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Vita

Captain Edwin H. Oshiba was born on 29 January 1966 in Hilo, Hawaii. He graduated from Waiakea High School in 1984 and entered undergraduate studies at Santa Clara University in Santa Clara, California. He graduated with a Bachelor of Science degree in Electrical Engineering in June 1988, and received his commission on 30 June 1988, through the Air Force Reserve Officer Training Corps.

Captain Oshiba's first assignment was to the 96th Civil Engineer Squadron, Dyess AFB, Texas, as the Chief of Readiness. He also served as an Electrical Design Engineer, and deployed in support of Operation DESERT STORM as the Deputy Base Civil Engineer. Since his first assignment, Captain Oshiba has served in a variety of positions, including Chief of Contract Management and Chief of Engineering at Kunsan Air Base, South Korea, and Command Unaccompanied Housing Manager and Executive Officer to The Civil Engineer at Air Force Space Command. He received his regular commission in November 1995 and graduated from Squadron Officer School in February 1996. In May 1996, he entered the Graduate School of Engineering, Air Force Institute of Technology.

Upon graduation, Captain Oshiba will be assigned to the 1st Civil Engineer Squadron, Langley Air Force Base, Virginia.

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SINGLE

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APPENDIX 1-1: Inventory of U.S. Installations in Korea (89)

U.S. Army Installations				
Installation	Major Function	Acres	Sq Km	Government Cost
Camp Stanton	ADA Battalion	68	0.28	\$7,838,200
Camp Gray Annex	Administrative Offices	2	0.01	\$289,900
Far East District, COE	Administrative Offices	11	0.04	\$2,547,700
Beason	AFKN Signal Site	4	0.02	\$599,800
Brooklyn	AFKN Signal Site	34	0.14	\$328,600
Charlie Block	AFKN Signal Site	7	0.03	\$232,900
Dart Board	AFKN Signal Site	10	0.04	\$606,100
High Point	AFKN Signal Site	11	0.04	\$217,300
Morse	AFKN Signal Site	7	0.03	\$408,300
Richmond	AFKN Signal Site	14	0.06	\$311,600
Salem	AFKN Signal Site	11	0.04	\$509,500
Tacoma	AFKN Signal Site	8	0.03	\$293,800
Camp Humphreys	Airfield/Troop Support	1,249	5.05	\$81,690,800
Camp Kwang Sang-Ri	Ammunition	31	0.13	\$49,000
Camp Ames	Ammunition Storage	20	0.08	\$976,800
Camp Essayons	Artillery Battalion	77	0.31	\$14,989,200
Camp Pelham	Artillery Battalion/Brigade Company	77	0.31	\$23,075,800
Camp Stanley	Artillery/Aviation Battalion	567	2.29	\$56,141,400
Alamo ASA	ASA Site	8	0.03	\$657,800
Kamaksan ASA	ASA Site	48	0.19	\$687,000
Koryosan ASA	ASA Site	11	0.04	\$419,600
Hwaaksan Evenreach	ATC Site	2	0.01	\$848,200
Papyongsan	ATC Site	0	0.00	\$139,600
K-16 Airfield	Aviation and Maintenance	202	0.82	\$17,093,000
Camp Eagle	Aviation Battalion	77	0.31	\$14,066,200
Camp LaGuardia	Aviation Battalion	34	0.14	\$8,596,300
Camp Page	Aviation Battalion	471	1.91	\$42,438,500
Camp Edwards	Brigade Support Area	83	0.34	\$12,713,500
Command Post Tango	Command Post	241	0.98	\$8,495,200
Camp Carroll	Depot	679	2.75	\$65,685,000
Masan Ammo Depot	Depot	1,059	4.29	\$1,215,400
Camp Red Cloud	Division HQ	207	0.84	\$37,006,900
DMZ South Half	DMZ Guard Post	0	0.00	\$1,459,800
Camp Castle	Engineer Battalion	51	0.21	\$8,651,400
Camp Nimble	Engineer Company	14	0.06	\$5,344,800
Camp Falling Water	Facility Engineer	59	0.24	\$2,464,200
Camp Giant	Facility Engineer	42	0.17	\$5,780,900
Niblo Barracks	Family Housing	7	0.03	\$1,012,400
Camp Yongin	Field Army Support	8	0.03	\$2,734,500
H-220 Heliport	Heliport	52	0.21	\$8,496,400
Yongsan Garrison	HQ USFK/EUSA	714	2.89	\$105,044,100
Camp Greaves	Infantry Battalion	59	0.24	\$15,592,000

U.S. Army Installations (Continued)				
Installation	Major Function	Acres	Sq Km	Government Cost
Camp Casey	Infantry Brigade	3,496	14.15	\$125,395,300
Camp Hovey	Infantry Brigade	3,928	15.90	\$50,349,900
Camp Howze	Infantry Brigade HQ	156	0.63	\$25,295,300
Camp Liberty Bell	Infantry Company	17	0.07	\$5,301,500
Freedom Bridge	Infantry Platoon	14	0.06	\$210,200
Kimpo Mail Terminal	Mail Terminal	3	0.01	\$13,000
Camp Sears	Maintenance Company	32	0.13	\$5,297,500
Camp Kyle	Maintenance Company/TISA	36	0.15	\$8,644,800
Chang Sang	Microwave Site	23	0.09	\$661,600
Camp Jackson	NCO Academy	953	3.86	\$8,119,800
Swiss-Swede	Neutral Nation	0	0.00	\$1,153,200
Camp Libby	POL Terminal	1	0.00	\$45,600
Kunsan POL	POL Terminal	16	0.06	\$3,237,000
EUSA Retreat Center	Recreation	5	0.02	\$265,300
Sungnam Golf Course	Recreation	230	0.93	\$0
K-9 Airfield	RS&O Facility	5	0.02	\$72,400
Camp Colbern	Signal Battalion	76	0.31	\$6,109,600
Concord	Signal Site	3	0.01	\$243,000
Madison	Signal Site	21	0.08	\$277,700
Shinbuk Relay	Signal Site	13	0.05	\$556,500
Camp Market	Storage	119	0.48	\$6,280,100
Pusan Storage Facility	Storage	65	0.26	\$13,457,400
Taegu Storage Facility	Storage	2	0.01	\$104,000
Camp Hialeah	Support Installation	135	0.55	\$20,554,900
Camp Long	Support Installation	85	0.34	\$10,935,500
Camp Walker	Support Installation	192	0.78	\$41,425,600
Camp Henry	TAACOM HQ	59	0.24	\$21,543,800
Pier #8	Terminal	10	0.04	\$1,096,200
Chejudo Training Facility	Training	48	0.19	\$1,065,900
Bayonet Training Site	Training Area	1,003	4.06	\$0
Bull's Eye #1	Training Area	21,177	85.70	\$4,723,000
Bull's Eye #2	Training Area	1,391	5.63	\$0
Gimbols	Training Area	7,486	30.30	\$0
Gun Training Area	Training Area	219	0.89	\$0
Mobile	Training Area	2,761	11.17	\$0
Pyongtaek CPX	Training Area	90	0.36	\$481,900
Watkins Range	Training Area	45	0.18	\$0
Yongpyong	Training Range	3,211	12.99	\$7,556,700
Camp Bonifas	UNC Security Force HQ	36	0.15	\$8,933,800
Joint Security HQ	UNCMAC	0	0.00	\$1,334,800
Army Subtotal:		53,498	216.51	\$938,492,200

US Navy Installations				
Installation	Major Function	Acres	Sq Km	Government Cost
Chinhae	USN FLTACT HQ	76	0.31	\$7,240,200
Pohang Depot	USMC Training Center	1	0.00	\$386,850
<i>Navy Subtotal:</i>		77	0.31	\$7,627,050
US Air Force Installations				
Osan Air Base	Airbase (MOB)	1,780	7.20	\$252,477,784
Kunsan Air Base	Airbase (MOB)	2,549	10.32	\$173,438,755
Suwon Air Base	COB	32	0.13	\$16,631,078
Taegu Air Base	COB	752	3.04	\$22,764,241
Kwangju Air Base	COB	316	1.28	\$33,673,974
Kimhae Storage Facility	COB	86	0.35	\$10,089,780
Pil-Sung Air Range	Training Area	28	0.11	\$739,896
Sachon Storage Facility	Storage	3	0.01	\$226,616
Kooni Air Range	Training Area	439	1.78	\$437,348
Osan-Ni Ammo Storage	Ammunition Storage	604	2.44	\$740,967
Chongju Air Base	COB	4	0.02	\$37,489
Choejong-San	Satellite Tracking	42	0.17	\$2,435,277
Wonju Air Station	Seismic Monitor	93	0.38	\$1,846,845
Seoul House	Restaurant	1	0.00	\$7,463
Radio Beacon Site	Signal Site	1	0.00	\$0
<i>Air Force Subtotal:</i>		6,730	27.24	\$515,547,513
<i>USFK Total:</i>		60,305	244.05	\$1,461,666,763

Notes:

1. MOB: Main Operating Base
2. COB: Collocated Operating Base. The installation is operated and maintained by the ROK Air Force in peacetime; during contingencies, U.S. Air Force assets arrive and the installation comes under operational control of USFK. DoD supports some limited construction and maintenance and repair.

APPENDIX 1-2: Terms Explained

AF: Air Force (United States).

ARAR: Applicable or Relevant and Appropriate Requirements. 42 U.S.C § 9621(d)(2)(a) defines ARARs as:

1. Any standard, requirement, criteria, or limitation under any federal environmental law; and,
2. Any promulgated standard, requirement, criteria, or limitation under a state environmental or facility siting law that is more stringent than any federal standard. (96:238)

Aquifer: An underground geological formation, or group of formations, containing usable amounts of ground water that can supply wells and springs.

Ash: The mineral content of a product remaining after complete combustion.

Attenuation: The process by which a compound is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation.

Biological Treatment: A treatment technology using bacteria to consume organic waste.

Bioremediation: Use of living organisms to clean up oil spills or remove other pollutants from soil, water, or wastewater.

BOD₅: Five-day biochemical oxygen demand test. The BOD₅ measures the total amount of oxygen consumed by microorganisms during the first five days of biodegradation in a 300 mL bottle. The test is conducted under controlled conditions—complete darkness, stoppered bottle to keep air from replenishing dissolved oxygen removed by biodegradation, and a fixed temperature of 20 degrees Celcius (102:118).

CDIP: Combined Defense Improvements Program. A ROK burdensharing program which builds facilities which directly support the warfighting mission for USFK forces. The design and construction CDIP projects are under the complete control of MND.

Cleanup: Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term “cleanup” is sometimes used interchangeably with the terms remedial action, removal action, response action, or corrective action.

COE: Corps of Engineers. In this text, COE normally refers to the Far East District COE. They are responsible for providing technical engineering support (design, construction management, and environmental services) for DoD organizations in South Korea.

Commercial Waste: All solid waste emanating from business establishments such as stores, markets, office buildings, restaurants, shopping centers, and theaters.

Construction and Demolition Waste: Waste building materials, dredging materials, tree stumps, and rubble resulting from construction, remodeling, repair, and demolition of homes, commercial buildings and other structures and pavements. May contain lead, asbestos, or other hazardous substances.

Contaminant: Any physical, chemical, biological, or radiological substance or matter having an adverse effect on air, water, or soil.

Contamination: Introduction into water, air, and soil, of microorganisms, chemicals, toxic substances, wastes, or waste water in a concentration making the medium unfit for its next intended use. Also applies to surfaces of objects, buildings, and various household and agricultural use products.

DERP: Defense Environmental Restoration Program. The DERP, codified in 10 USC 2701 through 2708, describes the DoD restoration program, and is similar to the Superfund in that it provides funds necessary to accomplish cleanup at DoD installations in the United States and mandates use of a relative risk assessment model to prioritize and rank health risks associated with hazardous waste sites.

Disposal: Final placement or destruction of toxic, radioactive, or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous material from removal actions or accidental releases. Disposal may be accomplished through use of approved secure landfills, surface impoundments, land farming, deep-well injection, ocean dumping, or incineration.

DoD: Department of Defense.

DODD: Department of Defense Directive. DoD document which provides binding policy for Defense Department organizations.

DODI: Department of Defense Instruction. DoD document which outlines guidance for Defense Department organizations. Generally, DODIs provide specific instructions which, if followed, fulfill DoD policy stated in DODDs, OSD policy memorandums, executive orders, and U.S. law.

Dump: A site used to dispose of solid waste without environmental controls.

DUSD(ES): Deputy Undersecretary of Defense for Environmental Security. The principle environmental policy-making organization within DoD.

ECAMP: Environmental Compliance and Management Program. An Air Force program to measure compliance with environmental policy and regulations, and determine the overall health of the environmental management program at a specific installation.

ECAS: Environmental Compliance Assessment System. Army equivalent of ECAMP.

EPO: USFK Environmental Programs Office.

EUSA: Eighth United States Army

FED: Far East District, Corps of Engineers. This regional office has responsibility for all Corps of Engineers endeavors in South Korea.

FGS: Final Governing Standards. A combination of host-nation environmental standards and the OEBGD applicable DoD operations in a specific foreign country. The FGS should adopt the most stringent of host-nation and OEBGD standards, considering political, economic, and technical factors.

Filling: Depositing dirt, mud, or other materials into aquatic areas to create more dry land, usually for agricultural or commercial development, often with ruinous ecological consequences. Also known as land reclamation.

Garbage: Animal and vegetable waste resulting from the handling, storage, sale, preparation, cooking, and serving of foods.

Generator: 1. A facility or mobile source emitting pollutants into the air or releasing hazardous waste into water or soil. 2. Any person, by site, whose act or process produces related medical waste or whose act first causes such waste to become subject to regulation.

Groundwater: The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs.

Ground-Water Discharge: Ground water entering near coastal waters which has been contaminated by landfill leachate, deep well injection of hazardous wastes, septic tanks, etc.

Hazardous Waste: By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Hazardous Waste Landfill: An excavated or engineered site where hazardous waste is deposited and covered.

Household Waste (Domestic Waste): Solid waste, composed of garbage and rubbish, which normally originated in a private home or apartment house. Domestic waste may contain a significant amount of toxic or hazardous waste.

Immediately Dangerous to Life and Health (IDLH): The maximum level to which a healthy individual can be exposed to a chemical for 30 minutes and escape without suffering irreversible health effects or impairing symptoms.

Incineration: A treatment technology involving destruction of waste by controlled burning at high temperatures, e.g., burning sludge to remove the water and reduce the remaining residues to a safe, nonburnable ash that can be disposed of safely on land, in some waters, or in underground locations.

Incinerator: A furnace for burning waste under controlled conditions.

Industrial Waste: Unwanted materials from an industrial operation; may be liquid, sludge, solid, or hazardous waste.

Infectious Waste: Hazardous waste with infectious characteristics, including contaminated animal waste, human blood and blood products, isolation waste, pathological waste, and discarded sharps (needles, scalpels, or broken medical instruments).

Irreversible Effect: Effect characterized by the inability of the body to partially or fully repair injury caused by a toxic agent.

Landfills: 1. Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. 2. Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

Leachate: Water that collects contaminants as it trickles through wastes, pesticides, or fertilizers. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.

Leaching: The process by which soluble constituents are dissolved and filtered through the soil by a percolating fluid.

MCL: Maximum Contaminant Level

Media: Specific environments—air, water, soil.

Mitigation: Measures taken to reduce adverse impacts on the environment.

MND: Ministry of National Defense, Republic of Korea. Equivalent to U.S. DoD.

MOE: Ministry of Environment, Republic of Korea. Equivalent to U.S. EPA.

Monitoring: Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements and/or pollutant levels in various media or in humans, plants, and animals.

O&M: Operations and Maintenance (funds).

OSD: Office of the Secretary of Defense.

OEBGD: Overseas Environmental Baseline Guidance Document. Promulgated by DoD, the overseas environmental standards applies to all DoD operations overseas, including those with host-nation Final Governing Standards.

PAH: Polycyclic aromatic hydrocarbon. Multi-(benzene) ring structure, many of which are either suspected or known carcinogens or mutagens. Examples include naphthalene, anthracene, and phenanthrene.

POL: Petroleum, Oils and Lubricants.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution: Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects.

Release: Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous or toxic chemical or extremely hazardous substance.

Remediation: Cleanup or other methods used to remove or contain a toxic spill or hazardous waste.

ROK: Republic of Korea

SVOC: Semi-volatile organic compound (see VOC). SVOCs are somewhat akin to VOCs, with a lower volatility point.

SOFA: Status of Forces Agreement between the U.S. and the host-nation. The SOFA outlines the "rules of engagement" for basing U.S. forces in a foreign country, and includes such provisions as jurisdiction over crimes, condition of facilities and land prior to return to the host-nation, claims for damage to off-installation property, and use of commercially-available utility services. In most cases, "SOFA" as used in the thesis refers to the U.S./ROK SOFA.

Solid Waste: Non-liquid, non-soluble materials ranging from municipal garbage to industrial wastes containing complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid waste also refers to liquids and gases in containers.

Toxic Substance: A chemical or mixture that may present an unreasonable risk of injury to health or the environment.

Toxic Waste: A waste that can produce injury if inhaled, swallowed, or absorbed through the skin.

Treatment: 1. Any method, technique, or process designed to remove solids and/or pollutants from solid waste, waste streams, effluents, and air emissions. 2. Methods used to change the biological character or composition of any regulated medical waste so as to substantially reduce or eliminate its potential for causing disease.

U.S. EPA: United States Environmental Protection Agency

USFK: United States Forces Korea; the joint Army, Air Force, and Navy command structure overseeing DoD combat operations in South Korea.

VOC: Volatile organic compound. A class of contaminants most commonly found in groundwater. VOCs are often used as solvents in industrial processes, and a number of them are either known or suspected carcinogens or mutagens. Because of their volatility, VOCs are normally not found in high concentrations (ppb) in surface water; however, in groundwater, their concentration can be in orders of magnitude greater (102:116)

Waste: 1. Unwanted materials left over from a manufacturing process. 2. Refuse from places of human or animal habitation.

Won: Korean measure of currency. 780 won is approximately equal to US\$1.00.

APPENDIX 2-1: Interview Questions

I. BASIC INFORMATION (Interviewees)

1.	NAME:		
2.	TITLE:		
3.	ORGANIZATION:		
4.	MAILING ADDRESS:		
5.	PHONE:		
6.	FAX:		
7.	E-MAIL ADDRESS:		
8.	TIME IN CURRENT POSITION:	YRS:	MO:
9a.	EXPERIENCE IN ENVIRONMENTAL CAREER FIELD	YRS:	MO:
9b.	List past experience in environmental career field, if applicable.	(Continue on attached sheet, if appropriate)	
10.	EDUCATIONAL LEVEL (List undergraduate and graduate degrees held. Example: "BS—Civil Engineering" "MS—Eng and Envr Management" "PhD—Envr Engineering"		
11.	AREA(S) OF ENVIRONMENTAL INTEREST		

I. CURRENT ENVIRONMENTAL POLICY ISSUES:

	Question	Korean Univ	MOE	MOD	US
1.	Of the various media (air, water, soil), which presents the greatest challenge and garners the highest priority today? Why?	√	√		
2.	Of the "four pillars" of environmental management—clean-up, compliance, conservation, and pollution prevention—which pillar would you say receives the greatest emphasis from the Korean government? Why? Which would you want to emphasize?	√	√	√	√
3.	If clean-up (of which hazardous waste site remediation is a subset) is not the highest priority, where does this issue rank among national environmental problems? (Answer should include a qualitative answer rather than a number ranking).	√	√	√	√
4.	How would you characterize the "health" of the environment in Korea as related to human hazards? Describe what you mean by "health".	√	√	√	√
5.	Do you believe current levels of hazardous wastes in the environment pose a serious health hazard to the general public? "Serious" health hazard is defined as causing greater than 1 death in 1,000 individuals. a. What hazardous waste poses the greatest risk to humans? b. If a hazardous waste does not pose the greatest risk to humans, what substance does?	√	√	√	
6.	How would you characterize the level of government enforcement within the hazardous waste arena? Choose among the percentage of polluters which are not punished for unauthorized release of hazardous wastes and provide a qualitative explanation for your answer. Very High (Less Than 10%) High (Less Than 20%) Mediocre (Less Than 30%) Below Average (Less Than 40%) Poor (Less Than 50%)	√	√	√	
7.	Do you believe environmental issues currently receive the "appropriate" level of support from the Korean government? Why or why not? "Support" is defined as political attention, as measured by the time spent by legislators on investigating and developing appropriate laws and policy for environmental protection	√	√	√	
7a.	In reference to the question above, do you believe the level of funding from the Korean government is sufficient to meet current environmental needs?	√	√	√	

	Question	Korean Univ	MOE	MOD	US
7b.	In reference to the question above, do you believe the level of enforcement is sufficient to meet environmental needs?	√	√	√	
7c.	In reference to the question above, do you believe polluters are adequately punished when found guilty for environmental "crimes"?	√	√	√	
8.	How would you characterize the level of environmental awareness among the general population? (Does preservation of the environment enter into everyday decisions?)	√	√	√	
9.	How would you characterize the level of environmental awareness among the business community? (Does preservation of the environment enter into business decisions?)	√	√	√	
10.	The current Status of Forces Agreement (SOFA) between the Korean government and US states, "The Government of the United States is not obliged, when it returns facilities and areas to the Government of the Republic of Korea on the expiration of this Agreement or at an earlier date, to restore the facilities and areas to the condition in which they were at the time they became available to the United States armed forces, or to compensate the Government of the Republic of Korea in lieu of such restoration." Do you believe this is fair? If not, what recommendation(s) for change would you make?	√	√	√	√
11.	Should US installations comply with US environmental regulation and policies in Korea? Why or why not?	√	√	√	√
11a.	Should US installations comply with Korean environmental law and neglect US law, regardless of which country's regulations are more stringent? Why or why not?	√	√	√	√
11b.	Should US installations comply with US environmental law and neglect US law, regardless of which country's regulations are more stringent? Why or why not?	√	√	√	√
11c.	Should the cost of remediation be considered in the decision process? Why or why not?	√	√	√	√
11d.	Would you feel application of US environmental law to DoD installations in Korea would infringe upon the sovereignty of South Korea? In other words, would application of US environmental law on DoD installations in Korea encroach on the authority of the Republic of Korea to implement its own decision on the matter?	√	√	√	√
11e.	Should future liability be considered in the decision process (the concept of "joint and several liability")? Why or why not? This may require explanation of the US CERCLA to Korean officials.	√	√	√	√
11f.	If the US decided to implement NEPA procedures to DoD installations in Korea, how would the Korean public react to the public hearing process? Favorably? Unfavorably? Not interested?	√	√	√	

	Question	Korean Univ	MOE	MOD	US
12.	Should the US remediate hazardous waste sites on DoD installations in Korea: a. If US forces were responsible for creating the hazard? b. If the site poses a long-term hazard to humans? c. If the site poses an acute hazard to humans? d. If the site poses no known hazard to humans (short-term or long-term), but may adversely affect the ecosystem?	√	√	√	√
13.	What role does local governments play in environmental regulation and policy? Describe the environmental management organization at the local government level.	√	√	√	
14.	Describe the environmental engineering academic program at the undergraduate level. At the graduate level.	√			
15.	Is there a manifest system for tracking hazardous wastes from inception to disposal (much like the RCRA manifest system in the United States)? If not, how do regulators know how much waste is being generated, and where the waste is being ultimately disposed?	√	√		
16.	What are the hazardous wastes of greatest concern in Korea?	√	√		
17.	Landfills: a. What items are specifically banned from landfills within Korea (obtain list)? b. What percentage of those wastes are domestic wastes? c. How many landfills are currently operating within Korea? Is this sufficient to process all land-fillable wastes within the country? d. Is there a licensing process for landfills? If so, describe the process. e. Are there separate landfills specifically designated for hazardous wastes? If so, what are the specifications for construction?	√	√		

	Question	Korean Univ	MOE	MOD	US
18.	Describe US responsibilities for environmental management at COBs, munitions storage areas, bombing ranges, communication sites, command and control centers (such as CP "Tango" and CP "Oscar"). Specifically, what are our environmental responsibilities (clean-up, compliance, conservation, pollution prevention)?			√	√
19.	<p>Explain the funding procedure for environmental projects in Korea as it applies to:</p> <p>a. Military installations. b. Other government entities.</p> <p>Specifically, at what level does authority exist for approving projects?</p> <p>Is funding separately appropriated for environmental projects as opposed to combined within appropriations for acquisition of aircraft, purchasing of supplies, construction of facilities, or other categories?</p> <p>Describe the procedure for approving environmental projects. Are there specific approval limits based on cost of the project? If so, where does the authority lie?</p>		√	√	
20.	<p>Are there periodic environmental assessments conducted at Korean military installations? If so, describe the process.</p> <p>a. How often are the assessments conducted?</p> <p>b. Who conducts the assessments?</p> <p>c. What items are assessed?</p>		√	√	
21.	<p>Do Korean military installations comply with Korean environmental law, or are there separate less stringent, or more stringent regulations which specifically govern them?</p> <p>If so, are Korean military installations specifically exempt from certain, specific laws?</p>		√	√	
22.	Is there a publicly-released document outlining the countries top polluters (such as the US Toxic Release Inventory)? If so, are Korean military installations obligated to report their releases on this list?	√	√	√	

	Question	Korean Univ	MOE	MOD	US
23.	<p>Is there an environment impact assessment requirement in Korea?</p> <p>a. If so, describe the process.</p> <p>b. Is the process applicable to military projects? Are there specific funding limits which trigger the requirement, or must the process be accomplished for every project?</p>	√	√	√	
24.	<p>Within the Ministry of Defense (or ROKA, or ROKA, or ROKN), how much priority does environmental security enjoy when compared to other traditional missions (organize, equip, train)?</p>		√	√	
25.	<p>Are there environmental training classes available within the military? If so, at what level (technician, first-line supervisor, installation commander, etc.)? Please provide any documentation outlining the training provided to students.</p>		√	√	
26.	<p>Where are analyses conducted for environmental samples taken on DoD installations?</p> <p>If Korean laboratories are used for analyses, what quality control/quality assurance measures are applied? Please provide copies of QA/QC documents.</p>				√
27.	<p>Describe the relationship between DoD environmental management organizations at the headquarters (or staff level) and installations, and the Korean government (local and national).</p>		√		√

II. PROJECTED ENVIRONMENTAL POLICY

	Question	Korean Univ	MOE	MOD	US
1.	Of the various media (air, water, soil), which presents the greatest challenge in the future? Why?	√	√		
2.	Of the "four pillars" of environmental management—clean-up, compliance, conservation, and pollution prevention—which pillar should receive the greatest emphasis from the Korean government in the future? Why? Which would you want to emphasize	√	√	√	
3.	Do you believe environmental policy and regulations in Korea will become more stringent in the future? a. In what areas (pollution prevention, conservation, compliance, clean-up) do you expect the most changes? b. Explain the kinds of changes you expect to occur.	√	√	√	
4.	If the United States decides to withdraw its forces from the Korean peninsula, should the United States be held liable for restoration of the land to pre-occupation conditions? Why or why not?	√	√	√	√
5.	In your opinion, do you think DoD Installations in Korea will have to comply with Korean environmental law (substantively) in the future? To what extent?	√	√	√	√
6.	Do you feel extending NEPA's procedures abroad would increase the number of lawsuits using NEPA as a vehicle to litigate over foreign relations and national defense policies?				√
7.	Do you feel such litigation, as well as implementing NEPA's procedural requirements, would disrupt U.S. relations with other countries and limit the President's ability to act with the kind of flexibility and dispatch often critical in the conduct of foreign affairs?				√
8.	Do you feel the litigation might also raise difficult constitutional questions of encroachment on the powers of the President?				√
9.	Would the Ministry of Defense approve environmental remediation projects as Host-Nation funded construction projects under CDIP (Combined Defense Initiative Program) or HNFC (Host-Nation Funded Construction)?			√	
10.	Would USFK be willing to support environmental projects funded under CDIP or HNFC? If the CDIP and HNFC budgets were adjusted to account for increased environmental spending?				√
11.	Would the Ministry of Defense be willing to support a joint US/ROK program to jointly fund environmental remediation projects at DoD installations?			√	

	Question	Korean Univ	MOE	MOD	US
12.	Would USFK be willing to support a joint US/ROK program to jointly fund environmental remediation projects at DoD installations?				√
13.	Would the Ministry of Defense be willing to support a joint US/ROK environmental assessment team to assess US and ROK installations?			√	
14.	Would USFK be willing to support a joint US/ROK environmental assessment team to assess US and ROK installations?				√
15.	<p>Would you have some potential remediation projects should policy change concerning justification for remediation projects in Korea?</p> <p>What are some potential projects?</p> <p>What would the prevalent types of remediation problems encountered (fuel spills, chlorinated solvents, etc.)</p>				√

III. TECHNOLOGY AND TECHNOLOGY TRANSFER ISSUES

	Question	Korean Univ	MOE	MOD	US
1.	What are the current remediation technologies employed in Korea? Which remediation technologies are most widely employed throughout the country?	√	√		
2.	Would you feel amiable toward technology transfer between the Korean and US governments? If so, under what conditions?	√	√		
3.	Do you know of any technology transfer agreements made between the Korean government and any entity within the United States (federal, state, or local government, or private organization)? If so, please provide the details of the agreement.	√	√		
4.	What form of hazardous waste treatment is most prevalent within Korea? Do you believe this is the "correct" technology to employ? If not, what would you recommend? Why?	√	√		
5.	Are there any specific remediation technologies currently employed within the US, but not in Korea, which you are interested in obtaining?	√	√		
6.	Where are majority of remediation technologies developed (military R&D centers, government-funded laboratories, commercial centers, etc.)? a. Is there a mechanism for sharing or transferring technologies between various entities? b. Is there a "clearinghouse" for remediation technologies. If so, please describe the process/organization of the "clearinghouse".	√	√	√	
7.	Is there patent or other legal "rights of ownership" limitations to transfer of technology within Korea? To transfer of technology to other countries?	√	√		
8.	Does Korea have international agreements for technology transfer with other countries? If so, name the countries and describe the agreement.	√	√		
9.	Would technology transfer issues impinge on US patent laws?				√
10.	Would technology transfer issues or other similar US aid from military organizations in Korea impinge upon the SOFA, or other security or treaty requirements? Specifically, are there any limitations on providing documents on remediation technologies to Korea?				√

Items to Obtain:

	Item	Korean Univ	MOE	MOD	US
1.	All applicable Ministry of Defense environmental regulations and policy statements (English translation, if available).			√	√
2.	All applicable Ministry of Environment regulations and policy statements (English translation, if available).	√	√		√
3.	Organizational diagram of the Ministry of Environment.		√		
4.	Organizational diagram of the Ministry of Defense, Environmental Division (or equivalent).			√	
5.	Organizational diagram of a "typical" installation-level, chain-of-command, showing environmental management office (if organization exists). Include separate diagram for ROKA, ROKAF, and ROKN, if chain-of-command structure is significantly different.			√	
6.	Listing of currently available hazardous waste site remediation technologies.	√	√	√	
7.	Listing of restoration projects at Korean installations (project type, project cost, status of clean-up, estimated completion date).		√	√	
8.	Environmental funding levels (current and projected years) for: a. Ministry of Environment b. Ministry of Defense c. ROKAF d. ROKA e. ROKN	√	√	√	
9.	Overall funding levels (current and projected years) for: a. Republic of Korea (government-funded programs) b. Ministry of Defense c. ROKAF d. ROKA e. ROKN	√	√	√	
10.	Copies of recent environmental assessments at Korean military installations.			√	
11.	Data on hazardous waste generation at Korean military installations (historical and projected).		√	√	
12.	Copies of recent environmental assessments at DoD military installations (including COBs). a. ECAMP b. ECAS c. Other environmental assessments/studies				√
13.	Copy of the Soil Protection Act of 1995	√	√	√	
14.	Historical and most recent hazardous waste statistics including: a. Total amount of hazardous waste generated b. Total amount of hazardous waste sent to landfills c. Total amount of hazardous waste disposed (other than landfilled)	√	√		

	Item	Korean Univ	MOE	MOD	US
15.	Historical and most data on hazardous waste sites and clean-up, including: a. Total number of sites b. Cost of clean-up c. Remediation technology employed	√	√		
16.	Data on hazardous waste site remediation technologies, including: a. List of "most favorable" remediation technologies (those technologies most often employed) b. Remediation R&D budget	√	√	√	
17.	Educational data: a. Number of universities offering undergraduate programs in environmental engineering b. Number of universities offering graduate programs in environmental engineering	√			
18.	List of current/future environmental projects (current FY plus five year projections) a. FY97 Program (O&M, MILCON, Host-Nation Funded, Environmental, Medical, NAF) b. FY98—FY03 POM Submission (projects and priorities)				√
19.	Local Guidelines a. Copy of local memorandum of agreements pertaining to environmental quality.		√		√
20.	Updates to FGS and other DoD environmental policy and regulations				√
21.	Updates to Korean environmental law and policy (English translations)				√

Note: The list of questions served as a guide during the various interview process. Interviewers were cautioned to temper questions as necessary to avoid antagonizing the interviewee, based on individual personalities and situations.

APPENDIX 3-1: DoD Policy and Regulations Applicable to Overseas Remediation

Document	Title	Reference	Policy/Directive/Instruction
DODD 4715.1	Environmental Security	Para D	"It is DoD policy to display environmental security leadership within DoD activities worldwide and support the national defense mission by...Protecting, preserving, and, when required, restoring, and enhancing the quality of the environment."
DODI 4715.5	Management of Environmental Compliance at Overseas Installations	Para B1f	"Does not apply to the determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities."
DODI 4715.8	Environmental Remediation for DoD Activities Overseas	Para B1	"This instruction applies to... b. Remediation of environmental contamination on DoD facilities or installations overseas, including DoD activities on host-nation installations or facilities. c. Remediation of environmental contamination caused by DoD operations, including training, that occur off a DoD installation or facility..."
		Para D2	"The Environmental Executive Agents...shall: a. Establish...remediation policy...the country-specific policy shall: (1) Define, or provide procedures to define, the appropriate level of remediation at contaminated sites; (2) Provide procedures for negotiating the scope of any required remedial measures with the host nation... (3) Provide procedures for furnishing documentation to the host government."
		Para D3	"The Heads of the DoD Components [SAF, SAA, SAN] shall: a. Remedy known environmental contamination... b. Resolve site-specific issues such as approving strategies for remediation and determining how best to use DoD Component resources."

Document	Title	Reference	Policy/Directive/Instruction
DODI 4715.8 (Continued)	Environmental Remediation for DoD Activities Overseas	Para E1a	"The DoD Components shall take prompt action to remedy known imminent and substantial endangerments to human health and safety due to environmental contamination that was caused by DoD operations and that is located on or is emanating from a DoD installation or facility."
		Para E3a	"The DoD Components shall take prompt action to remedy known imminent and substantial endangerments to human health and safety due to environmental contamination that was caused by current DoD operations at overseas location but that is not located on or emanating from a DoD installation or facility."
		Para E4a	"The decision as to whether a contaminated site poses an imminent and substantial endangerment shall be made by the in-theater commander of the DoD Component after consultation with the appropriate DoD medical authority and the DoD environmental Executive Agent..."
		Para E4b	"Projects...are considered completed when the contamination no longer poses an imminent and substantial endangerment to human health, environment, and safety. Commanders have the discretion to make risk-based decisions on how to carry out the remediation, ranging from institutional responses, such as restricting access, to more permanent remedies."
		Para E5	"...actual or anticipated...remediation costs incurred by the host nation for DoD-caused contamination on or emanating from DoD installations or facilities or caused by current DoD operations may be considered as an offset against the residual value of DoD capital improvements."

Document	Title	Reference	Policy/Directive/Instruction
DODI 4715.8 (Continued)	Environmental Remediation for DoD Activities Overseas	Para F1	"The DoD Components may develop information, and shall maintain existing information, relating to...contamination at DoD locations until the location is returned to the host nation."
		Para F2	"Information on contamination not on a DoD installation or facility...shall be collected and maintained until issues concerning the contamination are finally resolved with the host nation."
		Para F3	"...this information shall be provided...to host-nation authorities upon request."
DoD Overseas Environmental Baseline Guidance Document	Same as Document	Para 1	"Specifically, this document does not apply to... The determination or conduct of remedial or cleanup actions to correct environmental problems caused by the Department of Defense's past activities."
		Para 19	<p>"Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:</p> <ul style="list-style-type: none"> c. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs; and d. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs."

Document	Title	Reference	Policy/Directive/Instruction
DEPSECDEF Memo, 18 Oct 95	Environmental Remediation Policy for DoD Activities Overseas	Para 2a(1)	"Service components...shall take prompt action to remediate known imminent and substantial endangerments to human health and safety due to environmental contamination caused by DoD operations."
		Para 2a(2)	"...the in-theater commander of the service component...may approve additional remediation of environmental contamination if the commander determines the additional remediation is required to maintain operations or protect human health and safety."
		Para 2a(3)	"International agreements also may require the U.S. to fund environmental remediation. Such remediation may be more extensive than that necessary to remediate known imminent and substantial endangerments to human health and safety. Before a service component...begins remediation pursuant to such an agreement it shall consult with the DoD environmental executive agent, if any, and shall obtain a legal determination that the requirement is mandatory and arises from a binding international agreement that pertains to U.S. military operating rights in the host country."
		Para 2a(3)	"International agreements also may require the U.S. to fund environmental remediation. Such remediation may be more extensive than that necessary to remediate known imminent and substantial endangerments to human health and safety. Before a service component...begins remediation pursuant to such an agreement it shall consult with the DoD environmental executive agent, if any, and shall obtain a legal determination that the requirement is mandatory and arises from a binding international agreement that pertains to U.S. military operating rights in the host country."

Document	Title	Reference	Policy/Directive/Instruction
DEPSECDEF Memo, 18 Oct 95 (Continued)	Environmental Remediation Policy for DoD Activities Overseas	Para 3	"The decision as to whether a contaminated site poses an imminent and substantial endangerment shall be made by the in-theater commander of the service component... The authority to make this decision may be delegated... to an installation or facility commander, as appropriate. Projects designed to remediate an imminent and substantial endangerment are complete when the contamination no longer poses an imminent and substantial endangerment to human health and safety."
AR 200-1	Environmental Protection and Enhancement	Para 14-6a	"Comply with comprehensive DoD environmental restoration policy, applicable DA Supplemental Policy, and Executive Agent developed country-specific cleanup policy when published."
		Para 14-6b	"... U.S. funds will not be spent for environmental restoration beyond the minimum necessary to sustain current operations or eliminate known imminent and substantial dangers to human health and safety, unless required by applicable U.S. law, treaty, or international agreement."
		Para 14-6c	"Depending on the terms of the governing international agreement, actual or anticipated environmental cleanup costs for U.S. caused environmental contamination may be included in the host nation's overall damage claim."
OPNAVINST 5090.1B	Navy Environmental and Natural Resources Program Manual	Para 18-5.19	"... International agreements, SOFA, and U.S. government policy shall be used to decide whether cleanup action should be coordinated with the EA [Executive Agent]."

Document	Title	Reference	Policy/Directive/Instruction
AFI 32-7006	Environmental Program in Foreign Countries	Para 2.2	<p>"A comprehensive DoD restoration policy does not exist. There is an OSD policy for installations or facilities identified for return to the host nation. The policy only allows the use of U.S. funds on maintenance, repair or environmental restoration to sustain current operations or eliminate known imminent and substantial dangers to human health and safety, unless required by applicable U.S. law, treaty or international agreement. The Air Force applies this same OSD policy to all sites contaminated by Air Force operations."</p>
USFK Cir 200-97-XX	Environmental Governing Standards (Draft)	Para 1-2	<p>"Specifically, these Environmental Governing Standards (EGS) do not apply to... The determination or conduct of remedial or cleanup actions to correct environmental problems caused by past DoD activities."</p>
		Para 1-6b(2)	<p>"The sole regulatory requirement applicable to USFK installations is this USFK Circular, the EGS. Although the EGS takes into consideration... U.S. laws... ROK environmental laws and regulations... and international treaties... those underlying instruments do not set legal standard with which USFK installations must comply. The EGS does."</p>
		Para 9-3f(2)	<p>"Follow on steps [after a POL spill or leak] are— (a) Act to prevent migration of released POL into soils and nearby surface waters. (c) Determine soil and water cleanup action."</p>

Document	Title	Reference	Policy/Directive/Instruction
USFK Cir 200-97-XX (Continued)	Environmental Governing Standards (Draft)	Para 14-3a(2)	<p>"Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up IAW the following:</p> <p>(c) Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs.</p> <p>(d) Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs.</p>
		Para 18-3(5)	<p>"In the event a spill of POL or hazardous substance occurs inside a USFK installation and cannot be contained within the installation boundaries, threaten a ROK drinking water resource, or the spill occurs off-post...the unit which has caused the release will take immediate action to contain the damage and cleanup within the limits of their capabilities."</p>
		Para 18-3(5)(f)	<p>"Under the provisions of Article XXIII of the U.S. ROK SOFA, claims by local national individuals or organizations for damages arising from off-installation spills will be handled through the established claims procedures."</p>
		Para 19-3c(3)	<p>"Soil and groundwater contaminated by the release will be remediated when there is imminent or substantial danger...Imminent and substantial danger refers to acute injury or death, rather than illness or injury typically caused by long term, chronic exposure. A determination...shall be made by the Installation Commander after consultation with the USFK Surgeon and the USFK ACofS, Engineer."</p>

Document	Title	Reference	Policy/Directive/Instruction
USFK Memo, undated (Draft)	United States Forces Korea (USFK) Environmental Remediation Policy	Para 3	"Component and subordinate activity commanders shall take prompt action to remediate known imminent and substantial endangerments to human health and safety due to environmental contamination on USFK installations or facilities."
		Para 4	"Component commanders, in consultation with the USFK Environmental Programs Office (EPO), shall determine whether contaminated sites pose either an operational risk or an imminent and substantial endangerment to human health and safety...based on site-specific information such as contaminant toxicity and exposure potential."
		Para 5	"Each installation shall establish and maintain a listing of sites where petroleum products or other hazardous substances may have been released to the environment...Each installation shall conduct a preliminary assessment of each site using existing information...Once potentially contaminated sites have been identified, each installation shall conduct a site inspection and collect sufficient data (which may include limited soil, groundwater or other environmental sampling) necessary to determine whether each site poses an imminent and substantial endangerment to human health and safety."
		Para 6	"Remediation is complete when the site no longer poses a risk to operations or an imminent and substantial endangerment to human health and safety."

Note: References to each document listed above can be found in the bibliography (original text document).

APPENDIX 3-2: Environment-Related Acts, Republic of Korea

Environmental Acts	Purpose	Date Legislated
Environmental Management Corporation Act	Establishes the Environmental Management Corporation, which manages and operates pollution control projects, such as treatment facilities, pollution abatement facilities, etc. Also provides technical assistance for design and construction.	1983, 21 May 1993, 27 Dec (Amended)
Basic Environmental Policy Act	Establishes general environmental strategy and goals, action-forcing standards, and creation of Environmental Preservation Committee, similar to the US Council on Environmental Quality. Similar to US National Environmental Policy Act. Also contains a strict, joint, and several liability clause (like CERCLA) which holds polluters liable for environmental damage.	1990, 1 Aug 1991, 31 Dec (Amended) 1993, 11 Jun (Amended) 1994, 22 Dec (Amended)
Toxic Chemicals Control Act	Assesses toxicity of chemical substances and control manufacture and distribution of toxic chemical substances. Similar to US Toxic Substances Control Act.	1990, 1 Aug 1994, 3 Aug (Amended)
Environmental Dispute Settlement Act	Provides procedures for mediation, reconciliation, and rulings for an investigation into damages and adjustment of disputes caused by environmental pollution.	1990, 1 Aug
Air Quality Control Act	Regulates emission of pollutants and odor into the air. Specifies (1) types of pollutants; (2) emission standards; (3) types of sources to be controlled; (4) methods of measuring pollution to facilitate emission control. Similar to US Clean Air Act. Regulates various sources such as industrial facilities, vehicles, households, and polluting activities; establishes non-compliance charge system.	1990, 1 Aug 1991, 31 May (Amended) 1992, 8 Dec (Amended) 1993, 11 June (Amended) 1993, 27 Dec (Amended) 1994, 5 Jan (Amended)
Water Quality Control Act	Regulates effluent into surface waters (rivers, lakes and streams). Does not apply to groundwater contamination (regulated by Basic Environmental Policy Act); does not apply to sea water (regulated by Marine Pollution Prevention Act). Specifies (1) types of pollutants; (2) emission standards; (3) types of sources to be controlled; (4) methods of measuring pollution to facilitate emission control. Regulatory requirements and sanctions against industrial polluting sources similar to Air Quality Control Act.	1990, 1 Aug 1991, 31 May (Amended) 1992, 8 Dec (Amended) 1993, 27 Dec (Amended) 1994, 5 Jan (Amended) 1994 3 Aug (Amended)
Noise and Vibration Control Act	Prevents environmental damage and degradation to human health due to excessive noise and vibration from factories, construction sites, roads, railroads, etc.	1990, 1 Aug 1993, 27 Dec (Amended)
Environmental Dispute Settlement Act	Provides economic and efficient remedies for environmental damage; attempts to reduce financial burden of the claimant by offering voluntary arbitration. Establishes the Central Environmental Disputes Coordination Committee to arbitrate damage claims resulting from environmental pollution (note: committee made up entirely of MOE scientists—no legal representation).	1990, 1 Aug

Environmental Acts	Purpose	Date Legislated
Potable Water Act	Establishes standards for drinking water (piped water systems); requires government to formulate plans for construction of potable water systems; establishes Safety Assessment Committee to assess safety of drinking water. Also regulates bottled water production.	1990, 3 Aug 1993, 3 Aug (Amended) 1995, 1 Jul (Amended)
Marine Pollution Prevention Act	Preserves the marine environment through regulation of hazardous substances and wastes discharged into sea from ships, marine facilities, etc. Discusses remediation of sea pollutants where contamination threatens coastal regions. Amendment required due to Korea's accession to MARPOL in 1991.	1991, 8 Mar (Wholly Amended)
Solid Waste Management Act	Specifies guidelines for proper waste treatment; regulates generation and discharge of solid wastes. Similar to US RCRA. Goal of the act is to reduce the volume of solid wastes, and treat wastes discharged to prevent human and environmental health risks. Classifies waste into two categories: (1) general wastes (non-toxic); and (2) specified wastes (hazardous). Delegates responsibility for managing general wastes to provincial governments.	1991, 8 Mar 1992, 8 Dec (Amended) 1993, 6 Mar (Amended) 1994, 5 Jan (Amended)
Act Relating to Treatment of Sewage, Night Soil, and Livestock Wastewater	Regulates treatment of sewage, night soil (human wastes), and livestock wastewater (effluent from livestock cultivation).	1991, 8 Mar 1993, 27 Dec (Amended)
Act Relating to Punishment for Environmental Crimes	Describes punitive actions taken against entities engaging in business activities causing environmental pollution which adversely affects humans.	1991, 31 May
Natural Environment Preservation Act	Preserves and protects the natural environment from artificial damage, and prevents extermination of species (biological diversity). Similar to US Endangered Species Act.	1991, 31 Dec 1994, 3 Aug (Amended)
Act Relating to Environmental Improvement Charges	Implements environmental improvement measures and secures resources for environmental investment using the "polluter-pays-principle". Revenue collected may be used for construction of environmental facilities, R&D on environmental technology, and subsidies. Charges levied on commercial/business buildings and diesel-fueled vehicles. The Special Account for the Environmental Improvement Account established in 1994 to make necessary capital available for investment in environmental improvement projects.	1991, 31 Dec 1994, 15 Jan
Act Relating to Promotion of Resources Saving and Reutilization	Promotes reduction in volume of wastes produced and discharged, and encourages energy and resource conservation through reuse and recycling schemes. Establishes a comprehensive deposit/refund system and product charge for waste management.	1992, 8 Dec

Environmental Acts	Purpose	Date Legislated
Act Relating to Transboundary Movement of Wastes and Their Disposal	Prevents environmental pollution caused by transboundary movement of wastes; control export, import, and inland transit of wastes. Passed in response to the Basel Convention relating to Control of Transboundary Movement and Disposal of Hazardous Wastes	1992, 8 Dec
Environmental Impact Assessment Act	Creates system for assessing/reviewing environmental impacts of certain projects deemed especially harmful to the environment.	1993, 11 Jun
Korea Resources Recovery and Reutilization Corporation Act	Establishes the Korea Resources Recovery and Reutilization Corporation to manage pollution prevention projects.	1993, 27 Dec
Sewer System Act	Establish standards for sewage treatment systems and requirement to formulate plans for construction of sewage treatment plants. Transferred supervision of waste-water facilities from Ministry of Construction to Ministry of Environment.	1994, 3 Aug
Rules and Regulations on Preservation of Groundwater Quality	Establishes construction standards for businesses which use more than 30 tons of groundwater per day; requires groundwater monitoring devices for underground oil or hazardous chemical storage facilities.	1994, 9 Aug
Act Relating to Support and Development of Environmental Technologies	Establishes long-term environmental technology development plan; recommends most highly effective environmental technology for use by local industry; provides technical support to small companies; legally support use of "eco-mark" labeling system.	1994, 22 Dec
Drinking Water Management Act	Establishes groundwater monitoring network; standards for different classes of groundwater based on use (domestic, irrigation/agricultural, and industrial).	1995, 1 Jan (Wholly Amended)
Soil Preservation Act	Establishes a soil contamination monitoring network (assessment), standards ("trigger value" and "action value"), regulates installation of "soil contamination prevention facilities," and soil preservation zones. Previously under Water Quality Preservation Act. Remedial action not specified, but inherent in trigger and action values. Once soil contaminated beyond action value, area must be remediated to less than trigger value before able to use that land for specific purposes (agriculture or industry).	1995, 5 Jan

Note: Acts referenced from the original legal text (listed in the bibliography) or from the following:

Ministry of Environment. Development of Korean Environmental Policy: 1996.

Ministry of Environment. Environmental Protection in Korea: 1996.

Ministry of Environment. Environmental Protection in Korea: 1994.

Lee, Shin-Bom. South Korea Environmental Report.

APPENDIX 3-3: Allegations of U.S. Violation of Korean Environmental Law

Organization	Alleged Violation
Ministry of Foreign Affairs	<ol style="list-style-type: none"> 1. Use of Imhoff tanks (primary sewage treatment) at Camp Walker, Taegu. 2. Contamination of the Hwangguji River in Pyongtaek, near K-55 (Camp Humphreys, Pyongtaek). 3. Frequent violations of Air Quality Preservation Act due to delinquent check-ups on automobile exhaust and lack of anti-pollution devices. 4. Illegal painting of a "hill" at Kunsan AB. 5. Frequent cases of illegal burying of harmful material, such as film developing (mercury contained), solid waste construction material, and general solid waste.
Green Korea	<ol style="list-style-type: none"> 1. Uijongbu (Camp Red Cloud): <ol style="list-style-type: none"> a. Water samples collected in waterways along U.S. bases exceed industrial standards. Chemical Oxygen Demand (COD) and nitrogen levels exceed standard by five times. Level of eutrophication exceeds standards by two times. Water still used for agriculture. May pollute groundwater. b. Excessive noise from helicopter operations (74.0 dB). c. Impossible to plan for greenbelt zone due to base location. d. Asbestos in abandoned buildings on Camp Indian. 2. Chunchon (Camp Page) <ol style="list-style-type: none"> a. Excessive noise from helicopter operations (max 89.3 dB). b. Suspected air, water, soil pollution from helicopter operations. 3. Inchon (Camp Market, AFFES depot, DECA depot) <ol style="list-style-type: none"> a. Illegal landfilling; suspected soil pollution. b. Excessive noise (max 68.8 dB) from factory operations. c. Surface water contamination (excessive total phosphorus, nitrogen and turbidity); heavy metals found (manganese, zinc). 4. Tongduchon (Camp Casey) <ol style="list-style-type: none"> a. Food wastes and edible oils dumped in waterways "through pulverizer". b. Propagation of "exotic plants," damaging to local flora. c. Surface water contamination (excessive nitrogen, COD, and turbidity). d. Suspected pollution of soil, waterways, groundwater from golf course. 5. Pyongtaek (Osan AB, Camp Humphreys) <ol style="list-style-type: none"> a. Excessive noise (max 112.0 dB). b. Pollution of Hangkugichun waterway (excessive COD, nitrogen, turbidity; heavy metals). Exceeds standards for industrial use; yet used for agricultural purposes. 6. Wonju (Camp Long) <ol style="list-style-type: none"> a. Excessive total nitrogen and turbidity in groundwater. b. Cracks in buildings and damage to crops due to "helicopter traffic." c. Exposed asbestos. d. Construction of joint ROKAF/USAF airfield destroyed a small mountain and waterways. e. "Illegal" base landfill (use for 7 years). c. Excessive noise from aircraft operations (max 107.0 dB). d. "Unfair relation" concerning use of Kunsan's runway by civilian airlines in exchange for solid waste disposal by the local government.

Organization	Alleged Violation
Green Korea (Continued)	<p>7. Kunsan Air Base</p> <ul style="list-style-type: none"> a. Pollution of adjacent waterways and wetland (Saemankeum). b. Illegal dumping of scrap metals and heavy metals in Korean mountains and rivers. <p>8. Taegu (Camp Walker, Camp Henry, Camp Carroll, K-2 Air Base)</p> <ul style="list-style-type: none"> a. Excessive noise from helicopter operations (max 96.0 dB). b. Suspected water pollution (strong odors, high acidity). c. Excessive noise from aircraft operations (max 118.3 dB). <p>9. Pohang (POL Storage)</p> <p>Suspected POL pipeline oil leaks, resulting in polluted farm land which fueled a forest fire.</p>
Honam Ilbo Daily Newspaper	Dumping of 10,000 tons of construction debris at the south end of Kunsan Air Base (beach).

APPENDIX 3-4: Research Topics Studied by the ROK National Institute of Environmental Research in 1993

Completed in 1993	Topic
1.	Classification of Environmental Information Objective: Illustrate how to establish and use environmental information systems (GIS).
2.	Classifying Pollutant Emitting Firms Objective: Determine the actual volume of emissions discharged by each firm; formulate new method of classification.
3.	Survey and Assessment of Damage Caused by Air Pollution and Acid Rain Objective: Examine and determine the impact of air pollution and acid rain on forests, soil, and buildings.
4.	Air Pollution in Urban Areas and a Photochemical Reaction Model Objective: Analyze photochemical reactions in the air in major cities; develop a model of movement and generation of secondary pollutants.
5.	Measures for Accommodating the UN Framework Convention on Climate Change Objective: Review and analyze the contents of the Convention, specifically on regulating carbon dioxide emissions.
6.	Improving the Sound Quality of Automobile Horns Objective: Study people's reactions to different types of automobile horns "to make driving safer."
7.	Performance Evaluation of Exhaust Gas Control Equipment Objective: Evaluate the effectiveness of emission control equipment and additives, quality of fuels and lubricants, and level of automobile maintenance on automobile exhaust gas emissions.
8.	Inspection of Pollutant Discharge from Astigmatic Pollution Sources Objective: Determine the impact of non-point pollution sources, means of inspection, and characteristics of effluent.
9.	Measures to Prevent Hazardous Liquid Substances from Leaking into the Sea Objective: Determine measures for the establishment and operation of storage facilities on land and effective prevention of leakage of hazardous liquids in ports.
10.	Technology to Reclaim Solid Wastes in Urban Areas and Stabilize Landfills Objective: Determine status of reclaimed land management and leachate disposal from landfills.
11.	Optimum Management of Land Reclaimed with Solid Industrial Wastes Objective: Study the types of hazardous substances emanating from land reclaimed with solid industrial wastes, and determine methods of reducing leachate of hazardous substances.
12.	Potential Environmental Damage Caused by Chemicals Objective: Study assessment systems for toxic chemicals (foreign and domestic) to establish an environmental risk assessment system designed to prevent danger to human health and damage to the environment.
13.	Search for Residual Chemicals and Development of Methods for Their Control Objective: Establish standard methods of collecting, pre-treating, analyzing, and managing air, water, and waste samples of chlorinated hydrocarbons.

Underway Since 1994	Topic
	1. Technology Development to Forecast Chronic Respiratory Diseases Caused by Air Pollution Objective: Comparative study of large cities and industrial areas (Seoul, Pusan, Ulsan) and a less polluted area in Chongju to establish the relationship between air pollution and chronic respiratory diseases.
	2. Development of Purifying Organisms for Environmental Improvement Objective: Identify which trees and other flora best reduce air pollution.
	3. Research for the Establishment of Air Pollutant Emissions Standards Objective: Study emissions of dust, sulfurous acid gas, and nitrogen oxide-emitting facilities, and review regulations for dust-generating facilities in "advanced countries" to determine a new volume-based air pollution regulation system.
	4. Study on Noise Control Measures at Plants Objective: Develop technology for abatement and control of noise in urban areas.
	5. Study on the Development of Wastewater Treatment Technology Objective: Develop anaerobic, non-oxide, and aerobic treatment technology for wastewater treatment. Evaluate the efficiency of various existing pollution treatment methods through experimentation.
	6. Study of Wastewater Treatment Technology Objective: Study prototype wastewater treatment technologies in small-scale housing complexes to determine treatment and cost effectiveness.
	7. Development of the River Environment Management System Objective: Assess various related factors for successful development of a river environmental management system aimed at reversing the deteriorating quality of water in rivers throughout Korea.
	8. Development of Biological Treatment Technology for Foul Odors from Sewage Treatment Plants Objective: Self-explanatory.
	9. Study on the Development of Hazardous Waste Management Technology Objective: Review of all known hazardous wastes and the existing classification system. Evaluate means of reducing volumes of hazardous wastes.
	10. Study on Methods of Soil Purification Objective: Use of trees and plants to remediate soil contaminated with heavy metals (phytoremediation).
	11. Study on the Prevention of Eutrophication Objective: Research various chemical treatment technologies to curb multiplication of algae in eutrophic lakes and marshes.
	12. Development of Technology to Reduce Pollution Levels in Inland Hatcheries Objective: Characterize and control effluent from in-land fish hatcheries.
	13. Study of Water Treatment Technology Through the Food Chain Objective: Study of biological treatment techniques (plankton-eating silver salmon) to remediate polluted lakes and marshes.

HAN (Highly Advanced National) Projects	
Time Period	Topic
1990-1992	<p>1. Development of Technology for Controlling Propagation of Algae in Lakes and Marshes Outcome: Unknown, but studied use of water hyacinth and other remedial technologies for removing algae-enhancing nutrients.</p> <p>2. Development of Equipment for Filtering Particles from Diesel Fuel Outcome: Successfully installed and tested prototype equipment on buses and automobiles.</p>
1991-1993	<p>1. Development of Technology to Assess Impacts on Ecosystems Outcome: Basic data on the impact of development on ecosystems.</p> <p>2. Development of Technology for Treatment and Recycling of Organic Sludges with Microorganisms in Soil Outcome: (1) Organic sludge could not be treated through vermistabilization without pre-treatment. (2) Developed and commercialized technologies for use of night soil as fertilizer and deodorizing agent.</p>
1992	<p>1. Characteristics of CO₂ Emissions from Major Sources Outcome: Completed characterization of CO₂ sources and volume of emissions.</p> <p>2. Basic Technology for Monitoring Greenhouse Gases Outcome: Completed survey on development and commercialization of high temperature filtering materials.</p>
1992-1993	<p>Development of Treatment Technology for Dyes and Other Not-Easily Decomposable Wastes Outcome: A new process was developed using anaerobic microorganisms to decompose various coloring compounds and coloring agents.</p>
1992-1994	<p>1. Study to Develop Environmental Risk Assessment System Outcome: (1) Database on environmental pollutants and toxic chemicals created. (2) Selected chemicals for priority management and further study based on toxicity and risk.</p> <p>2. Development of Pollution and Acid Rain Resistant Species and Bio-Indicator Based Selection of Species Outcome: (1) Concentration of organic substances, total nitrogen, phosphorus, aluminum, and total sulfur higher in industrial complexes and closed-down mines than in unpolluted areas. (2) Concentration of heavy metals higher in unpolluted areas than in industrial complexes and closed-down mines. (3) Sixteen species of pollution-resistant plants and three species of sensitive plants selected as pollution indicators</p> <p>3. Study on Establishment of a Marine Pollution Monitoring Network and the Change in the Pollution Situation Outcome: Gathered data on standard measurement and analysis techniques; justified expansion of marine pollution monitoring network.</p>

HAN (Highly Advanced National) Projects (Continued)	
Time Period	Topic
1992-1994	<p>4. Development of Stack-Gas Desulfurizing Equipment (Dry Process) for Industrial Facilities Outcome: Gathered data on performance and cost effectiveness of various desulfurizing technologies, including semi-dry and foam-spraying equipment.</p> <p>5. System of Selecting Alternative Methods for Water Quality Control Outcome: Develop system for selecting alternative pollution treatment methods in small- and medium-sized cities taking into account water quality, pollution sources, and cost.</p>
Unknown	<p>Development of CNG-Mixed Fuel System Outcome: Successful testing and fielding of a prototype engine capable of running on CNG-mixed fuel.</p>

APPENDIX 3-5: Environmental Compliance and Management Program (ECAMP) and Environmental Compliance Assessment System (ECAS) Inspection Results Related to Hazardous Waste Site Remediation

Osan Air Base - November 1996	
Location	Finding Title
	Details
821	Lube Oil/Haz Material or Waste Stored Improperly
1214	Inadequate Secondary Containment for Hazardous Waste
511	Inadequate Secondary Containment for Hazardous Waste
1712	Improper Wastewater Sludge Disposal
878	Leaking Aboveground Storage Tank (AST)
1712	WWTP effluent exceeds standards
	Provides primary treatment only; disinfection not accomplished. Oil and grease limits exceeded. No monitoring for BOD. Carryover from 1995 assessment.
	Accumulation point for batteries; one battery had hole and leaking onto ground. Sludge from wastewater treatment plant disposed by a solid waste contractor although analysis of sludge indicates waste exceeds RCRA threshold for barium, chromium, lead, and mercury. Carryover from 1995 assessment.
	Fuel oil tank leaking (containment dike contained approximately one foot of storm water with thick layer of fuel oil).
	Overloaded wash rack oil/water separator (OWS) drains directly into creek. Oil stains on the soil at the discharge location.
	Domestic wastewater discharges to a septic tank followed by a stream. Discharge never tested by bioenvironmental engineering (BEE).
	Transportation vehicle wash rack effluent discharges from OWS into stream. Discharge never tested to determine compliance with effluent limits.
	Kimhae Air Base - June 1996
1006	Improper Disposal of Medical Waste
1006	Improper Disposal of Hazardous Waste
2001	Discharge of POL to Adjacent Waterway
	The medical waste incinerator is used to dispose of expired pharmaceuticals and dead animals. The ash, collected and disposed as solid waste, has never been characterized.
	Spent fluids from x-ray film development process discharged directly into a drain.
	An overloaded OWS drains directly into an adjacent waterway. The vehicle maintenance yard also drains to the waterway.

Kimhae Air Base - June 1996 (Continued)	
Location	Finding Title
2001	Landfill Operations Must Meet Specific Requirements Details The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.
2014	Domestic Wastewater Effluent Wastewater effluent not tested to ensure quality limitations not exceeded.
1012	Sludge Disposal Sludge from the contingency hospital's lift station not disposed of as either solid or hazardous waste. Unknown whether the sludge is disposed on or off-site.
1006	Total Trihalomethane Sampling Total trihalomethane exceeded the standard and notification not provided to the unit to undertake remedial corrective measures. Two tests conducted in CY95 indicated total trihalomethane exceeded the 100 mg/L MCL. Water supplied from the Pusan municipal water system; three ponds serve as emergency back-up (no wells). Contingency Support Plan (Jan 96) for Kimhae AB, pg 14-1, rates the base water supply/emergency water supply as "poor", which may signify development of groundwater wells to augment present surface water back-up system.
Kooni Range - June 1996	
22	No OWS at Wash rack A wash rack next to vehicle maintenance has no OWS and drains directly to a storm water ditch.
22	Vehicle Maintenance Pit Drains to Storm Water A vehicle maintenance pit in the CE yard drains directly into a storm water ditch.
1	Landfill Operations Must Meet Specific Requirements The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.
NA	Improper Disposal of Lighting Ballasts Basewide finding. Ballast units removed from fluorescent lighting fixtures discarded to trash with no attempt to identify if they contain PCBs.
NA	Improper Disposal of Possible Asbestos Containing Material (ACM) Basewide finding. Possible ACM removed during facility maintenance discarded as general refuse.
9	Domestic Wastewater Effluent Limitations The three domestic waste holding tanks overflowed into area ditches which flow into rice fields; no testing accomplished to determine compliance.

Kwangju Air Base - June 1996	
Location	Finding Title
2123	Improper Disposal of Fluorescent Bulbs
2278	Installation Lacks Waste Analysis Plan
2151	Improper Disposal of Hazardous Waste
535	OWS
5356	Building Floor Drain Discharge
535	OWS Waste Characterization
5356	Maintaining OWS
215	Leaking Underground Storage Tanks (USTs) Not Removed From Service
1204	No Monthly Inventory of USTs Basewide
1204	Some USTs Not Tightness Tested Annually
535	Discharge of POL to Adjacent Ditches/Streams
NA	Landfill Operations Must Meet Specific Requirements
2155	Improper Disposal of Lighting Ballasts

Details

Waste fluorescent bulbs disposed as solid waste. Generally, fluorescent bulbs are high in mercury and other hazardous constituents and should be disposed as a hazardous waste unless testing/analysis indicates otherwise.

Basewide finding. No waste analysis plan for periodic testing of all waste streams from all generators.

8th Fighter Wing maintenance personnel rinsed synthetic oil cans by filling each container with water and draining it into an OWS, which discharges into an open ditch.

Existing OWS too small for waste flowing through, allowing oil to pass through and discharge to the storm drain.

Floor drains were discharging oils and solvents directly into open ditches.

A waste stream characterization had not been accomplished for each OWS. All OWS discharged to open ditches.

Frequent use of a small OWS resulted in generating waste that because of the small quantity, host nation contractors refused to remove. The volume of waste oils exceeded the capacity of the separator which overflowed into an open ditch.

Two USTs (215 and 123) that failed tightness testing in Sep 95 have not been emptied and removed from service.

Monthly inventory of USTs not being conducted per requirements. No system in place to track individual tank inventories and detect leaks between annual tightness testing.

Eight USTs were not tightness tested during the latest annual testing in Sep 95.

All OWSs drained to adjacent ditches/streams. Oil stains present on the soil at the effluent pipe and on standing water nearby.

The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.

Ballast units removed from fluorescent lighting fixtures discarded to trash with no attempt to identify if they contain PCBs.

Kwangju Air Base - June 1996 (Continued)	
Location	Finding Title
	Details
NA	Improper Disposal of Possible ACM
310	Discharge Characterization
310	Industrial Wastewater Characterization
310	Sludge Disposal
Pilsung Range - June 1996	
59	No OWS for Wash rack
NA	Landfill Operations Must Meet Specific Requirements
10	Improper Disposal of Lighting Ballasts
NA	Improper Disposal of Possible ACM
NA	Domestic Wastewater Discharge
NA	Industrial Wastewater Discharge
Suwon Air Base - June 1996	
2214	Failure to Take USTs Out of Service
2214	No Monthly Inventory of USTs Basewide
2348	Lack of Wash rack and OWS

Basewide finding. Possible ACM removed during facility maintenance discarded as general refuse.

Wastewater discharge characterization from the Imhoff tank not accomplished monthly to determine compliance with ROK standards.

Effluent from the base wastewater treatment facility not tested quarterly for constituents listed in Table 4-5 of FGS.

Sludge from the Imhoff tank had not been characterized to determine an appropriate disposal method. Unknown whether the sludge is disposed on or off-site.

A wash rack and vehicle maintenance building floor drain have no OWS to intercept POL before discharging directly into a nearby river.

The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.

Ballast units removed from fluorescent lighting fixtures discarded to trash with no attempt to identify if they contain PCBs.

Basewide finding. Possible ACM removed during facility maintenance discarded as general refuse.

Basewide finding. The six septic tank effluents discharging into a local stream not characterized.

Basewide finding. Vehicle wash rack drains directly into a local stream without separation of oil/fuels.

Five USTs that failed the annual tightness test (date of last tightness test not provided) have not been taken out of service.

Monthly inventory of USTs not being conducted per requirements. No system in place to track individual tank inventories and detect leaks between annual tightness testing.

The Army Motor Pool washes vehicles with no wash rack or OWS.

Suwon Air Base - June 1996 (Continued)	
Location	Finding Title
2218	Inadequately Designed OWSs
NA	Landfill Operations Must Meet Specific Requirements
NA	Improper Disposal of Lighting Ballasts
NA	Improper Disposal of Possible ACM
NA	Wastewater Monitoring
2103	Domestic Wastewater Monitoring
2541	Oil Discharges to Treatment Plant
2541	Sludge Disposal
Taegu Air Base - June 1996	
3571	No Monthly Inventory of USTs Basewide
6220	Suspected Leaking UST Not Removed From Service
3571	Failure to Take USTs Out of Service

Details

Several OWSs have been constructed to not only receive facility oily water, but also yard storm water which overload the system and cause oil to be discharged. Facilities at 2208 and 2506 have sinkholes that allow the waste stream to discharge directly into the ground before entering the OWS.

The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.

Basewide finding. Ballast units removed from fluorescent lighting fixtures discarded to trash with no attempt to identify if they contain PCBs.

Basewide finding. Possible ACM removed during facility maintenance discarded as general refuse.

Basewide finding. Discharge inappropriately sampled (grab versus composite) to determine compliance with standards.

Discharges from wastewater treatment systems at buildings 2103 and 2541 no analyzed for all required constituent/parameters.

Oil was discharging to Area B wastewater treatment facility, flowing through the Imhoff tank and discharging to a stream.

Accumulated sludge in Area A and B (buildings 2103 and 2541) Imhoff tanks not analyzed and disposed in the past two years.

Monthly inventory of USTs not being conducted per requirements. No system in place to track individual tank inventories and detect leaks between annual tightness testing.

A concrete UST at the bulk fuel storage pump house holding JP-4 is suspected of leaking. The ROKAF uses the tank to empty railcar drip pans until JP-4 is pumped back into the system.

Six USTs that failed the annual tightness test (date of last tightness test not provided) have not been taken out of service.

Taegu Air Base - June 1996 (Continued)

Details	
Location	Finding Title
5012	<p>JP-4 Discharged to Ditch</p> <p>The JP-4 recovery system (skim off product, then pump and treat) is not effective. Treatment is a large OWS whose flow is too high to allow the JP-4 to float to the top of the water. The small of JP-4 can easily be detected at the discharge point. There is no evidence that the discharge has ever been analyzed. The system has been operating since 1972 (?).</p>
109	<p>Oil Discharges to Imhoff Tank</p> <p>POL spills have occurred into the Imhoff tank causing a biological process failure and oil discharge to surface waters.</p>
3571	<p>No Containment of Wash Racks and Fuel Transfer Area</p> <p>There is a high potential for POL to enter the waters of the ROK from the lack of OWSs at wash racks throughout the base and a lack of secondary containment at fuel transfer areas at the gas station, truck fill stands, and railcar off-loading areas.</p>
NA	<p>Landfill Operations Must Meet Specific Requirements</p> <p>The write-up states: "The installation commander shall ensure contractors meet specific landfill standards." It is unknown whether the landfill is sited on-base and owned/operated by DoD personnel, or off-base and owned/operated by civilian personnel.</p>
3605	<p>Improper Disposal of Lighting Ballasts</p> <p>Ballast units removed from fluorescent lighting fixtures discarded to trash with no attempt to identify if they contain PCBs.</p>
NA	<p>Improper Disposal of Possible ACM</p> <p>Basewide finding. Possible ACM removed during facility maintenance discarded as general refuse.</p>
NA	<p>Septic Tank Wastewater Discharge</p> <p>Basewide finding. Domestic waste discharged to the surface waters from 14 septic tanks not tested to ensure compliance with effluent standards.</p>
NA	<p>OWS Discharges</p> <p>Basewide finding. Oily water was discharged to the ground or surface waters at various facilities. Water not characterized.</p>
109	<p>Domestic Wastewater Sludge</p> <p>Sludge from the drying bed not characterized to determine appropriate disposal procedures.</p>

Kunsan Air Base -	
Location	Finding Title
1050	Leaking AST
818	POL Release
705	UST Overfill Spills
2852	Fuel Tank Overfilled
1060	Tank Leak/Open Dike Drain
2855	Fuel Tank Overfilled
828	Possible Underground Pipe Leak
396	Raw Sewage Discharge
399	Overloaded Wastewater Treatment System
<p>The existing sewage treatment facilities provide only primary treatment. The six Imhoff settling tanks are operating well above their design capabilities, resulting in effluent discharges which constantly exceed EPA standards and do not comply with Korean environmental laws</p>	
Area 1-West (Various) ¹ - March 1996	
NA	No Internal Assessments Performed
<p>Area 1 West installations have not performed internal environmental compliance assessments since 1993.</p>	
NA	Domestic Wastewater Discharge
<p>The septic tanks at Camp Sears, Shinbuk Relay and Yawolsan discharge directly into the environment. The effluent has never been characterized nor is there any monitoring presently conducted. None of the septic tanks have leach fields.</p>	
H-220 Heliport	Contaminated Soil
<p>Soil contaminated by heating oil from the repair of a broken underground supply line from an AST near Bldg T 2673 has not been removed. The area of contamination is estimated at approximately 2.5 m at base, 2 m in height, and of undetermined depth.</p>	
NA	UST Overfill
<p>USTs throughout Area I West lack containment provisions for spillage of fuel during filling. Fuel stained soil was noted at USTs throughout Area I West.</p>	

¹ Includes camps in the Uijongbu and Tongduchon Enclaves: Camp Falling Water, Camp Red Cloud, Camp Essayons, Camp Sears, Camp Kyle, Camp LaGuardia, Camp Jackson, Camp Stanley, Camp Kwangsa-ri, Camp Casey, MPRC and All Training Ranges, Camp Mobile, H-220, Camp Hovey, Yawolsan, Shinbuk Relay Station, Kamaksan, Camp Castle, Camp Nimble

Area 1-West (Various) - March 1996 (Continued)	
Location	Finding Title
Shinbuk Relay	<p>Details</p> <p>Two heating fuel oil supply line valves from three ASTs located above the Shinbuk Relay facility bunker are leaking fuel. The area of contaminated soil runs a distance of approximately four feet from the valves toward the edge of the top of the bunker. The ASTs are temporary replacements for a leaking UST located in the body of the bunker that has been taken out of service. The ECAS report does not mention if the area around the leaking UST had been previously characterized or contaminated soil removed. However, personnel noted fuel leaking from fractures in the concrete face of the bunker running into the stormwater drainage culvert.</p> <p>The secondary containment to the fuel oil AST located behind the dining facility lacks a stormwater drain valve. Fuel oil leaking from the AST plumbing has discharged from the containment onto the ground on a downhill slope for a distance of approximately ten feet.</p>
Shinbuk Relay	Leaking Secondary Containment Around AST
Camp Stanley - March 1996	
NA	<p>Wastewater Discharge</p> <p>The wastewater treatment plant fails to meet the effluent standards for 5-day BOD. The monthly 5-day BOD average for Jan and Feb 96 was 39 mg/L; the effluent standard is 30 mg/L. The 5-day BOD standards were also exceeded during the last quarter of 1995. There is a high amount of grease in the influent causing the plant to "under-perform."</p>
Camp Essayons - March 1996	
NA	<p>Wastewater Discharge</p> <p>The wastewater treatment plant fails to meet the effluent standards for 5-day BOD (annual average 5-day BOD for 1995 was 68 mg/L; the effluent standard is 60 mg/L).</p>
Camp Castle - March 1996	
NA	<p>Wastewater Discharge</p> <p>The wastewater treatment plant fails to meet the effluent standards for 5-day BOD. The monthly 5-day BOD average for 1995 was 71 mg/L; the effluent standard is 60 mg/L. Failure is due mainly to lack of OWSS.</p>

Camp Casey- March 1996	
Details	
Location	Finding Title
Railhead	Contaminated Soil
NA	Wastewater Discharge
NA	Improper Disposal of Suspected Hazardous Waste
4 th CHEM	Contaminated Soil
1/72 AR BN	Contaminated Soil
Camp Red Cloud- March 1996	
TMP	Improper Disposal of Suspected Hazardous Waste
Camp Kyle- March 1996	
3120	Contaminated Soil

The crushed rock area between and around the rails at the Camp Castle Railroad, along the edge of the railhead where fuel is transferred from tank cars to storage tanks, and where couplings are kept, is stained with POL from past spills and leaks. The wastewater treatment plan is about 30 percent hydraulically overloaded. The plant meets effluent standards, but, occasionally, during heavy inflow, untreated influent is bypassed through the lift stations to a nearby creek.

The 702 MSB battery shop neutralizes battery acid and discharges it to the sanitary sewer without characterizing it for hazardous characteristics (heavy metals).

The soil area between the 4th CHEM's western perimeter fence and the stormwater draining culvert leading to Camp Casey's fresh water supply, and the stone wall embankment are stained with POL products that have leaked from drums stored outside the 4th CHEM's containment area.

A member of the 1/72 AR BN was observed draining a 5 gallon can of oil into a trash container in the northeast corner of the motor pool. Inspection of the trash container revealed POL residues indicating draining of POL containers into the trash is not an uncommon practice in this motor pool. On the concrete paving near this trash accumulation point was a previous used POL release that covered approximately 3 m². Older POL release stains in this area extend along the sandbags at the edge of the pavement for a distance of approximately 10 m. The write-up did not specify site characterization or cleanup as a corrective action.

The TMP neutralizes battery acid and discharges it to the sanitary sewer without characterizing it for hazardous characteristics (heavy metals).

Soil contaminated by fuel oil has not been removed. The fuel oil came from the installation of a temporary AST.

Western Corridor and Camp Page (Various) ² - February 1997	
Location	Finding Title
NA	Western Corridor Water Supplies Exceeded Lead/Copper Action Levels in 1995 and 1996
NA	Abandoned Water Supply Wells in the Western Corridor Are Not Properly Sealed
NA	No Internal Assessments Performed
NA	No Site Investigations
NA	Camps Howze and Edward Water Supplies Exceeded TCE MCL in 1996
NA	Effluent from Camps Swiss/Swede, Bulls Eye, and Ouellette Discharges into Fields/Streams
NA	Western Corridor Wastewater Plants Occasionally By-Pass Untreated Sewage
NA	UST Overfill

Details

Installations exceeding lead/copper action levels include: Camps Howze, Garry Owens/Giant, Bonifas/Liberty Bell, Stanton, Greaves, Edwards, Swiss/Swede, Warrior Base, and Bulls Eye.

Abandoned wells, if not properly sealed, may provide a pathway for contaminants to enter the groundwater aquifer. The ECAS report did not specify how long the wells were open before discovery.

Western Corridor installations and Camp Page have not performed internal environmental compliance assessments since 1993.

Western Corridor installations and Camp Page have not been screened for possible contamination from past use of fuel and hazardous substances. Camps Page and Edwards have been conducting bulk fuel operations for as long as the camps' existence. Both camps operate railheads that receive fuel by rail with associated pump stations and UST/AST. In addition, Camps Edwards and Howze show elevated levels of TCE in the groundwater.

Despite the high TCE levels, suggested corrective action for the ECAS finding only recommended alternative water supplies (an aeration tower for Camp Howze is in the final design stage, with construction completion estimated for Dec 97). No remedial action or site investigation was suggested.

The ECAS report does not specify how long this conditions has existed (presumably, for the life of the installations which date back to the Korean War).

During the rainy season, wastewater plants become overloaded and untreated sewage is bypassed to keep plants operational. Many sewer systems manholes are below the flood level and many sewer pipes are broken or cracked.

UST heating oil fill points throughout Western Corridor installations were stained with POL from filling operations. The ECAS report did not specify site investigations as one of the suggested corrective actions.

² Includes Camp Edwards, Bull's Eye #1, Bull's Eye #2, Camp Howze, Camp Pelham, Camp Giant, Camp Bonifas, Camp Stanton, Camp Greaves, Charlie Block, Freedom Bridge, Liberty Bell, Papyongsan ATC, DMZ South Half, Joint Security Area MAC HQ, and Swiss/Swede CP MAC HQ

Warrior Base - February 1997	
Location	Finding Title
NA	Warrior Base Wastewater Treatment System Unsatisfactory
<p>Details</p> <p>Warrior Base currently maintains six septic tanks for wastewater treatment. The septic tank leaching wells are clogged and the effluent from the septic tanks is piped to a drainage ditch. This effluent does not meet the FGS criteria. Although a new wastewater treatment system is currently under construction, no site investigation for past contamination was suggested in the ECAS report.</p>	
Camp Giant - February 1997	
T-36	Bldg T-36 Not Connected to the Sewer System
<p>Details</p> <p>The facility contains a shower facility, wash basin, and urinal, and is currently draining to a storm drain. The ECAS report does not describe the facility's current or past use, which may have produced hazardous waste.</p>	
Camp Edwards - February 1997	
Location	Finding Title
Health/Dental Clinic	X-Ray Silver Recovery Unit Effluent Not Monitored
<p>Details</p> <p>The recovery unit consists of a plastic pail with a filter to absorb silver. No laboratory analysis of the effluent is conducted prior to release to the sewer system. Current detection technique consists of using a detection paper with insufficient sensitivity (detects g/L rather than mg/L).</p>	
Camp Stanton - February 1997	
Wash Rack	Raised Donut of Soil Located Next to Eastern-Most Wash Rack Heavily Stained With Waste POL
Runway	Contaminated Soil
T-26	Contaminated Soil
<p>Details</p> <p>The donut's interior diameter was approximately 1.5 meters and its height approximately 20 centimeters. The interior of the structure had a native soil floor and was black from used POL. The donut structure appeared to have been a dumping site for POL removed from the accumulation chamber of the adjacent wash rack or used POL.</p> <p>The crushed rock parking area for helicopter fueling is stained with POL. An area approximately 6 square meters is stained with fuel from accumulation of fuel releases.</p> <p>The fill pipe plumbing to the heating oil UST behind Bldg T-26 is leaking heating oil onto the soil and into a storm water drainage ditch. The ECAS report did not specify site investigation as one of the suggested corrective actions.</p>	

Camp Garry Owens - February 1997	
Location	Finding Title
Motor Pool	Fuel Dispensing Nozzle Leaking Fuel Onto Ground (4-7 th CAV C Troop Motor Pool)
Motor Pool	A Tanker of JP-8 Parked in the Motor Pool Was Leaking Fuel Onto the Ground
Camp Greaves - February 1997	
NA	Fuel Pod 711 in the 7 th KSC CO Compound
Wash Rack	Two Raised Donut Structures Stained With Used POL
20th Support Group Installations³ - September 1996	
NA	No Internal Assessments Performed
NA	No Site Investigations

Details
 The fuel leaking from the nozzle stained an area approximately 6 square meters. If fuel is released at this location such that it saturates the soil and begins to flow, it will flow unhindered until it reaches neighboring rice fields. No site investigation has been accomplished to characterize the area for past spills.
 The tanker was parked on native soil approximately three meters from the compound's perimeter fence. There is no containment provisions along the compound's fence, which is anchored directly over an adjoining stream.

The fuel pod is located in a dug out area directly over a storm water run-off ditch, and contained significant POL stains on the ground under the plumbing of the tank. The ECAS report did not specify site investigation as part of the discrepancy's corrective action.
 The donut structures were approximately 1.5 meters in diameter and 20 centimeters high. It appeared the donuts had been used to receive residues from cleaning of the wash rack OWS.

The 20th Support Group installations (Taegu, Waegwan, and Pusan areas) have not performed internal environmental compliance assessments in the years between the external ECAS evaluations (since 1993)
 All installations within 20th Support Group (SG) with the exception of Camp Carroll have not been screened for past use of hazardous substances. As found through the Environmental Baseline Study conducted at Camp Carroll and contaminated groundwater sources with volatile organic compounds (VOCs) at Camps Carroll and Hialeah, potential contamination exists at all 20th SG installations and real properties with past storage or use of hazardous substances.

³ Includes Camp Carroll, Camp Henry, Camp Walker, Dart Board, Salem, Taegu Storage Area, Kunsan POL Terminal, Brooklyn, Chang San, Camp Hialeah, K-9 Airfield, Pier #8, Pusan Storage Facility, Masan Ammo Depot, and Chejudo Training Center

20 th Support Group Installations ³ - September 1996 (Continued)	
Location	Finding Title
NA	Abandoned Wells Not Sealed
George, Walker	Contaminated Soil
Pusan Area	Stormwater Discharge Not Monitored
Chejudo Training Center - September 1996	
NA	Domestic Wastewater
Motor Pool	Petroleum Film In Storm Water Culvert

Details

Available information indicates that existing water wells at Camps Walker, George, and Carroll were neither constructed nor installed in accordance with United States Standards (e.g. capping and sealing). One abandoned well at Camp George, and two abandoned wells at Camp Carroll were not sealed in accordance with the United States standards. During this assessment FED crew was at Camp Walker to seals its five abandoned wells. Protection of the ground water aquifer is critical to maintaining the ground water quality. An abandoned well's casing can corrode over time. An opening in a corroded casing can provide a pathway for pollutants to enter the ground water.

Camp George uses a rotating biological contactor (RBC) for DODD schools, and Camp Walker uses Imhoff tanks for wastewater treatment. The effluent from these plants goes to city sewers as per agreement with the city of Taegu. The effluent quality is not monitored. The scum collected from the manual cleaning of the Imhoff tanks has not been picked up by a disposal contractor in several months. Currently, there are six, 55-gal drums full of scum at the Imhoff tank site, and one, 55-gal drum full of oil that had entered the Imhoff tank due to an accidental spill. The oil drum was overfilled and some oil has spilled to the surrounding ground. Stormwater discharge is not surveyed or analyzed at the Pusan area installations.

Installation's domestic wastewater is treated by septic tanks. The effluent, which has never been monitored or characterized, discharges directly over a farmers field. A 4 mm thick, 30cm wide, 6 meter long petroleum film was observed atop water collected in the storm water runoff culvert on the west side of the Chejudo Recreation Center motor pool. The water and POL had accumulated because the exit point of the culvert had been blocked by the local farmer. The motor pool has not been in use since the facility was converted to a recreational facility. The POL may be residual from a UST leak that occurred prior to the conversion of the facility. That leak was reported in the 1993 ECAS.

Chejudo Training Center - September 1996 (Continued)

Location	Finding Title	Details
NA	Contaminated Soil	There was no secondary containment for the fuel tank for the Chejudo Recreation Center potable water auxiliary water pump at the potable water source. Fuel that has leaked from the tank's drain line had stained an area approximately one meter by three quarters of a meter about the tank.
Auto Hobby Shop	Contaminated Soil	Adjacent to the Auto Hobby Shop, an unattended 55 gallon drum of used oil had been left in the weather with an open bung. Rain water accumulated atop the drum and flowed through the open bung displacing used oil. An area approximately 1 meter by 1.5 meters to the side of the drum is contaminated with released used oil.

APPENDIX 4-1: List of Persons Interviewed

Government, Republic of Korea			
Date	Organization	Person(s) Contacted	Position
12 Jun 97	Ministry of National Defense (ROK)	Col Yang, Im-Suk	Director, Office of Environmental Management
13 Jun 97	Korea Institute of Science and Technology	Dr. Yeom, Ick Tae	Senior Researcher
25 Jun 97	Ministry of Environment (ROK)	Mr. Cho, Hyun Goo	Acting Director, Soil Conservation Division
Academicians, Republic of Korea			
10 Jun 97	Hankuk University	Dr. Kang, Guyoung	Professor
17 Jun 97	Honam University	Mr. Song, Chang-Soo	Professor
17 Jun 97	Inha University	Dr. Bae, Jae-Cho	Professor
12 Jun 97	Kangwon National University	Dr. Kim, Bomchul	Director, Environmental Research Institute
23 Jun 97	Korea University	Dr. Lee, In-Mo	Professor
24 Jun 97	Kwangwoon University	Dr. Choi, Sangil	Professor
9 Jun 97	Seoul National University	Dr. Yi, Jongheop	Professor
Environmental Consulting Firms, Republic of Korea			
16 Jun 97	Hanwha Energy Corporation	Dr. Hwang, Jong-Sic	Team Manager, Environmental Business Team
Department of Defense			
7 Aug 97	Deputy Undersecretary of Defense for Environmental Security (DUSD(ES))	Mr. Gary Vest Mr. Mike McNerney	Principal Assistant Staff
7 Aug 97	Department of Defense, General Counsel	CMDR Mike Ritter	US/ROK SOFA Legal Advisor

Headquarters, United States Air Force			
Date	Organization	Person(s) Contacted	Position
5 Aug 97	Secretary of The Air Force (SAF/MIQ)	Col Richard Drawbaugh	Chief, Environmental Safety and Occupational Health
6 Aug 97	Headquarters, Air Force (AF/LEO)	Col Thomas Griffith	Chief, Operations Division (Former Environmental Division Chief)
Headquarters, 7th Air Force			
23 Jun 97	7 th Air Force	Lt Col Mike Royko Lt Col P. Christopher Clark	The Civil Engineer Deputy Staff Judge Advocate
Headquarters, United States Forces Korea			
16, 26 Jun 97	Environmental Programs Office	Mr. Ernest P. Eddy Mr. Mark Y. Kwon Mr. Yi, Sang-Hun Mr. James L. Duff	Chief Environmental Engineer Environmental Engineer Environmental Protection Specialist
Individual DoD Installations, Republic of Korea			
16-18 Jun 97	8 th Civil Engineer Squadron, Kunsan Air Base Environmental Flight	Capt Richard Baringer Capt Theodore Baudendistel Capt Charles Wendt Capt Keith Groth Capt Rogers	Flight Chief Chief, Compliance Chief, Pollution Prevention Bioenvironmental Engineer Environmental Law
20-23 Jun 97	51 st Civil Engineer Squadron, Osan Air Base Environmental Flight	Mr. Nicholas Linden Capt Raymond Tsui Capt Thomas Kwiat Capt Pete Domahowski	Flight Chief Deputy Chief Deputy Chief Chief, Hazardous Waste

Individual DoD Installations, Republic of Korea (Continued)

Date	Organization	Person(s) Contacted	Position
20-23 Jun 97	51 st Aerospace Medical Group	Lt Col (s) Roger E. Bousam	Bioenvironmental Engineer
Osan Air Base (Continued)		SSgt Michael Middleton	Bioenvironmental Engineering Technician
19 Jun 97	51 st Fighter Wing	Capt Lori Chang	Assistant Staff Judge Advocate
Camp Carroll	607 th Material Maintenance Squadron	1Lt Shannon McGlynn	Chief, Civil Engineer Flight
24 Jun 97	Environmental Office, Department of Public Works	Mr. Kim, Chom-Tong	Chief
Camp Casey	Environmental Office, Department of Public Works	Mr. Yi, Tu-Ha	Chief
25 Jun 97	Defense Reutilization and Marketing Office	Mr. William Donnelly	Chief, Environmental Programs
Camp Market			

APPENDIX 5-1 - Summary of Significant Findings

U.S. Law and DoD Policy Governing Overseas Remediation		Degree of Convergence
Significant Findings		
1.	<p>U.S. environmental laws do not require remediation of hazardous waste sites in Korea</p> <ul style="list-style-type: none"> • Confirmed by literature and personal interviews • Not likely to change, but Congressional interest in overseas restoration program increasing 	Convergent
2.	<p>Acceptability/Adequateness of DoD overseas remediation policy</p> <ul style="list-style-type: none"> • DoD policy makers believe policy adequate/acceptable • Installations believe policy too "vague" • Issues: <ul style="list-style-type: none"> • Differing definition of "imminent and substantial endangerments to human health" • Vague definition complicates project justification, prioritization • Poor organizational structure for managing restoration program • Recommended solution: Health risk-based standard 	Divergent
3.	<p>Cleanup precedents set in other foreign countries influence future remediation policy</p> <ul style="list-style-type: none"> • Differing opinions on amount of effect • No change to policy versus eventual change due to international law considerations 	Partial
4.	<p>Current DoD remediation policy may allow ROK access to data on contaminated sites on DoD installations</p> <ul style="list-style-type: none"> • DODI 4715.8, Paragraph F3 (only source of finding; not validated by other methodologies) • Differing opinions on effect <ul style="list-style-type: none"> • Negative: Increase public pressure • Positive: Openness may foster goodwill, cooperative spirit between U.S. and ROK 	Divergent
International Agreements		
1.	<p>International agreements do not require DoD activities to remediate hazardous waste sites prior to their closure and return to Korea</p> <ul style="list-style-type: none"> • Confirmed by literature review and personal interviews • Explicitly stated in Article IV, U.S./ROK SOFA 	Convergent
2.	<p>International agreements will be revised in future years to require remediation of hazardous waste sites in Korea</p> <ul style="list-style-type: none"> • Differing opinions on possibility of revision • March 1993 Supplementary Agreement with Germany • ROK Officials: Current U.S./ROK SOFA "unfair" 	Partial

International Agreements (Continued)

	Significant Findings	Degree of Convergence
3.	<p>The SOFA may allow DoD individuals to be incriminated for violation of Korean environmental law, or held responsible for damages to third parties resulting from contamination</p> <ul style="list-style-type: none"> • Divergent between literature and personal interviews • DoD Legal Officials: Never • Literature: Possible given: <ul style="list-style-type: none"> • Increase in Korean requests for exclusive jurisdiction • Title 18 USC Chapter 45, Section 956 • Tort law and Article XXIII 	Divergent
ROK Environmental Law and Current Environmental Conditions		
1.	<p>The level of ROK environmental awareness and compliance with Korean environmental law is increasing</p> <ul style="list-style-type: none"> • Confirmed by literature review and personal interviews • MND environmental program is notable indicator of positive change 	Convergent
Current Environmental Conditions (DoD)		
1.	<p>Suspected and confirmed hazardous waste sites, contaminated primarily with petroleum, oils and lubricants (POL), organic solvents, and heavy metals, exist at numerous locations throughout the peninsula</p> <ul style="list-style-type: none"> • Confirmed by literature review, personal interviews, and field observations • Primarily POL, organic solvents, heavy metals <ul style="list-style-type: none"> • Eight confirmed sites • 37 additional sites at Osan Air Base (Possible) • 79 additional sites Korea-wide (Possible) 	Convergent
2.	<p>Drinking water wells at several main operating bases (MOBs) and collocated operating bases are contaminated with POL and organic solvents</p> <ul style="list-style-type: none"> • Confirmed by literature review, personal interviews, and field observations • Osan Air Base: 24 wells • Camp Carroll: 7 of 13 wells • Suwon Air Base: 4 wells • Taegu Air Base: 2 of 7 wells • Camp Casey: 2 of 23 wells 	Convergent

Opportunities for Cooperation		Degree of Convergence
Significant Findings		Convergent
1.	<p>Numerous opportunities for cooperation between DoD and the ROK government exist in the field of environmental remediation</p> <ul style="list-style-type: none"> • Confirmed by literature review and personal interviews • Includes the following relating to remediation: <ul style="list-style-type: none"> • Training materials • Advanced education (graduate and post-graduate studies) • Technology transfer • "Easy target" for success; supported by DoD and ROK 	
Other		
1.	<p>Funding Problems</p> <ul style="list-style-type: none"> • Confirmed by literature review and personal interviews • Does not directly influence remediation policy, but influences execution • Insufficient resources → poor execution • Solutions: <ul style="list-style-type: none"> • ROK pays for remediation at ROKFC project sites • Develop sound strategic funding strategy 	Convergent

APPENDIX 5-2: Treaties To Which The Republic of Korea Is a Signatory

Title	Effective Date	U.S. Signatory?
Amendments to the Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	Unknown	YES
Protocol relating to modification of the International Convention for the Conservation of Atlantic Tunas	Unknown	YES
Protocol relating to the International Convention for the Safety of Life (SOLAS PROT 1988)	Unknown	YES
Agreement establishing the Fund for the Development of the Indigenous Peoples of Latin America and the Caribbean	Unknown	NO
Protocol to amend Paragraph 2 of Article X of the International Convention for the Conservation of Atlantic Tunas	Unknown	YES
Constitution of the World Health Organization	17 Aug 49	YES
Constitution of the Food and Agriculture Organization of the United Nations	25 Nov 49	YES
Agreement for the Establishment of the Asia Pacific Fishery Commission	19 Jan 50	YES
Constitution of the United Nations Educational, Scientific and Cultural Organization	14 Jun 50	YES
Convention on International Civil Aviation Annex 16 Aircraft Noise	11 Dec 52	YES
International Agreement for the Creation of an International Office for dealing with Contagious Diseases of Animals at Paris	21 Nov 53	YES
International Plant Protection Convention	8 Dec 53	YES
Agreement of the International Bank for Reconstruction and Development	26 Aug 55	YES
Agreement of the International Monetary Fund	26 Aug 55	YES
Convention of the World Meteorological Organization	16 Mar 56	YES
Agreement concerning the organization of a Joint Institute for Nuclear Research	26 Mar 56	NO
Statute of the International Atomic Energy Agency	8 Aug 57	YES
Articles of Agreement of the International Development Association	18 May 61	YES
Convention on the International Maritime Organization	10 Apr 62	YES
Convention on the Liability of Operators of Nuclear Ships	25 May 62	NO
Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water	24 Jul 64	YES
International Convention for the Safety of Life at Sea	26 May 65	YES
Agreement establishing the Asian Development Bank	22 Aug 66	YES
General Agreement on Tariffs and Trade	14 Apr 67	YES
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies	13 Oct 67	YES

Title	Effective Date	U.S. Signatory?
Statutes of the International Centre for the Study of the Preservation and Restoration of Cultural Property	22 Jul 68	YES
Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects launched into Outer Space	4 Apr 69	YES
International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	29 Nov 69	YES
International Convention for the Conservation of Atlantic Tunas	28 Aug 70	YES
Convention on Road Traffic	14 Jun 71	YES
Convention placing the International Poplar Commission within the Framework of the Food and Agriculture Organization of the United Nations	16 Jan 73	YES
Convention on the Recognition and Enforcement of Foreign Arbitral Awards	9 May 73	YES
Treaty on the Non Proliferation of Nuclear Weapons	23 Apr 75	YES
Convention on the International Regulations for Preventing Collisions at Sea	29 Jul 77	YES
International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended in 1962 and 1969	31 Oct 78	YES
International Convention for the Regulation of Whaling	28 Dec 78	YES
International Convention on Civil Liability for Oil Pollution Damage	18 Mar 79	YES
International Convention for Safe Container (CSS)	18 Dec 79	YES
Convention on International Liability for Damage caused by Space Objects	14 Jan 80	YES
Vienna Convention on the Law of Treaties	27 Jan 80	YES
International Convention for the Safety of Life at Sea (SOLAS)	31 Mar 81	YES
Convention on Registration of Objects Launched into Outer Space	14 Oct 81	YES
Amendment of the Plant Protection Agreement for the Asia and Pacific Region	19 Oct 81	NO
Plant Protection Agreement for the Asia and Pacific Region	4 Nov 81	NO
Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Protocol I)	15 Jul 82	YES
Protocol Additional to the Geneva Conventions relating to the Protection of Victims of Non International Armed Conflicts (Protocol II)	15 Jul 82	YES
Protocol relating to the International Convention for the Safety of Life at Sea (SOLAS Prot.)	2 Mar 83	YES
International Convention for the Prevention of Pollution from Ships as Modified by the Protocol of 1978	23 Oct 84	YES
Convention on the Conservation of Antarctic Marine Living Resources	28 Apr 85	YES
Constitution of the United Nations Industrial Development Organization	21 Jun 85	YES
International Tropical Timber Agreement	25 Jun 85	YES
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers	4 Jul 85	YES

Title	Effective Date	U.S. Signatory?
The Antarctic Treaty	28 Nov 86	YES
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	2 Dec 86	YES
Convention on the Physical Protection of Nuclear Material	8 Feb 87	YES
Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil thereof	25 Jun 87	YES
Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction	25 Jun 87	YES
Convention on the Law of Treaties between States and International Organizations or between International Organizations	29 Jun 87	YES
Protocol to the International Convention for the Regulation of Whaling	29 Dec 87	YES
Convention on the Regulation of Antarctic Mineral Resource Activities	25 Nov 88	YES
Convention concerning the Protection of the World Cultural and Natural Heritage	14 Dec 88	YES
Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare	4 Jan 89	YES
Convention on Early Notification of a Nuclear Accident	9 Jul 90	YES
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	9 Jul 90	YES
International Covenant on Economic, Social and Cultural Rights	10 Jul 90	YES
International Covenant on Civil and Political Rights	10 Aug 90	YES
Agreement establishing the European Bank for reconstruction and development	14 Jan 91	NO
International Plant Protection Convention (Revised Text)	4 Apr 91	YES
Charter of the United Nations	17 Sep 91	YES
Convention for the Protection of the Ozone Layer	27 May 92	YES
Protocol on Substances that deplete the Ozone Layer	27 May 92	YES
Protocol to the Antarctic Treaty on Environmental Protection	2 Jul 92	YES
Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and their Destruction	14 Jan 93	YES
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	8 Mar 93	YES
Protocol to the International Convention on Civil Liability for Oil Pollution Damage	8 Mar 93	NO
Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer	10 Mar 93	YES
Convention on International Trade in Endangered Species of Wild Fauna and Flora	7 Oct 93	YES

Title	Effective Date	U.S. Signatory?
Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (art XI)	7 Oct 93	YES
Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (NAFO)	21 Dec 93	YES
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	20 Jan 94	YES
Amendments to Annexes to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter concerning Incineration at Sea	20 Jan 94	YES
Framework Convention on Climate Change	21 Mar 94	YES
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	29 May 94	YES
Convention on Nuclear Safety	20 Sep 94	YES
Convention on Biological Diversity	1 Jan 95	YES
Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer	2 Mar 95	YES
Convention establishing a marine scientific organization for the North Pacific Region (PICES)	1 Aug 95	YES
Agreement for the Establishment of the Indian Ocean Tuna Commission	27 Mar 96	NO
United Nations Convention on the Law of the Sea	27 Apr 96	NO
Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982	28 Jul 96	YES
International Convention to combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa	26 Dec 96	YES
International Tropical Timber Agreement	1 Sep 97	YES

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE December 1997	3. REPORT TYPE AND DATES COVERED Master's Thesis		
4. TITLE AND SUBTITLE Department of Defense Hazardous Waste Site Remediation Issues in the Republic of Korea			5. FUNDING NUMBERS	
6. AUTHOR(S) EDWIN H. OSHIBA, Capt, USAF				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Institute of Technology (AFIT) 2950 P. Street Wright Patterson AFB, OH 45433-7765			8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/GEE/ENV/97D-20	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Institute for National Security Studies (INSS) 2354 Fairchild Drive, Suite 4D33 USAF Academy, CO 80840-6258			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The purpose of this research was to provide information to DoD decision makers regarding factors influencing hazardous waste site remediation policy for South Korea. This study addressed: International agreements and U.S. and South Korean laws and policies relevant to hazardous waste sites; objectives of DoD environmental policy makers; extent and effects of soil and groundwater contamination; cleanup precedents set in other foreign countries; availability of resources and technical capabilities to investigate and remediate hazardous waste sites in South Korea; and opportunities for cooperation between the U.S. and South Korean military with regard to hazardous waste site remediation. Data were collected and compared using triangulation methodology. This research resulted in identification of multiple factors which have an impact on promulgation of DoD hazardous waste site remediation policy for South Korea to include: (1) human health risk; (2) Congressional support for remedial actions overseas; (3) cleanup precedents set in other foreign countries; (4) Korean and U.S. perceptions; (5) Korean environmental law; and, (6) impact of contaminated sites on wartime capabilities. More study is required to assess the influence each issue has on DoD hazardous waste site remediation policy for Korea based on the values of policy makers.				
14. SUBJECT TERMS Republic of Korea, South Korea, South Korean environment, hazardous waste site remediation, overseas cleanup policy, environmental law			15. NUMBER OF PAGES 328	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	