environmental Regulations*, which proposed 10 principles on regulatory reform and directed U.S. Environmental Protection Agency (U.S. EPA) to implement 25 high priority actions. One of these was aimed at achieving regulatory reform within the Department of Defense (DoD) through a program called ENVVEST (Environmental Investment).

On 2 November 1995, the DoD and U.S. EPA signed a Memorandum of Agreement (MOA) on Regulatory Reinvention Pilot Projects, which formally indoctrinated the ENVVEST program. The MOA established a framework for developing pilot programs at three to five selected DoD facilities. Vandenberg Air Force Base (AFB) has been selected as the prototype facility to pilot the ENVVEST program and implement common sense and cost effective environmental protection. The ENVVEST program emphasizes regulatory compliance through pollution prevention and provides an alternative strategy to prescriptive command-and-control regulatory requirements in the form of a performance based environmental management system designed to attain greater environmental results.

On 3 November 1997, Vandenberg AFB, U.S. EPA, and the Santa Barbara County Air Pollution Control District (SBCAPCD) signed the first, and currently the only, ENVVEST Final Project Agreement (FPA) within the DoD. The FPA states the intentions of the aforementioned parties to carry out a pilot project pursuant to the 1995 MOA by testing innovative approaches to environmental protection. Under the FPA, the Vandenberg AFB Air Quality Project XL/ENVVEST Initiative is aimed at improving air quality beyond that achieved through federal, state, and local permit programs. This multi-year implementation strategy is aimed at generating a reduction of ozone precursors, i.e., oxides of nitrogen (NOx) and volatile organic compounds (VOCs) by 10 tons or more by 30 November 2002.

The first agreed upon milestone required Vandenberg AFB to complete an initial assessment and cost feasibility study within 30 days of execution of the FPA. On 26 November 1997, Vandenberg AFB submitted the Boiler Emission Reduction Implementation and Cost Feasibility (ERI & CF) Study to the SBCAPCD, thus fulfilling the requirements of the first milestone. The second agreed upon milestone, on 30 April 1999, requires Vandenberg AFB to retrofit or replace 30 percent of the candidate boilers identified in the Boiler ERI & CF Study.

2. ENVVEST CANDIDATE BOILER DETERMINATION

The boilers at Vandenberg AFB span a broad range of equipment designs and heat input capacities; however, for purposes of ENVVEST the initial assessment was limited to boilers with a heat input range of 2.0 to 5.0 million British thermal units per hour (MMBtu/hr). This size range is the next largest class of boilers not environmentally regulated nor subject to performance emission standards and therefore, thought to present the greatest emission reduction potential. The assessment focused on the feasibility of retrofitting the burner or replacing a boiler, which is dependent on heat transfer configuration, furnace size, burner configuration, heat input capacity, fuel type, fuel train configuration, age, and overall condition. In addition to the hardware and equipment specifications, there are space and facility constraints that need to be

considered when evaluating the feasibility of each burner retrofit or boiler replacement. Coupled with the complexity of the boiler design are the similar variations in estimating the uncontrolled NOx emissions. Uncontrolled NOx emissions were shown to vary significantly among two distinct burner design types, atmospheric and power burners.

2.1. ENVVEST BASELINE BOILERS

During the site survey process Vandenberg AFB identified 44 boilers between 2.0 to 5.0 MMBtu/hr (Table 2.1) referred to as the ENVVEST Baseline Boilers. The building number, facility description, building square footage, tenant organization, facility manager/point of contact (POC), POC phone number, and access constraints were identified. Additionally, the boilers were identified for potential impact (scheduled for replacement or elimination) by other projects through the year 2001. This effort involved contacting the Civil Engineer's Capital Improvement Program and examining the 30th Space Wing Space Track Plan.

In addition to the facility information, the site survey verified the boiler manufacturer, model, serial number, and heat input rating and identified the boiler and burner type, fuel type, and approximate age of the boiler. Boiler design and piping configurations were identified, as well. The fuel train and boiler configurations with respect to the boiler room orientation were also documented.

Finally, during the site survey, the emission measurement sampling ports and facility fuel meters were identified and installed. Sample ports were identified and located in accordance with U.S. EPA Method 1 and the ENVVEST Emission Measurement Protocol. The fuel meter type (e.g., turbine, rotary, or diaphragm meter) along with the meter function (e.g., dedicated boiler meter or facility meter servicing other combustion sources) and the resolution of the registers were also documented for pre-existing meters; otherwise, meter specifications were cited for installation.

2.2. ENVVEST PRE-SELECTED CANDIDATE BOILERS

During the site survey, it was also discovered that many of the ENVVEST Baseline Boilers had been replaced or were being replaced. In order to categorize the boilers and develop a pool of candidate boilers that would benefit the most from low NOx technology under the ENVVEST program, the following categories were developed:

"C"- Boilers that are scheduled for retrofit or replacement and are currently undergoing either process;
"E"- Boilers that are not scheduled for retrofit or replacement and are within the desired heat input range; also known and referred to as the ENVVEST Pre-Selected Candidate Boilers;
"N"- Boilers that do not meet the heat input rating criteria or the facility that housed the boiler is no longer in operation; and
"R"- Boilers that have been replaced.

After the initial evaluation, 24 of the 44 ENVVEST Baseline Boilers shown in Table 2.2 have qualified as a category "E" for the ENVVEST Pre-Selected Candidate Boiler pool. These boilers have under gone further evaluation to determine their eligibility for the ENVVEST program.

ENVVEST BOILER REFERENCE NUMBER	TID	BUILDING	FACILITY DESCRIPTION	BUILDING SQUARE FOOTAGE	FACILITY TYPE	FACILITY OCCUPANT
100	974	488			Warehouse	Lockheed Martin
101						
102						
103						
200	984	719	MST SUPPORT	5440	Payload Processing	Lockheed Martin
300	985	719	MST SUPPORT	5440	Payload Processing	Lockheed Martin
400	986	719	MST SUPPORT	5440	Payload Processing	Lockheed Martin
500	988	719	MST SUPPORT	5440	Payload Processing	Lockheed Martin
600	989	719	MST SUPPORT	5440	Payload Processing	Lockheed Martin
700	NA	731		21400	Office	Lockheed Martin
800	NA	731		21400	Office	Lockheed Martin
801						
802						
803						
900	1009	836		55271	Office	NASA
1000		836		55271	Office	NASA
1100	NA	875	MAINTENANCE SHOP	21889	Warehouse	Paradyne
1200	1023	980	SRM STORAGE	6758	Warehouse	NASA
1300	1024	980	STORAGE	12975	Warehouse	United Technologies
1400	951	1800	MISSILE MAINT FACILITY	18640	Warehouse	578 Test Squadron
1500	NA	1519	MISSILE ASSEMBLY BLD.	179050	Warehouse	Detachment 9 Materiel Command
1600	1035	3000	MSL/SPACE RSCH TST	74347	Warehouse	Lockheed Martin
1700	NA	3000	MSL/SPACE RSCH TST	74347	Warehouse	Lockheed Martin
1800	1036	6500	RSCH EQUIP STOR	172577	Warehouse	30th Transportation Squadron
1900	1041	6523	MSL/SPACE RSCH ENG	35078	Office	Various Government Tenants
2000	1043	6601	MSL OPS BLD	44300	Office	30th Mission Support Squadron
2100	1052	7425	MSL/SPACE RSCH ENG	36600	Office	30th Mission Support Squadron
2200	1062	8310	MSL/SPACE RSCH ENG	142051	Office	4th Space Launch Squadron
2201		8310			Office	4th Space Launch Squadron
2202		8310			Office	4th Space Launch Squadron
2203		8310			Office	4th Space Launch Squadron
2204		8310			Office	4th Space Launch Squadron
2300	1065	8314	AUDIO-VIS FCLTY	40736	Office	30th Communication Squadron
2400	1066	8401	RSCH EQUIP STOR	116900	Office	Lockheed Martin
2500	1071	8401	RSCH EQUIP STOR	116900	Office	Lockheed Martin
2600	1072	8401	RSCH EQUIP STOR	116900	Office	Lockheed Martin
2700	1074	8500	MSL SPACE RSCH ENG	119603	Office	Detachment 9 Space and Missile Cente
2701		8500			Office	Detachment 9 Space and Missile Cente
2702		8500			Office	Detachment 9 Space and Missile Cente
2703		8500			Office	Detachment 9 Space and Missile Cente
2800	1076	8510	MSL SPACE RSCH ENG	45223	Office	Lockheed Martin
2900	1079	9005	GYMNASIUM	23389	Warehouse	Gymnasium
3000	1086	9320	MSL/SPACE RSCH TST	40400	Warehouse	ITT-Federal Services
3100	1091	9340	PHOTO LAB BSE	35447	Office	30th CES
3200	1090	9340	PHOTO LAB BSE	35447	Office	30th CES
3300	1093	10146	SWIM POOL WTR TRMT	NA	Swimming pool	Various users
3400	1096	10252	OPEN MESS NCO	40035	Restaurant	NCO Club/Eating Facility
3500	1100	10577	HQ NUMBERED AF	92482	Office	Base Headquarter
3600	1108	11070	OPEN MESS OFF.	28325	Office	Officers Club
3601						
3700	1109	11439	BE MAINT. SHOP	52924	Office	30th CES
3800	1122	13123	DORM	15621	Dormitory	Air Force personnel
3801		13123			Dormitory	Air Force personnel
3802		13123			Dormitory	Air Force personnel
3803		13123			Dormitory	Air Force personnel
3900	1121	13321	DORM	11413	Dormitory	Air Force personnel
4000	1123	13323	DORM	11413	Dormitory	Air Force personnel
4100	1125	13330	OH ADM	14999	Administration and Mess Hall for Dormitory	Air Force personnel
4200	1128	13607	ACAD LECT. HALL	13406	Lecture Hall	Air Force personnel
4201		13607			Lecture Hall	Air Force personnel
4202		13607			Lecture Hall	Air Force personnel
4300	1153	23225	TRACKING STATION	11054	Office	Detachment 1, 750 SPG (Tracking Sta
4400	1154	23225	TRACKING STATION	11054	Office	Detachment 1, 750 SPG (Tracking Sta

	FACILITY MAINTENANCE	ORG/Office Symbol	POC	PHONE	ACCESS	BOILER FUNCTION	ZONE	BOILER MANUFACTURER
	Lockheed Martin	LMTO	Randy Hill	51117	RESTRICTED	ENVIRONMENTAL	2	KEWANEE
	Lockheed Martin	LMTO	Terry Schmid	54051	RESTRICTED	ENVIRONMENTAL	2	CLEAVER BROOKS
	Lockheed Martin	LMTO	Terry Schmid	54051	RESTRICTED	ENVIRONMENTAL	2	CLEAVER BROOKS
	Lockheed Martin	LMTO	Terry Schmid	54051	RESTRICTED	ENVIRONMENTAL	2	CLEAVER BROOKS
	Lockheed Martin	LMTO	Terry Schmid	54051	RESTRICTED	ENVIRONMENTAL	2	CLEAVER BROOKS
	Lockheed Martin	LMTO	Terry Schmid	54051	RESTRICTED	ENVIRONMENTAL	2	CLEAVER BROOKS
	LBSS-Space Mark				GENERAL	ENVIRONMENTAL	2	CLEAVER BROOKS
	LBSS-Space Mark				GENERAL	ENVIRONMENTAL	2	CLEAVER BROOKS
	30th CES/Zone 2	NASA	Larry Stalter BP:Levi Miller	53132 BP:53022	GENERAL	ENVIRONMENTAL	2	KEWANEE
	30th CES/Zone 2	NASA	Larry Stalter BP:Levi Miller	53132 BP:53022	GENERAL	ENVIRONMENTAL	2	KEWANEE
	30th CES/Zone 2	GSA	Randy Obert	58636	GENERAL	HEATING	2	KEWANEE
	30th CES/Zone 2	2SLS BP:NASA	2 Lt Jim Miller & 2 Lt Tim Kohl	51446 BP: 65459	GENERAL	ENVIRONMENTAL	2	KEWANEE
	LBSS-Space Mark	?	Al Dollinger	53316	GENERAL	HEATING	2	AJAX
	30th CES/Zone 1	LGMHE	TSgt Dan Farley	65501	GENERAL	HOT WATER	1	KEWANEE
	30th CES/Zone 1	ENF-661	MSgt Marc Wintermute	68117	GENERAL	ENVIRONMENTAL	1	INDUSTRIAL BOILER
	Lockheed Martin	OLVNBG / Lockheed Martin	Ron Johnson	61518	RESTRICTED	ENVIRONMENTAL	3	CLEAVER BROOKS
	Lockheed Martin	OLVNBG / Lockheed Martin	Ron Johnson	61518	RESTRICTED	ENVIRONMENTAL	3	CLEAVER BROOKS
	30th CES/Zone 3	LGTTS BP: LGTT	SSgt Charles Brady BP: Leroy Arnold	68015	GENERAL	HEATING	3	AJAX
	30th CES/Zone 3				GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3	TMSL	MSgt Marcus Whiteside	68513	GENERAL	HEATING	3	AJAX
	30th CES/Zone 3	SESPD	Alejandro Unzueta	63784	GENERAL	HEATING	3	AJAX
	30th CES/Zone 3	LMTO	Allen Isaac	65502	GENERAL	HEATING	3	AMERICAN STANDARD
	30th CES/Zone 3	LMTO	Allen Isaac	65502	GENERAL	HEATING	3	FULTON
	30th CES/Zone 3	LMTO	Allen Isaac	65502	GENERAL	HEATING	3	FULTON
	30th CES/Zone 3	LMTO	Allen Isaac	65502	GENERAL	HEATING	3	FULTON
	30th CES/Zone 3	LMTO	Allen Isaac	65502	GENERAL	HEATING	3	FULTON
	30th CES/Zone 3				GENERAL	HEATING	3	CLEAVER BROOKS
	LBSS-Space Mark		Prm:Rob Northropp	52690	RESTRICTED	ENVIRONMENTAL	3	THERMIFIC
	LBSS-Space Mark		Alt: Don Buck	52306	RESTRICTED	ENVIRONMENTAL	3	THERMIFIC
	LBSS-Space Mark				RESTRICTED	ENVIRONMENTAL	3	THERMIFIC
er	30th CES/Zone 3	DET 9			GENERAL	HEATING	3	RITE ENGINEERING
ar	30th CES/Zone 3	DET 9			GENERAL	HEATING	3	LEGEND 2000
er	30th CES/Zone 3	DET 9			GENERAL	HEATING	3	LEGEND 2000
er	30th CES/Zone 3	DET 9			GENERAL	HEATING	3	LEGEND 2000
	LBSS-Space Mark	RLOC	Bob McCauley BP: Bob McKonski	60696	RESTRICTED		3	CLEAVER BROOKS
	30th CES/Zone 3		MSgt Zaldi Funlestas	63832	GENERAL	HEATING	3	PACIFIC BOILERS
	30th CES/Zone 3	RSS10	Richard Stalder	67281	GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3	SCSVH	MSgt Michael Drummond	65322	GENERAL	HOT WATER	3	AJAX
	30th CES/Zone 3	SCSVH BP: CEOPF	MSgt Michael Drummond BP: Vincent Peters	65322 BP: 63367	GENERAL	HOT WATER	3	AJAX
	30th CES/Zone 3	BP: CEOIPW	BP: Donald Grigg	65317	GENERAL	HEAT SWIMMING POOL	3	RAY PAK INC.
	n.a	30SVS/220			GENERAL	STEAM/HEATING	3	KEWANEE
	30th CES/Zone 3	30 SW/XPO	TSgt Patty Kiehne	69858	GENERAL	HEATING	3	AJAX
	30th CES/Zone 3				GENERAL	HEATING	3	RITE ENGINEERING
	30th CES/Zone 3	CEOF	Capt Pakulski	61600	GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3	CEH	TSgt Kerry Weems	52590	GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3	CEH	TSgt Kerry Weems	52590	GENERAL	HEATING	3	HYDROTHERM
	30th CES/Zone 3	CEH	TSgt Kerry Weems	52500	GENERAL	HEATING	3	HYDROTHERM
	30th CES/Zone 3	CEH	TSgt Kerry Weems	52590	GENERAL	HEATING	3	HYDROTHERM
	30th CES/Zone 3				GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3				GENERAL	HEATING	3	AVCO
	30th CES/Zone 3				GENERAL	HEATING	3	KEWANEE
	30th CES/Zone 3	CCB	MSgt Burns Forsythe	63449	GENERAL	HEATING	3	AJAX
	30th CES/Zone 3	CCB	MSgt Burns Forsythe	63449	GENERAL	HEATING	3	HYDROTHERM
	30th CES/Zone 3	CCB	MSgt Burns Forsythe	63449	GENERAL	HEATING	3	HYDROTHERM
ion)	30th CES/Zone 1	Det 1/ 750 SG	Capt David Bishop	57308	RESTRICTED	ENVIRONMENTAL	1	AJAX
ion)	30th CES/Zone 1	Det 1/ 750 SG	Capt David Bishop	57308	RESTRICTED	ENVIRONMENTAL	1	AJAX

Table 2.2
ENVVEST Pre-selected Candidate Boilers

ENVVEST Pre-selected Candidate Boiler Reference Number	Building	Operating Facility Description	Zone	Access	Class	Boiler Function	Boiler Manufacturer	Boiler Model Number	Boiler Serial Number	Heat Input Rating (MMBtu/hr)	Boiler Type (Fire or Water Tube)	Burner Type (Power or Atmospheric)	Fuel Type	Year Installed	Age
200	719	SLC 4 (LM)/Temperature Control to SLC	2	Restricted	E	Environmental	Cleaver Brooks	M4S-2000	4G017684	2.000	WATER TUBE	POWER	NG	Jan-88	11
300	719	SLC 4 (LM)/Temperature Control to SLC	2	Restricted	E	Environmental	Cleaver Brooks	M4S-2000	4G017685	2.000	WATER TUBE	POWER	NG	Jan-88	11
400	719	SLC 4 (LM)/Temperature Control to SLC	2	Restricted	E	Environmental	Cleaver Brooks	M4S-3000	4G017686	3.000	WATER TUBE	POWER	NG	Jan-88	11
500	719	SLC 4 (LM)/Temperature Control to SLC	2	Restricted	E	Environmental	Cleaver Brooks	M4S-3000	4G017687	3.000	WATER TUBE	POWER	NG	Jan-88	11
600	719	SLC 4 (LM)/Temperature Control to SLC	2	Restricted	E	Environmental	Cleaver Brooks	M4S-3000	4G017688	3.000	WATER TUBE	POWER	NG	Jan-88	11
1100	875	GSA/Comfort Heat	2	General	E	Heating	Kewanee	M-175-KG	98247	2.188	FIRE TUBE	POWER	NG	Jan-85	4
1300	880	45[illegible] S/Comfort Heat	2	General	E	Heating	Ajax	WGFN-2500	92-44183	2.500	WATER TUBE	POWER	P	Jan-91	6
1400	1900	30 MSL/GMHE/Comfort Heat	1	General	E	Hot Water	Kewanee	M-250-KGO	R6151	2.350	FIRE TUBE	POWER	P	Jan-94	5
1500	1819	DETS/ENF861/Comfort Heat	1	General	E	Heating	Industrial Boiler	PFDL50GAS	S5094	2.100	FIRE TUBE	POWER	P	Jan-92	7
1900	5500	30 TRAN/Comfort Heat	3	General	E	Heating	Ajax	WGFD-4250	87-39279	4.250	WATER TUBE	POWER	NG	Jun-91	8
1900	6523		3	General	E	Heating	Kewanee	M-335-KG	97975	3.350	FIRE TUBE	POWER	NG	Aug-93	6
2000	6801	30 MS/Comfort Heat	3	General	E	Heating	Ajax	WGB-2000	B30889	2.000	WATER TUBE	ATMOSPHERIC	NG	Jan-93	6
2100	7425	30 MSS/Comfort Heat	3	General	E	Heating	Ajax	WGB-2250D	AC-81-33744	2.250	WATER TUBE	ATMOSPHERIC	NG	Jan-81	18
2300	8314	30 CS/SCVS 740/Comfort Heat	3	General	E	Heating	Cleaver Brooks	MW-3000	G-12517-M4	3.000	WATER TUBE	POWER	NG	Jan-79	20
2600	6510	4 SLS/CMF 770/Comfort Heat	3	Restricted	E		Cleaver Brooks	M4S-2500	AG018483	2.500	WATER TUBE	POWER	NG		
2900	9065	30 SVS/Fitness Center/Comfort Heat	3	General	E	Heating	Pacific Boilers	84-255	1167N1562	2.500	WATER TUBE	ATMOSPHERIC	NG	Jan-84	15
3000	9320	1-SCA/Comfort Heat	3	General	E	Heating	Kewanee	M-265-KDO	R3433	3.313	FIRE TUBE	POWER	NG	Jan-81	18
3100	9340	30CS/Hot Water	3	General	E	Hot Water	Ajax	WGB-4250	AC-87-39483	4.250	WATER TUBE	ATMOSPHERIC	NG	Jan-87	12
3200	9340	30CS/Hot Water	3	General	E	Hot Water	Ajax	WGB-4250	AC-87-39484	4.250	WATER TUBE	ATMOSPHERIC	NG	Jan-87	12
3300	10145	30 CES/Swimming Pool/Water Heater	3	General	E	Heat Swimming Pool	Ray Pak, Inc.	P-300-1A-BEDRDGA	1291117883	3.000	WATER TUBE	ATMOSPHERIC	NG	Jan-87	12
3700	11439	30 CES/CEQ/500/Comfort Heat	3	General	E	Heating	Kewanee	L25100-G	P-2783	4.185	FIRE TUBE	POWER	NG	Jan-81	16
4200	13330	30 SVS/Comfort Heat	3	General	E	Heating	Kewanee	H35-100KG	10527	4.185	FIRE TUBE	POWER	NG	Nov-82	8
4300	23225	250 SG/Maintain Heat to Control Room	1	Restricted	E	Environmental	Ajax	WGGFD-4250	92-43822	4.250	FIRE TUBE	POWER	NG	Jun-92	7
4400	23225	250 SG/Maintain Heat to Control Room	1	Restricted	E	Environmental	Ajax	WGGFD-4250	92-43806	4.250	FIRE TUBE	POWER	NG	Jun-92	7

2.3. ENVVEST CANDIDATE BOILERS

Nineteen of the twenty-four ENVVEST Pre-Selected Candidate Boilers have undergone the final evaluation to determine their candidacy for the program. The retrofit or replacement decision for each boiler is based on the emission reduction potential, cost of retrofit or replacement, age of boiler, and overall condition. Determining the emission reduction potential for each ENVVEST Pre-Selected Candidate Boiler requires two key operating indicators: first, a baseline emission rate and second, annual fuel consumption. Each ENVVEST Pre-Selected Candidate Boiler has been baseline emission tested in accordance with the ENVVEST Emission Measurement Protocol. With the exception of one facility, Space Launch Complex 4's Mobile Service Tower Support Facility (Building 719), the last gas meter to monitor annual fuel consumption was installed in July 1997. By 1 September 1998, twelve consecutive months of fuel usage has been compiled for 19 of the 24 ENVVEST Pre-Selected Candidate Boilers in accordance with the ENVVEST Fuel Measurement Protocol to derive an annual fuel consumption rate.

On 29 September 1998, Vandenberg AFB submitted to the SBCAPCD the final evaluation (see Table 2.3, EERi Planning Report) conducted in accordance with the ENVVEST Emission Baseline Protocol and the ranking and scoring guidelines[1] of ENVVEST Boiler ERI & CF Study for the 19 ENVVEST Pre-Selected Candidate Boilers. The final evaluation revealed that only 4 of the ENVVEST Pre-Selected Candidate Boilers qualified to be an ENVVEST Candidate Boiler. In other words, only 4 boilers were found to be feasible and cost effective for retrofit or replacement under the ENVVEST program.

In order to meet the ENVVEST program milestones specified in the FPA, Vandenberg AFB had prematurely begun retrofit and replacement projects on three of the ENVVEST Pre-Selected Candidate Boilers that did not make the final cut. It was assumed that several boilers would have made the ENVVEST Candidate Boiler list. However, after consultation with the SBCAPCD, it was decided that these three boilers would be added to the ENVVEST Candidate Boiler list. On 29 October 1998, Vandenberg submitted to the SBCAPCD the ENVVEST Candidate Boiler list consisting of the seven boilers shown in Table 2.3-1.

Table 2.3-1
ENVVEST Candidate Boilers

Reference #	Building #	Heat Input Rating (MMBtu/hr)	R&R Type	Status
1400	1800	2.05	Retrofit	Completed 8/98
1900	6523	3.35	Retrofit	To be awarded 2/99
2000	6601	2.00	Retrofit	Completed 5/98
2800	8510	2.50	Replacement	Completed 12/98
2900	9005	2.50	Replacement	Completed 3/98
3300	10145	3.00	Replacement	Completed 4/98
4100	13330	4.185	Retrofit	Scheduled for 2/99

Only five additional boilers located in Building 719, Mobile Service Tower Support Facility, await further evaluation, once 12 consecutive months of fuel data have been collected. The boilers at Building 719 provide environmental climate control during payload processing

[1] Ranking and scoring guidelines for the ENVVEST Pre-Selected Candidate Boilers were cited in Tables 2.3.1 and 2.3.2 of the 29 June 1998 Semiannual Progress Report.

TABLE 2.3

EERi Planning Report

Ref. #	*Building #*	*Average Temp (R)*	*Average Pressure (in. Hg)*	*Pre RR Natural Gas Usage (scf)*	*Pre RR Propane Usage (scf)*	*Post RR Natural Gas Usage (scf)*	*Post RR Propane Usage (scf)*	*ENOxpre (lb/MMBtu)*	*ENOxpost (lb/MMBtu)*	*CEpre (%)*	*CEpost (%)*	*AHIpre (MMBtu/yr)*	*AHIpost (MMBtu/yr)*	*AERpre (lb/yr)*	*AERpost (lb/yr)*	*EERi (lb/yr)*
1100	875	536.00	29.57	712501.57	0.00	0.00	0.00	0.08	0.02	74.71	80.00	746.13	666.68	59.16	12.72	46.46
1300	885	518.70	29.57	0.00	10936.87	0.00	0.00	0.06	0.02	74.58	80.00	1300.72	832.67	57.84	16.79	41.05
1400	1600	518.70	29.57	0.00	26571.71	0.00	0.00	0.12	0.02	76.77	80.00	2431.31	2293.93	282.52	43.09	239.43
1500	1619	518.70	29.57	0.00	29897.16	0.00	0.00	0.07	0.02	83.63	80.00	2744.74	2869.26	181.15	52.22	128.93
1600	5500	536.00	29.57	864868.07	0.00	0.00	0.00	0.07	0.02	72.10	80.00	908.13	818.45	67.20	14.73	52.47
1900	8523	536.00	29.57	9045214.27	0.00	0.00	0.00	0.10	0.02	80.78	80.00	9497.47	9560.06	922.20	172.62	749.58
2000	6601	536.00	29.57	3413424.19	0.00	0.00	0.00	0.13	0.02	56.58	80.00	2584.10	2938.44	465.93	45.69	420.24
2100	7425	536.00	29.57	1016945.21	0.00	0.00	0.00	0.13	0.02	68.66	80.00	1067.76	918.41	141.91	16.71	125.20
2300	8314	536.00	29.57	1521576.01	0.00	0.00	0.00	0.07	0.02	78.80	80.00	1597.87	1536.05	117.93	27.65	90.28
2600	8510	536.00	29.57	4536452.50	0.00	0.00	0.00	0.10	0.02	69.47	80.00	4763.28	4136.31	484.90	75.28	409.62
2900	9005	536.00	29.57	988119.77	0.00	0.00	0.00	0.14	0.02	73.93	80.00	1037.53	958.80	149.71	17.26	132.46
3000	9320	536.00	29.57	285809.08	0.00	0.00	0.00	0.07	0.02	78.14	80.00	299.85	285.42	20.75	5.19	15.56
3100	9340	536.00	29.57	1492572.56	0.00	0.00	0.00	0.14	0.02	73.99	80.00	1567.20	1449.47	220.66	26.38	194.28
3200	9340	536.00	29.57	1492572.56	0.00	0.00	0.00	0.14	0.02	73.99	80.00	1567.20	1449.47	220.66	26.38	194.28
3300	10145	536.00	29.57	8057563.38	0.00	0.00	0.00	0.18	0.02	75.87	80.00	8460.44	8023.67	1495.81	144.43	1351.38
3700	11439	536.00	29.57	1456570.21	0.00	0.00	0.00	0.08	0.02	77.47	80.00	1529.43	1481.03	129.69	27.10	102.59
4100	13330	536.00	29.57	4359813.87	0.00	0.00	0.00	0.08	0.02	73.45	80.00	4577.80	4203.60	361.65	70.61	291.04
4300	23225	536.00	29.57	1027139.57	0.00	0.00	0.00	0.02	0.02	75.94	80.00	1078.50	1019.72	16.39	18.35	-1.96
4400	23225	536.00	29.57	1027139.57	0.00	0.00	0.00	0.02	0.02	73.58	80.00	1078.50	991.68	24.70	18.15	6.55

activities at Space Launch Complex 4 (SLC-4). Due to mission constraints, Vandenberg AFB had to wait until July 1998 for a window of opportunity to interrupt natural gas supply at SLC-4 for installation of a new rotary gas meter. The final evaluation of the boilers at Building 719 will be completed by August 1999.

3. STATUS OF R&R BOILER PROJECTS

3.1. ENVVEST BOILERS

Through the investigation and implementation of advanced emission reduction technologies, Vandenberg AFB is demonstrating the effectiveness and difficulties of controlling air pollution with pollution prevention methods. The initiatives outlined below have applied innovative pollution prevention techniques in reducing emissions from the ENVVEST Candidate Boilers. Advanced burner developments provide for the reduction of NOx emissions through alterations in the burner configuration, eliminating the need for traditional post exhaust controls. By working directly with technology vendors, Vandenberg AFB has applied low (<30 ppmvd NOx @ 3% O_2) to advanced ultra-low (<15 ppmvd NOx @ 3% O_2) emission reduction technology. Although Vandenberg AFB has been very successful at reducing NOx emissions from boilers on base, there have been some difficulties in application of advanced emission controls.

3.1.1. MISSILE MAINTENANCE FACILITY (BUILDING 1800)

This ENVVEST project involved retrofitting a propane fired 2.05 MMBtu/hr fire tube boiler, manufactured by Kewanee Boiler in 1994, with a fully modulating diffuser head forced (DHF) draft burner manufactured by S.T. Johnson Company. Johnson's Boiler & Control Inc. completed the burner retrofit on 3 September 1998. The Kewanee power burner was replaced with a new DHF draft burner along with a new refractory throat. The retrofit package utilized the existing gas train and burner management control system, adding to the cost effectiveness of this project. An FGR system was installed to introduce flue gas back into the combustion air on the intake side of the burner. This dilutes the incoming air and lowers the oxygen concentration in the combustion zone, while the recirculated flue gases absorb heat and reduce peak combustion temperatures; all of these are effective means of controlling NOx emissions. This is an inexpensive retrofit package, yet capable of achieving less than 30 ppm NOx. Vandenberg AFB conducted emission testing on the old and new units in accordance with the ENVVEST Emission Measurement Protocol. Test results showed an average baseline NOx concentration of 95.7 ppmvd @ 3% O_2 on the old unit, while the burner retrofit package achieved 29.5 ppmvd @ 3% O_2, a 69 percent reduction in NOx concentration.

3.1.2. REMOTE LAUNCH CONTROL CENTER (BUILDING 8510)

This ENVVEST project included replacing a gas fired 2.5 MMBtu/hr water tube boiler, manufactured by Cleaver Brooks with an Ajax Model HPG-2500 low-pressure steam boiler. Ajax has developed an advanced low NOx premix burner capable of achieving less than 20 ppm. This system uses a gas/air premix manifold. The burners are linked to a fully modulated blower mixer that precisely controls combustion through the full range of modulation. The burner bed provides a uniform heat distribution on all boiler tubes for improved heat transfer and boiler efficiency. Uniform heat distribution over the entire heating surface at each firing rate provides

longer tube life by eliminating concentrated heat on limited tube surfaces. R.F. MacDonald Company completed this boiler installation on 31 December 1998. Vandenberg AFB conducted emission testing on the old and new units in accordance with the ENVVEST Emission Measurement Protocol. Test results showed an average baseline NOx concentration of 83.9 ppmvd @ 3% O_2 on the old unit, while the new boiler achieved 18.1 ppmvd @ 3% O_2, a 78 percent reduction in NOx concentration. Additionally, the Ajax boiler achieved a slight increase in combustion efficiency, which also results in moderate fuel savings.

3.1.3. GYM & FITNESS CENTER (BUILDING 9005)

As previously discussed in the 29 June 1998 ENVVEST Semiannual Progress Report, this project replaced a 2.5 MMBtu/hr atmospheric burner, water tube boiler, manufactured by Pacific Boilers in 1984, with a 2.5 MMBtu/hr power burner installed in a new water tube boiler manufactured by PVI Industries, Inc. The Pyromat Radiation Stabilized power burner designed by Alzeta Corporation incorporates cylindrical burner surfaces that control heat flux uniformity to substantially lower NOx emissions. R.F. MacDonald Company completed this boiler installation on 18 March 1998. In addition to achieving low emissions, the manufacturers of this boiler package have set a goal of obtaining system certification from Underwriters Laboratory (UL).

Vandenberg AFB conducted emission testing on the old and new units in accordance with the ENVVEST Emission Measurement Protocol. Test results showed an average baseline NOx concentration of 118.8 ppmvd @ 3% O_2 on the old unit, while the new boiler achieved 8.7 ppmvd @ 3% O_2, a 93 percent reduction in NOx concentration. The average combustion efficiency on the old Pacific boiler was 73.9 percent efficient, while the PVI boiler achieved 79.5 percent, a 7 percent increase in combustion efficiency and proportional fuel savings.

This project has encountered several problems. The first was observed after installation was complete and the boiler was started up for operation and tuning. The gas line pressure did not remain relatively constant at 11" water gage (w.g.) pressure as expected, but instead fluctuated as low as 5" w.g. The drop in gas pressure caused the burner to "flame out" because it was originally designed to operate at higher pressures. This required a restriction of the gas plumbing configuration by resizing the orifice in the pressure regulator to accommodate the unexpected fluctuation in line pressure.

The second problem resulted from the fact that the new PVI boiler was configured to provide both space heating and hot water for the gymnasium. Previously two separate boilers were used, one for each application. Vandenberg AFB elected to leave the old hot water boiler in place to serve as a backup to the new PVI boiler during times of servicing. The new boiler was tied into the original hot water tank. The new configuration, setup for both heating and hot water, required additional heat transfer to the hot water tank. However, the new boiler could not dissipate heat readily enough causing it to overheat and constantly shut down. After extensive trouble shooting, it was observed that the original heat exchanger core in the hot water tank was undersized and plugged, due to hard water deposits. The heat exchanger was removed, cleaned, and replaced to correct this problem.

The third problem arose after several months of operation, resulting in the burner failing to re-ignite. After trouble shooting, it was observed that the electrodes had prematurely wore out.

This was due to the cyclical loading on the boiler causing it to constantly fire on and off. This was the first boiler project under the ENVVEST program with no baseline fuel consumption data. Knowing that the original boiler rated at 2.5 MMBtu/hr was slightly oversized for its application, it was assumed that a boiler of equal size would be sufficient to provide both heating and the additional hot water loads for the facility. However, after compiling sufficient fuel usage data from the facility it was realized that the boiler was grossly oversized for its application. To correct this problem, Alzeta Corporation has agreed to replace their burner with a new one, sized to half its current rating under the warranty agreement. This burner replacement will aid in the UL certification requirement as specified in the contract agreement.

It should be noted that Alzeta Corporation (burner manufacturer), R.F. MacDonald Company (boiler installation contractor), and Tetra Tech, Inc. (prime contractor), along with continued support from the Operations Flight under the Civil Engineering Squadron, have diligently worked to resolve all of the aforementioned problems encountered on this project.

3.1.4. BASE SWIMMING POOL (BUILDING 10145)

This boiler project, like the previous one, was discussed in the last report and has encountered several difficulties. This project replaced a 3.0 MMBtu/hr atmospheric burner, water tube boiler manufactured by Ray Pak, Inc. in 1987 with two 1.44 MMBtu/hr water tube boilers manufactured by Lochinvar. Replacement was decided due to the poor condition of the Ray Pak boiler and its history of maintenance problems. The two boilers were configured to operate on a lead-lag system, whereby each boiler operates on an as needed basis. This is designed to increase boiler efficiency with a tailored heating system that optimizes boiler operations to meet the pool heating requirements. Southern California Boiler, Inc completed the installation on 2 April 1998.

Vandenberg AFB conducted emission testing on the old and new units in accordance with the ENVVEST Emission Measurement Protocol. Test results showed an average baseline NOx concentration of 145.6 ppmvd @ 3% O_2 on the old unit, while the new boiler achieved 18.9 ppmvd @ 3% O_2, an 87 percent reduction in NOx concentration. The average combustion efficiency on the old Ray Pak boiler was 75.9 percent efficient, while the Lochinvar boiler achieved 81.7 percent, a 7 percent increase in combustion efficiency and proportional fuel savings. Although these numbers are impressive, nothing else is commensurate pertaining to this project.

This project has encountered extensive difficulties ranging from substandard work to faulty equipment. The first problem was observed upon completion of installation and initiation of start up, which resulted in numerous leaks on the inlet and outlet hot water plumbing. These leaks were immediately repaired, however, leakage continues to be a problem at unions made by both the installation contractor and the boiler manufacturer. The second problem was a constant shutdown of the boilers requiring HVAC maintenance crews to continually re-initialize the programming on the Techmar lead-lag controller. The problem was temporarily corrected through by-passing the controller and setting the boilers to operate manually. After extensive trouble shooting, it was finally determined that a faulty lead-lag controller was the problem. The third and most perplexing problem resulted in the boilers failing to bring the pool water up to temperature. Multiple service calls by Lochinvar representatives and Southern California Boiler, Inc. to diagnose the problem only resulted in finger pointing between the boiler manufacturer

and the installation contractor. Finally, the Maintenance Engineering Flight under Vandenberg's Civil Engineering Squadron, the Vice President of Southern California Boiler, Inc., and a third party representative from R.F. MacDonald were called in to diagnose the problem. Finally, all parties arrived at the same conclusion, that the flow rate generated by the main circulating pump exceeds the maximum flow rate capacity of the boilers. The flow is being restricted through the bypass line at the boilers and through the boilers themselves. The plumbing configuration in which the boilers were piped was correct in the sense that the units were set up as a secondary heat loop from the main system. However, the restriction in the bypass line of the main loop is forcing more flow through the boilers, which are unable to handle the larger volume of flow. This creates an insufficient retention time of the water passing through the boilers, failing to allow adequate heat transfer to the pool water. Simply removing the bypass line and installing a full 6" line in its place is an easy way to correct the flow volumes. These modifications are scheduled to occur in February 1999.

3.1.5. BREAKERS DINING HALL (BUILDING 13330)

The final boiler project is a true research and development initiative. This project includes retrofitting a 4.185 MMBtu/hr fire tube boiler, manufactured by Kewanee in 1992, with a 2.500 MMBtu/hr power burner, designed and patented by the Institute of Gas Technology (IGT). Field-testing on the Kewanee boiler determined the maximum firing range for this boiler is 0.4 to 3.5 MMBtu/hr, and that the normal operating range is 0.4 to 1.7 MMBtu/hr. Therefore, to optimize the boiler efficiency, the firing rate of the new burner will be de-rated from 3.5 to 2.5 MMBtu/hr for this retrofit application.

IGT's unique combustion system design, formally known as a forced internal recirculation (FIR) burner, combines two-stage combustion with premixed first stage gases and forced internal recirculation of flue gases to reduce the formation of NOx emissions. The FIR burner is designed to achieve ultra low emissions without the use of external flue gas recirculation or post combustion controls. IGT has successfully demonstrated this novel burner design in much larger industrial sized boiler applications. Vandenberg AFB will serve as the test bed for IGT's prototype burner in a common, commercially sized boiler application.

Since the last progress report the engineering design has been completed, the burner fabricated by Detroit Stoker Co., and tested by IGT at their Chicago, Illinois research facility. The test results showed an impressive 10 ppm NOx across the full firing range of the burner. The demonstration project was now ready to proceed to the final stage for installation and testing. On 7 December 1998, the burner retrofit was initiated. By the third day, the retrofit was complete and initiation of start up for burner optimization and tuning was ready to commence. Unfortunately, an unexpected phenomenon occurred that was not seen at IGT's research facility. There was instability between the first and second stage combustion zones, causing the power flame to constantly oscillate between stages. Unable to correct the problem on site, IGT decided to remove the burner and conduct further evaluations at their Chicago test facility. The original Kewanee burner was re-installed and the boiler was brought back online on 11 December 1998. Tentatively, the FIR burner installation has been rescheduled for late February or early March 1999.

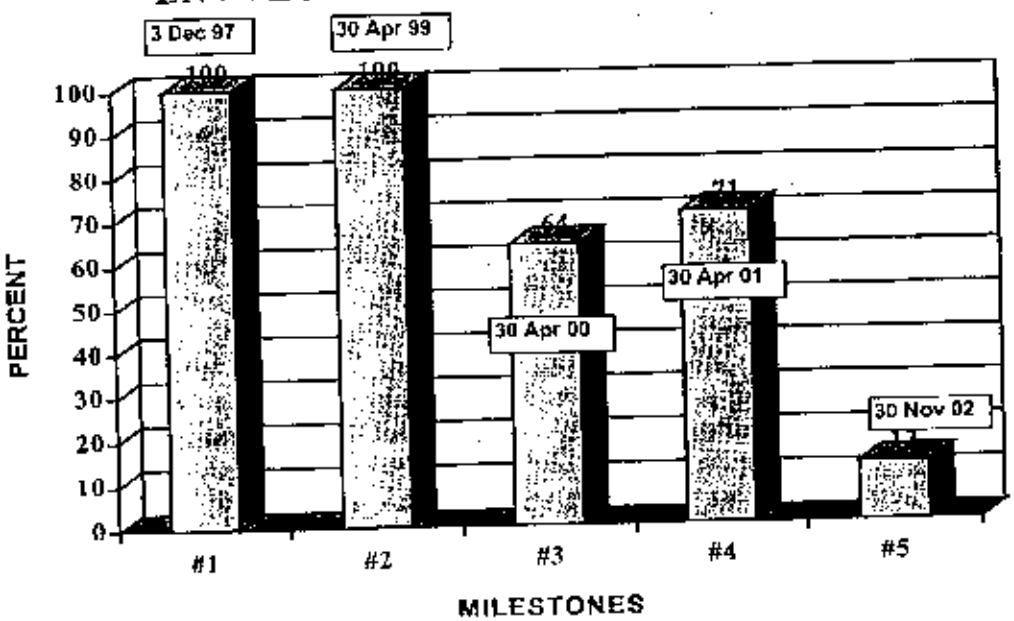
4. PROGRESS OF FPA MILESTONES

Through the process outlined in the FPA, Vandenberg AFB has agreed to the following milestones:

1. Within 30 days of execution of this Agreement, Vandenberg AFB shall complete the initial assessment and cost feasibility study.
2. By 30 April 1999, 30 percent of candidate boilers identified in milestone #1 are being retrofitted.[2]
3. By 30 April 2000, 2 tons per year of emission reductions shall have been accomplished.
4. By 30 April 2001, 70 percent of candidate boilers identified in milestone #1 are being retrofitted.
5. By 30 November 2002, Vandenberg AFB shall achieve a reduction in annual emissions of ozone precursors by 10 tons or more.

If any of the milestones are not met, the FPA will terminate and Vandenberg AFB will be required to comply with the requirements of Title V of the 1990 Clean Air Act Amendments. Table 4.1 shows Vandenberg AFB progress with respect to percent completion for each milestone.

Table 4.1
ENVVEST MILESTONE PROGRESS



[2] The term "being retrofitted" encompasses construction, testing, and monitoring of emission reductions.

5. ENVVEST EMISSION REDUCTION ASSESSMENTS & FEASIBILITY STUDIES

Vandenberg AFB is implementing a phased program, ultimately achieving an annual emission reduction of ozone precursors by at least 10 tons by 30 November 2002. The initial focus has been controlling emissions from boilers, furnaces, or process heaters. Realizing the shortfall of emission reductions from boiler projects, other initiatives are being explored to support attainment of the 10 ton reduction goal. Details of these efforts are discussed below.

5.1. SOUTH VANDENBERG POWER PLANT FUEL NOZZLE FEASIBILITY STUDY

This study was an assessment of retrofit options to reduce NOx emissions from five Allison 501-KB gas turbines located at the South Vandenberg Power Plant (SVPP). The retrofit options were limited to modifications to the combustion section of the turbines rather than add-on exhaust control technology. Ten retrofit options for NOx control were identified through a review of published technical articles, control technology guidelines prepared by the California Air Resources Board and the U.S. EPA, and discussions with gas turbine manufacturers and servicing representatives.

Each retrofit option was assessed based on the following criteria: potential NOx emission reductions, demonstrated performance, reliability and maintainability, associated system requirements, and economics. Four of the retrofit options were considered not to meet the assessment criteria, and therefore no further evaluation was performed for these options. The use of catalytic combustors appears to be the most promising NOx control technology for the Allison 501-KB gas turbines. The GENXON Power System and XONON Flameless Combustion System uses a catalyst to promote combustion below the NOx formation temperature. A pilot system has been successfully installed on a comparably sized General Electric gas turbine, and emission levels of 3.2 ppm NOx were demonstrated. This is much lower than the current SVPP emission levels of 25 ppmvd corrected to 15% O_2. The major drawback for this option is that it has not been demonstrated on an Allison gas turbine nor is it commercially available. The other five retrofit options assessed were found to be currently available and have predicted NOx emission levels ranging from 12 to 25 ppmvd at 15% O_2.

It has been determined that no pilot test program will be conducted at this time on the Allison 501-KB gas turbines based on the results of this assessment. The most promising retrofit option (catalytic combustors) is not currently available for the Allison gas turbines and is several years away from commercial application. Other available retrofit options do not appear to achieve sufficient reductions in NOx emission levels to be viable for further evaluation under the ENVVEST program.

5.2. INTERNAL COMBUSTION ENGINE (ICE) ASSESSMENT

Recent studies have demonstrated the availability of ICE control technology with sufficient NO_X emission reduction potential to be considered under the ENVVEST program. Specifically, studies by Battelle-Columbus Laboratory[3] have evaluated the ability of six different technologies to control NOx emissions from Air Force Aerospace Ground Equipment (AGE). Results of this study, which used a mobile electric power generator (Model A/M32A-86), showed that three of the control technologies were practical and achieved a 70 percent reduction in NO_X emissions without any increase in carbon monoxide (CO), hydrocarbon (HC), and particulate emissions.

The source applicability to the ENVVEST program was performed based on operating data presented in the 1995 and 1996 Comprehensive Emission Inventory, and previous study data. Previous study data include: data analysis by Battelle-Columbus Laboratory and Science Applications International Corporation (SAIC) AGE operations study at March AFB[4], which evaluates control technology options for diesel generators. In addition to these two studies, Engelhard, a manufacturer of control technology for diesel engines, was consulted on ICE control technology strategies. The assessment analyzed the potential emission reductions from applicable control technologies and their application for the ENVVEST ICE retrofit or replacement efforts.

The assessment focused on control technology applications for two groups of pre-selected ICEs (compressors rated at 190 and 375 cubic feet per minute [cfm]), which, if included under the ENVVEST retrofit and replacement program, would generate 2 to 3 tons per year of NOx reductions.

5.3. ZERO AND LOW VOC PAINT SUBSTITUTION

Vandenberg AFB is currently determining the emission reduction potential for volatile organic compounds (VOCs) from corrosion control, industrial facility painting, and architectural interior and exterior painting. A top down approach is being taken to accomplish this assessment. This includes evaluating painting and coating operations, determining the greatest VOC emission reduction potential, ranking painting and coating processes for ease of product substitution and greatest reduction, and listing zero or near zero VOC substitute products for the highest ranked processes.

The initial phase of this project identifies processes that use large quantities of paint, evaluates high usage processes for product substitution, calculates annual emissions based on product substitution, ranks evaluated processes, proposes baseline and quantification methods for SBCAPCD approval, and develops program protocols to quantify and track ENVVEST emission reduction credits.

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[3] "Evaluation of Air Emissions-Reduction Technologies for Aerospace Ground Equipment (Phase II: Green AGE Initiative)," Battelle Report to OC ALHSC/HRG, Wright-Patterson AFB, OH 45433, Contract No. F33657-92-D-2055, SICAC Task No. 123.9, December 20, 1996.

[4] "Aerospace Ground Equipment (AGE)," SAIC, Report to Headquarters, Air Force Reserve, Environmental Division HQ AFRES/CEV, March AFB, CA, Contract No. F08635-93-C-0152, SAIC Task No. 152-5-01, January 1997.

The painting and coating assessment will determine annual usage for the following operations:

- 30 CES/CEOHV (CE Paint Shop);
- Western Range Support Services contractor (ITT Federal Services);
- Launch Operations Support contractor (MCA, Inc.); and
- Military Family Housing maintenance contractor (Valenzuela Engineering).

Next, Vandenberg AFB will identify those processes where the emission rate and potential emission reductions are the greatest. This will be accomplished by calculating an annual emission rate for each process. Annual emission rates will be based on annual usage and the VOC concentration of each coating or paint product. Results from this effort will be documented and each process will be ranked based on the annual emission rate and amenability for product substitution.

Manufacturers and literature are being researched to identify available zero or near zero VOC paint substitutes. Substitution options for each application will be identified and ranked in accordance with the ENVVEST program criteria.

Starting with the highest ranked candidate process, Vandenberg AFB will work with each process operator to ensure the proposed product substitution recommendation is a viable option. Each effort will include (if applicable):

- Coordinating efforts between the coating manufacturer and the painting operators to identify coating applicability;
- Evaluating case history to back the manufacturer's specifications;
- "Beta-testing" the product at Vandenberg AFB; and
- Evaluating product durability, preparation, application, cleanup, and cost.

Upon completion, a list of coating alternatives for each identified process will be provided to the painters for review. The reduction potential for the top candidate processes is estimated at 5 tons per year.

5.4. TRIP REDUCTIONS for SLC-2 WASTEWATER RECLAMATION PROJECT

As part of the ENVVEST program, Vandenberg AFB is determining emission reductions generated from the future implementation of a wastewater reclamation system at Space Launch Complex 2 West (SLC-2W) facility. The wastewater reclamation system eliminates the need for using heavy-duty diesel trucks (HDDT) to transport industrial wastewater resulting from launch processes on North Vandenberg to the Industrial Wastewater Treatment Plant (IWTP) located on South Vandenberg.

Vandenberg AFB will evaluate the emissions generated from the discontinuance of loading, off-loading and hauling wastewater from the SLC-2W to the IWTP using HDDTs and supporting internal combustion engines on a per launch basis. An emission rate for the following activities will be determined. Activities will include:

- HDDT operation;
- Wastewater loading and offloading processes; and
- Fueling of the HDDT.

Emission reductions will be quantified based on historical HDDT fuel usage and activities associated with wastewater transportation for each launch operation. Vandenberg AFB will quantify baseline emissions, forecast emission reductions for future SLC-2W launch operations, and develop program protocols to quantify and track emission reduction credits.

Emissions will be quantified using California Air Resources Board approved methods and emission factors. From this effort, an average emission rate and reduction will be established. The emission rate and reduction credit will be based on the following:

- Average HDDT fuel usage;
- Average HDDT loading capacity;
- SLC-2W wastewater generation from launch activities;
- Transportation distance of wastewater to and from the IWTP from SLC-2W;
- Transportation distance of wastewater to and from the SLC-2W from its dispatch location; and
- Average number of trips to support launch activities.

It is estimated that the emission reduction potential for this project, when fully implemented, will generate less than 1/2 ton per year.

5.5. IRF PAINT BOOTH APPLICATION

This assessment looked at the requirements to reactivate the Integrated Refurbishment Facility (IRF) for use by the 576th Flight Test Squadron (FLTS). The IRF paint booth/abrasive blast system is located in Building 1900 on North Vandenberg AFB. The structure is a large hanger-type building with high-bay doors and railway access to the interior. The interior of Building 1900 consists of large high-bay assembly areas, 2-level office facilities, and a sub-enclosure (24 ft. wide x 109 ft. long x 26 ft. high) designed for the spray painting and abrasive blasting of large rail-car equipment and missile components.

The IRF was one of several facilities constructed on Vandenberg AFB between 1988 and 1990 to support the Peacekeeper Rail Garrison program. Under this program, the Air Force was planning to place a force of Peacekeeper missiles on trains throughout the continental United States. The trains, with their missiles on continuous strategic alert, would be parked inside alert shelters in secure garrisons at designed Air Force bases. However, the Air Force never conducted a single test flight from the Vandenberg Rail Garrison complex. A remarkable chain of events, including the fall of the Berlin Wall in 1989, the eventual dissolution of the Soviet Union in 1991, and the signing of the START treaty by Russia and the United States, all drastically changed the international political landscape. Hence, the Cold War had ended. Congress no longer saw a need for the Peacekeeper Rail Garrison program, and subsequently the IRF was never utilized.

There are several permitted paint booths in operation at Vandenberg AFB, including the IRF paint booth. All paint booths have particulate emission controls, however none are equipped with VOC controls with the exception of the IRF paint booth. This facility, at the time of its construction, was considered to have state-of-the-art emission controls for any painting

application. The paint booth is capable of achieving a combined capture and control efficiency of 88.5 percent for VOC emissions.

This assessment included the analyses of equipment condition, permit modifications necessary to comply with all SBCAPCD surface coating rules, and a cost analysis of paint booth operating costs. The 576th FLTS agreed to cover the paint booth operating costs providing ENVVEST supported the reactivation of the emission control system, provided technical training for maintenance and operation of the system, and performed the necessary permit modifications to reactivate the IRF under the 576th FLTS. For a nominal investment, Vandenberg has secured the 576th FLTS future use of this facility benefiting their operations, as well as the ENVVEST program and ultimately the environment. The estimated emission reductions should range from 1/2 to 1 ton per year.