K-25

**OAK RIDGE
K-25 SITE**

MARTIN MARIETTA

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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**Remediation Plan
for
Fluorescent Light Fixtures
Containing
Polychlorinated Biphenyls (PCBs)**

Prepared by
Science Applications International Corporation
800 Oak Ridge Turnpike, Suite 1000
Oak Ridge, Tennessee 37830
Under Subcontract 95B-99928, Letter Release K30

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Health and Safety Upgrades Program
Oak Ridge K-25 Site

**REMEDIATION PLAN
FOR FLUORESCENT LIGHT FIXTURES
CONTAINING POLYCHLORINATED BIPHENYLS (PCBs)**

Prepared by
Science Applications International Corporation
800 Oak Ridge Turnpike, Suite 1000
Oak Ridge, Tennessee 37830
Under Subcontract 95B-99928, Letter Release K30

Date Issued—April 30, 1992

Prepared for
Health and Safety Upgrades Program
Engineering Division
at the
Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7101
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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**REMEDICATION PLAN FOR FLUORESCENT LIGHT FIXTURES
CONTAINING PCBs AT THE K-25 SITE**

	<u>Page</u>
ACRONYMS	v
EXECUTIVE SUMMARY	vii
DEFINITIONS	xii
 1.0 PROBLEM DEFINITION	
1.1 BACKGROUND	1
1.2 CONDITIONS OF NON-COMPLIANCE	2
1.3 APPLICABLE STANDARDS	3
1.4 ALTERNATIVE REMEDIATION SOLUTIONS	4
1.4.1 No Corrective Action	4
1.4.2 Change Out Ballasts as Bulbs are Replaced	5
1.4.3 Change Out Ballasts as They Fail	6
1.4.4 Defined Ballast/Bulb Change Out Plan	8
1.5 RECOMMENDED REMEDIATION PLAN	10
1.5.1 Short Term Actions	10
1.5.2 Long Term Actions	11
1.6 ALTERNATIVE REMEDIATION SOLUTIONS COSTS	11
1.6.1 Defined Ballast/Bulb Change Out (THE PLAN)	12
1.6.1.1 Material and Labor - THE PLAN	12
1.6.1.2 Technical Support - THE PLAN	15
1.6.1.3 Disposal/Storage of PCB Laden Ballasts and Bulbs - THE PLAN	18
1.6.2 Change Out Ballasts as Bulbs are Replaced	20
1.6.2.1 Material and Labor - As Bulbs Are Replaced	20
1.6.2.2 Technical Support - As Bulbs Are Replaced	21
1.6.2.3 Disposal/Storage - As Bulbs Are Replaced	21

1.6.3	Change Out Ballasts as They Fail	22
1.6.3.1	Material and Labor - As They Fail	22
1.6.3.2	Technical Support - As They Fail	23
1.6.3.3	Disposal/Storage - As They Fail	23
1.6.4	No Corrective Action	25
2.0	CORRECTIVE ACTION	
2.1	SCOPE	26
2.2	SAFETY	26
2.3	QUALITY ASSURANCE	26
2.4	PRIORITIZATION OF BUILDINGS	27
2.5	ORGANIZATIONAL RESPONSIBILITIES AND ACTIONS	27
2.5.1	The Remediation Plan Project Coordinator (PC)	28
2.5.2	The Plant Maintenance Division (PMD)	28
2.5.3	Health Physics Department (HPD)	29
2.5.4	Waste Management Department (WMD)	30
2.5.5	Quality Assurance Office (QAO)	31
2.5.6	Industrial Hygiene Department (IHD)	31
2.5.7	Plant Shift Superintendent (PSS)	32
2.5.8	Environmental Management Department (EMD)	33
2.5.9	Safety Department (SD)	33
2.5.10	Procurement Division (PD)	34
2.6	REMOVAL AND REPLACEMENT OF FLUORESCENT LIGHT FIXTURES AND BALLASTS CONTAINING PCBs	34
2.6.1	Routine Change Out of Fixtures and Ballasts Until Remediation Plan is Implemented	34
2.6.2	Implementation of Remediation Plan	35
3.0	DISPOSAL OF BALLASTS CONTAINING PCBs	
3.1	SCOPE	41
3.2	ORGANIZATIONAL RESPONSIBILITIES AND ACTIONS	41
3.2.1	Disposal Requester (DR)	41
3.2.2	Plant Maintenance Division (PMD)	43

3.2.3	Waste Management Division (WMD)	45
3.2.4	Health Physics Division (HPD)	46
3.2.5	Quality Assurance Office (QA)	47
3.2.6	Industrial Hygiene Department (IHD)	47
3.2.7	Hazardous Material Coordinator (HMC)	47
3.2.8	Safety Department (SD)	48
3.2.9	Fire Protection Department (FPD)	48
3.2.10	Environmental Management Department (EMD)	48
3.2.11	Traffic Department (TD)	49
3.2.12	Waste Disposal Coordinator (WDC)	49
3.2.13	K-25 Materials Disposal Committee (MDC)	51
3.2.14	Transportation Safety Council (TSC)	52
3.3	DISPOSAL PROCEDURES	52
3.4	DISPOSAL RECORDS	53
4.0	TRAINING	
4.1	SCOPE	54
4.2	SCHEDULE	54
4.3	DOCUMENTATION	54
5.0	REMEDIATION PLAN CONCLUSIONS	
5.1	Proposed K-25 Actions	56
5.1.1	Short Term Actions	56
5.1.2	Long Term Actions	57
5.2	Cost Comparison of Alternative Solutions	58
5.3	Other Recommendations	59

LIST OF ACRONYMS

CFR	Code of Federal Regulations
DOE	Department of Energy
DR	Disposal Requester
EMD	Environmental Management Department
Energy Systems	Martin Marietta Energy Systems, Inc.
EPA	Environmental Protection Agency
FPD	Fire Protection Department
FY	Fiscal Year
GOCO	Government Owned Contractor Operated
HMC	Hazardous Material Coordinator
HPD	Health Physics Department
IHD	Industrial Hygiene Department
MDC	Materials Disposal Committee
NEC	National Electric Code
NFPA	National Fire Protection Association
NOS	Not Otherwise Specified
OSHA	Occupational Safety and Health Administration
PC	Project Coordinator
PCB	Polychlorinated Biphenyls
PMD	Plant Maintenance Division
PSS	Plant Shift Superintendent
PD	Procurement Division
QAO	Quality Assurance Office
RCAA	Resource Conservation and Recovery Act
SD	Safety Department
TD	Traffic Department
TSC	Transportation Safety Council

TSCA	Toxic Substance Control Act
WDC	Waste Disposal Coordinator
WMD	Waste Management Department

EXECUTIVE SUMMARY

This report describes the remedial action to achieve compliance with 29 CFR 1910 Occupational Safety and Health Administration (OSHA) requirements of fluorescent light fixtures containing PCBs at K-25 site. This remedial action is called the Remediation Plan for Fluorescent Light Fixtures Containing PCBs at the K-25 Site (The Plan). The Plan specifically discusses (1) conditions of non-compliance, (2) alternative solutions, (3) recommended solution, (4) remediation plan costs, (5) corrective action, (6) disposal of PCB waste, (7) training, and (8) plan conclusions.

The results from inspections by Energy Systems personnel in 2 buildings at K-25 site and statistical extension of this data to 91 selected buildings at the K-25 site indicates that there are approximately 28,000 fluorescent light fixtures containing 47,036 ballasts. Approximately 38,531 contain PCBs and 2,799 of the 38,531 ballasts are leaking PCBs. Review of reportable occurrences at K-25 for the 12 month period of September 1990 through August 1991 shows that Energy Systems personnel reported 69 ballasts leaking PCBs. Each leaking ballast is in non-compliance with 29 CFR 1910 - Table Z-1-A. The age of the K-25 facilities indicate a continued and potential increase in ballasts leaking PCBs.

This report considers 4 alternative solutions for dealing with the ballasts leaking PCBs. The advantages and disadvantages of each alternative solution are discussed and ranked using cost of remediation, reduction of health risks, and compliance with OSHA as criteria. The evaluation results indicate that one solution better meets the criteria than the other 3 alternatives. This solution becomes the recommended Plan since it is the least expensive to implement, it addresses the problem and will achieve compliance with OSHA requirements, it eliminates this future health risk for Energy Systems personnel from the suspected carcinogen (PCB), it offers payback of remediation costs through reduced energy consumption of new energy efficient ballasts and bulbs, and it eliminates possible PCB contamination of soil, water, and human tissue from this source.

The Plan recommends the development of the earliest possible scheduled removal of all fluorescent light ballasts containing PCBs at the K-25 and replacement with the best available energy efficient ballasts and bulbs.

The Plan describes the costs for each of the 4 alternative solutions. Included in these costs are material and labor to change out the 47,036 ballasts and matching bulbs, the labor and special handling required for PCB spill cleanup, the disposal of the generated PCB waste, and the technical support labor required to safely implement and document the remediation actions. The cost estimates are based on rates for Energy Systems personnel doing the work, but the work could be accomplished by an outside contractor. The alternative solutions in order of most to least desirable are:

Alternative Solution		Cost Estimates
1.	"Defined Ballasts/Bulb Change Out"	
	Material and Labor	\$4,784,770
	Technical Support	3,032,908
	PCB Waste Disposal	<u>730,250</u>
		\$8,547,928
2.	"Change Out Ballasts as Bulbs are Replaced"	
	Material and Labor	\$5,217,989
	Technical Support	3,450,308
	PCB Waste Disposal	<u>730,250</u>
		\$9,398,547

3. "Change Out Ballasts as They Fail"

Material and Labor	\$10,430,015
Technical Support	6,903,223
PCB Waste Disposal	<u>1,098,252</u>
	\$18,431,490

4. "No Corrective Action"

This solution has no immediate cost,
but can be expected to be equal to
(3) plus potential health liabilities Greater than \$18,431,490

The preventive nature of plan (1) provides the most economical solution for remediation of PCBs in the fluorescent light fixtures at the K-25 site. The time for remediation is shortest for plan (1) and longest for plan (4). As this time increases, the potential for more ballasts to leak PCBs increases, and the remediation costs increase. The remediation costs will increase as material and labor costs also escalate. Therefore, plan (1), "The Defined Ballast/Bulb Change Out" is the recommended Remediation Plan for Fluorescent Light Fixtures containing PCBs.

The corrective action includes guidelines to properly identify, remove, handle, and dispose of PCB ballasts and to install new "NON-PCB" ballasts and bulbs. A list of 91 buildings are prioritized and recommended for remediation. The Energy Systems departments and/or divisions and their responsibilities required to implement the Plan are described. The Plan covers short term needs, routine change out of fixtures and ballasts until the remediation plan is implemented, and long term needs, the formal implementation of remediation plan.

As the PCB ballasts are removed, the resulting PCB waste is to be sorted according to non-radioactive PCB waste (Hazardous Waste) and radioactive PCB waste (Mixed Hazardous-Waste); then placed in 17C barrels. The barrels are to be tagged according to their contents. The non-radioactive PCB waste can be held in temporary storage for a maximum of 30 days from date of first placement in the drum and shipment offsite within 9 months for disposal in an approved Chemical Waste Landfill. The radioactive PCB waste shall be disposed in the K-1435 TSCA incinerator. All PCB Waste disposal and PCB spill cleanup actions will be properly documented.

The Project Coordinator is responsible for ensuring that all personnel are properly trained before participating in the removal, handling, storage, and disposal of fluorescent light ballasts containing PCBs. The training will include attending Polychlorinated Biphenyl Employee Information and Awareness Training (module 305), Carcinogen Control for Employees (Module 348) training sessions, and an orientation of the Remediation Plan.

The Remediation Plan offers the most cost effective solution for OSHA Compliance by the removal of PCB containing ballasts while eliminating health risks associated with exposure to PCBs on the job, and the potential for PCBs finding their way into adipose tissue of humans via contamination of soil, water supplies, and food chains. The Plan recommends:

1. Short Term

- As fluorescent fixtures require bulb change out, that the ballasts be inspected and labeled as "PCB" or "NON-PCB" ballasts to assist in future PCB ballast change out.
- As ballasts fail and require change out, that they be replaced with new "NON-PCB" energy efficient ballasts and bulbs. The fixture shall then be labeled, "THIS FIXTURE CONTAINS NO-PCBs" in a location visible from the floor level.

2. Long Term

- Approve the "Defined Ballast/Bulb Change Out" alternative as the Remediation Plan.
- Select a Project Manager, assemble team members, train personnel, change out PCB ballasts with new energy efficient ballasts and bulbs, and dispose of PCB waste in accordance with the Plan.

DEFINITIONS

Authorized Classifier¹. A person authorized to classify documents or material as restricted data, formerly restricted data, or national security information data.

Capacitor². "A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric." Prior to July 1, 1978, the capacitor dielectric, used as electrical insulator and heat transfer media, contained PCBs.

Chemical Waste Landfill². "A landfill at which protection against risk of injury to health or the environment from the migration of PCBs to land, water, or atmosphere is provided from PCBs and PCB items deposited therein by locating, engineering, and operating the landfill as specified in 40 CFR 761.75."

Classified Waste Material¹. Any waste which reveals or may reveal restricted information because of its function (e.g., functional use in or association with a classified program), shape, configuration, or materials of construction; because classified material to which it has been exposed has not been removed; or for any other reasons determined by an authorized classifier.

Demolition Waste¹. Includes all nonhazardous, nonmetallic, and unclassified waste generated by the demolition of buildings and/or other facilities. It includes such materials as concrete, asphalt, roofing, wood, plaster, and spoil dirt, and excludes such materials as waste-paper, cardboard, and food wastes.

Disposal². "Intentionally or accidentally to discard, throw away, or otherwise complete or terminate the useful life of PCBs and PCB items. Disposal includes spills, leaks, and other uncontrolled discharges of PCBs as well as actions related to containing, transporting, destroying, degrading, decontaminating, or confining PCBs and PCB items."

Disposal Forms and Tags^{1*}. All waste containers must be labeled or marked so that the waste within the containers is clearly identified. Materials that contain RCRA hazardous waste, polychlorinated biphenyls, asbestos, and radioactive waste have specified labeling requirements. Consult with the waste disposal coordinator to determine the requirements for labeling waste in these categories.

1. Request for Disposal of Waste Material and Equipment, UCN-12463 (Figure 7) - Utilized to initiate and subsequently effect all waste disposals.
2. Hazard Identification Tag, UCN-2114A (Figure 5) - Utilized to identify all hazardous materials. This tag is attached by the disposal requestor at the direction of the K-25 Waste Disposal Coordinator.
3. Waste Identification Tag, UCN-2114B (Figure 11) - Utilized to identify all waste materials that are not hazardous. This tag is attached by the Disposal Requestor at the direction of the K-25 Waste Disposal Coordinator.
4. Radiation Contamination Identification Tag, UCN-15A (Figure 10) - This yellow and magenta tag is utilized to identify material determined to be radioactively contaminated in excess of the limits set forth in SPP 804. This tag is filled out and attached to the waste by Health Physics personnel.
5. Equipment Radioactive Contamination Survey Form, UCN-11635 (Figure 8) - Utilized by the Health Physics Department to document all radioactive material surveys.

*See Appendix for Forms and Tags

6. Off-Site Material Transfer Tag, UCN-11623 (Figure 12) - This blue tag is utilized to identify material which has been determined to be nonradioactive or has been exposed to radioactive contamination less than the limits set forth in SPP 804 and can be shipped off-site. This tag is completed and attached to the waste by Health Physics personnel.
7. Request For Decontamination Services, UCN-5646 (Figure 9) - Completed by the department generating waste to request decontamination services of the Waste Management Department.
8. Classified Material Tag, UCN-10732 (Figure 17) - Utilized to identify material which has been determined to be classified. This tag is attached by the disposal requestor to all classified wastes, in addition to any other tags deemed necessary.
9. Waste Material Inventory Form, UCN-16792 (Figure 15) - Used to inventory laboratory-type chemicals and attached to UCN-12463, when needed.
10. Monthly Waste Generation Accounting Form, UCN-16791 (Figure 16) - Used for accounting monthly waste inventory associated with blanket disposals.
11. Property Transfer Record, UCN-541 (Figure 18) - Used to transfer property items from one custodian to another custodian and in the case of waste disposal, transfer to property sales for resale.

Disposal Mechanisms¹

1. Single Disposal - The act of effecting the disposal of one particular waste or category of waste as initiated by one disposal request.

2. Blanket Disposal - The act of effecting the disposal of similar wastes which are generated on a recurring basis but covered under the provisions of one disposal request form. While only one request form submission is needed, each individual disposal requires a separate disposal tag; the specific tag being dependent upon the nature of the waste and as determined by the Plant Waste Disposal Coordinator. The applicability and utilization of blanket disposals are determined by the K-25 Waste Disposal Coordinator from information provided by the disposal requester. Blanket disposal requests are issued for the calendar year (e.g., it expires 12-31). Waste accountability is the responsibility of the Blanket Disposal Requester. Failure to submit a monthly accountability document will result in suspension of the blanket disposal request.
3. Emergency Disposal - Any disposal necessitated by an emergency situation, as determined by the K-25 Shift Superintendent.

Disposal Requester¹ - Any person who properly initiates a request for the disposal of waste materials (UCN-12463). For wastes generated at K-25 by outside construction contractors, the K-25 construction engineer will be considered the disposal requester.

Fluorescent Electromagnet Light Ballast². A device that electrically controls fluorescent light bulbs and that includes a transformer and a capacitor containing 0.1 kg or less of dielectric. Unless the ballast is marked "non-PCBs," the dielectric should be considered to have PCBs.

Fluorescent Electronic Light Ballast. A device that electrically controls fluorescent light bulbs using solid state circuitry. These ballasts will be marked as "NON-PCBs." These ballasts have been introduced to the market since the 1978 ban of PCBs.

Generator of PCB Waste². Any person whose act or process produces PCBs that are regulated for disposal under 40 CFR 761 subpart D, or whose act first causes PCBs or PCB items to

become subject to the disposal requirements of subpart D; or who has physical control over PCBs when a decision is made that the use of the PCBs has been terminated and, therefore, is subject to the disposal requirements of subpart D. The term "person" means any natural or judicial person including any individual, corporation, partnership, or association; any State or political subdivision thereof; any interstate body; and any department, agency, or instrumentality of the Federal Government.

Hazardous Mixed Waste Material¹ - Any material which can be described as a hazardous waste material and is also radioactively contaminated.

Hazardous Waste Material¹

1. Any material which is regulated as a waste by the Resource Conservation and Recovery Act (RCRA) (40 CFR Part 260). Generally, these wastes are categorized as ignitable, corrosive, reactive, EP toxic, acutely toxic, and toxic.
2. Any material which is regulated as a waste by the Toxic Substance Control Act (TSCA) (40 CFR 761). This act regulates the disposal of polychlorinated biphenyls and other chemicals.
3. Any material containing asbestos.
4. Empty containers which have contained hazardous materials should be considered hazardous until they have been properly cleaned.
5. Wastes which might be considered hazardous but are not included in RCRA, TSCA, or asbestos regulations.

Incinerator². "An engineered device using controlled flame combustion to thermally degrade PCBs and PCB items."

Leak². Any substance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

Mark². The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items or other objects subject to these regulations.

Marked². The marking of PCB items and PCB storage areas and transport vehicles by means of applying a legible mark by painting, fixation of an adhesive label, or by any method that meets the requirement of these regulations.

PCBs². Polychlorinated biphenyls, the organic chemicals known for their dielectric and heat transfer capabilities. Materials with PCB concentrations of 50 ppm and greater must be stored and disposed in accordance with 40 CFR 761, subpart D. Dilution of the PCB concentration cannot be used to avoid compliance with this section. PCBs are a suspected carcinogen and must be handled and disposed as Hazardous Waste.

PCB Article². "Any manufactured article, other than a PCB container, that contains PCBs or whose surface(s) have been in direct contact with PCBs." Included in this are capacitors, transformers, electric motors, pumps, and pipe.

PCB Container². "Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles and whose surfaces have been in direct contact with PCBs."

PCB-Contaminated Electrical Equipment². "Any electrical equipment, including but not limited to transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches (including

sectionalizers and motor starters), electromagnets, and cable, that contain 50 ppm or greater PCBs, but less than 500 ppm PCBs."

PCB Item². "Any PCB article, PCB article container, PCB container, or PCB equipment, that deliberately or unintentionally contains or has as a part of it any PCB or PCBs."

PCB Light Ballast¹. A fluorescent light ballast containing or assumed to contain PCBs. Manufacturers are required to label all ballasts manufactured after July 1, 1978, as "NO PCBs" if it contains no PCBs or with the statement "THIS EQUIPMENT CONTAINS PCB CAPACITOR(S)" if the ballast capacitor does contain PCBs. No label, indicates pre July 1, 1978, manufacture, with high likelihood that PCBs are contained in the capacitor.

Plant Materials Disposal Committee¹. A group of technical personnel appointed to serve in an advisory capacity with regard to the disposal of certain waste materials.

Plant Refuse¹. Worthless scrap such as paper, food wastes, plastics, and cardboard which can be easily and safely compacted and which legally be disposed of in a sanitary landfill. All other wastes defined in this procedure are excluded from this definition.

Plant Waste Disposal Coordinator¹. The person responsible for overseeing the K-25 Waste Disposal Management Program as outlined in this procedure.

Posing an Exposure Risk to Food or Feed². "Being in any location where human food or animal feed products could be exposed to PCBs released from a PCB item. A PCB item poses an exposure risk to food or feed if PCBs released in any way from the PCB item have a potential pathway to human food or animal feed."

Scrap Metal¹. Any unclassified property or nonproperty item that is no longer useful in its present state but may have monetary value because of its metallic content. For the purposes of this procedure, scrap metal is categorized as follows:

- a. Clean Scrap Metal - Scrap metal which is known not to have been contaminated with radioactive materials or has been exposed to radioactive contamination less than the limits for the sale/shipment of surplus equipment set forth in SPP 804, "Contamination and Radiation Exposure Control Guides and Standards." Before a material can be classified as clean scrap metal, it must be surveyed and "blue tagged" (UCN-11623, Off-Site Material Transfer Tag) by Health Physics.
- b. Contaminated Scrap Metal - Scrap metal which has been contaminated with radioactive materials in excess of the limits for the sale/shipment of surplus equipment set forth in SPP 804. All contaminated scrap metal must be surveyed and "yellow tagged" (UCN-15A, Radiation Contamination Identification Tag) by Health Physics.
- c. Hazardous Scrap Metal - Scrap metal which contains sufficient hazardous materials to pose a threat to human health, property, or the environment. This material must have a Hazard Identification Tag, UCN-2114A, as well as the Health Physics tag.
- d. Mixed scrap metal - Any metal which meets the definition of Hazardous Scrap Metal and also has been contaminated with radioactive materials in excess of the limits for the sale/shipment of surplus equipment set forth in SPP 804.

Spill². "Both intentional and unintentional spills, leaks, and other uncontrolled discharges where the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contaminants resulting from those releases.

This policy applies to spills of 50 ppm or greater PCBs. The concentration of PCBs spills is determined by the PCB concentration in the material spilled as opposed to the concentration of PCBs in the material on to which the PCBs were spilled."

Spill Cleanup Records². "The documentation of the spill that is required by 40 CFR 761.125(b). The collection of required information must begin within 24 hours of spill awareness."

Storage for Disposal. Temporary storage of PCBs that have been designated for disposal. Temporary storage may not exceed 30 days.

Waste Material¹. Any material or equipment which cannot be further utilized, processed, or recycled and requires disposal.

¹ Energy Systems, SPP-341 "Waste Disposal Management"

² Quotations are from TSCA regulations, 40 CFR 761.3

1.0 PROGRAM DEFINITION

1.1 BACKGROUND

Martin Marietta Energy Systems, Inc., (Energy Systems) is presently mandated by the Department of Energy (DOE) to bring the K-25 Site in Oak Ridge, Tennessee, into compliance with Occupational Safety and Health Administration (OSHA) requirements. Energy Systems requires assistance in developing a Remediation Plan to address the problem associated with fluorescent light fixtures which have ballasts that contain polychlorinated biphenyls (PCBs). OSHA standards define allowable airborne and skin contact limits for personnel and the Environmental Protection Agency regulates the use and handling of PCBs.

Light ballasts are the primary electric components of fluorescent light fixtures and are located within the fixture enclosure. The ballast units consist of a transformer to increase the incoming voltage; a capacitor which may or may not contain PCB dielectric heat transferring liquid, and a thermal protection switch. These are encapsulated in a tar-like substance to muffle the electrical hum of the ballast. When a ballast fails, excessive heat may cause the capacitor to rupture and the encapsulate to melt. If the capacitor contains PCBs, this will result in PCBs leaking into the environment.

When released into the environment, PCBs do not biodegrade easily. Instead they persist for many years, bioaccumulate, and bioconcentrate in organisms. Laboratory tests show that PCBs cause cancer in animals. It is the Environmental Protection Agency's (EPA's) policy to consider any animal carcinogen a possible human carcinogen. Exposure to PCBs can cause chloracne, nausea, dizziness, eye irritation, and bronchitis. Ingestion of PCBs can cause liver damage and digestive problems. EPA regulates PCBs through rules issued pursuant to the Toxic Substances Control Act.

EPA imposed regulations on the use of PCBs in ballasts in 1978. All light ballasts manufactured after July 1, 1978, that do not contain PCBs must be marked "NO PCBs" by the manufacturer. If the ballast capacitor(s) do contain PCBs, they must be marked, "This equipment contains PCB capacitor(s)".¹ It is Energy Systems' policy to treat unmarked ballasts as ones containing PCBs.

1.2 CONDITIONS OF NON-COMPLIANCE

The Environmental Management Department at K-25 learned of incidents at the Paducah Gaseous Diffusion Plant (PGDP) where PCBs leaked from light fixtures onto a desk and floor area. These incidents required cleanup in accordance with TSCA spill cleanup procedures. Further surveys of fluorescent fixtures in the cafeteria revealed that one out of three ballasts had leaked PCBs. A similar ballast failure occurred in the Oak Ridge K-25 Building K-1001. Because of the age of K-25 buildings and the seriousness of potential health and safety concerns, a ballast inspection program was conducted on selected buildings at K-25.

A statistical sampling of fluorescent light fixtures for PCBs was done in Buildings K-1007 and K-1035 by Energy Systems personnel. These buildings were selected because of their age, large number of fixtures, and large number of workers. Using the number of fluorescent light fixtures per building provided by the engineering department and the data from the survey of buildings K-1007 and K-1035, it is estimated that there are 47,036 ballasts in 28,000 fluorescent light fixtures in the (91) buildings listed in Table 1 of the Appendix. Representatives from K-25 Engineering Division, Environmental Management Division, Health and Safety Division, and Plant Maintenance Division compiled the list of buildings in Table 1 as those at the K-25 site for remediation. Of the 47,036 ballasts, 38,531 are estimated to contain PCBs. An estimated 3,225

¹ TSCA Regulations, 40 CFR 761.40

ballasts are leaking, 2,799 of which are estimated to be leaking PCBs. The data indicates that the leaking ballasts are contained in 2,946 fixtures. Some fixtures have more than one ballast. The discovery of leaking ballasts at K-25 site resulted in records being kept of leaking ballasts. A review of the Environmental Management Division's records of reportable occurrences revealed that 69 leaking fluorescent ballasts were found and reported for the twelve months of September 1990 through August 1991. This indicates that the ballasts containing PCBs continue to fail and that the rate of failure is likely to increase due to the age of the fixtures. PCB leakage from these ballasts exceed OSHA standard 29 CFR 1910.1000 table Z-1-A for airborne limits when ballast smokes or potential for skin contact when PCBs spills onto surfaces which personnel can touch. PCB leakage has a negative impact upon human life and the environment while disrupting the normal operation of K-25. Such circumstances require remediation action.

1.3 APPLICABLE STANDARDS

This plan is developed and implemented in conformance with standards and criteria set forth in:

- 40 CFR 761, Environmental Protection Agency rules for controlling PCBs under TSCA
- 29 CFR 1910, Occupational Safety and Health Standards (OSHA)
- 29 CFR 1926, "Safety and Health Regulations for Construction" (OSHA)
- DOE Order 5483.1A, Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities
- Energy Systems Procedure, ESH-1, "Management of PCBs"

- Energy Systems Procedure, ESH-14, "Environmental Protection"
- Standard Practice Procedure, SPP-341, "Waste Disposal Management"
- Standard Practice Procedure, SPP-375, "Handling and Disposal of PCB Light Ballasts"
- Standard Practice Procedures, SPP-705, "Quality Assurance (QA) Program"
- Standard Practice Procedures, SPP-804, "Contamination and Radiation Exposure Control Guides and Standards"
- NFPA 70-1990, "National Electric Code"

1.4 ALTERNATIVE REMEDIATION SOLUTIONS

Four remediation alternatives were considered and are discussed in the subsections that follow.

1.4.1 No Corrective Action

Even though adverse health effects from PCBs have resulted from only prolonged and repeated exposure, OSHA requirements mandate that the potential for exposure be treated. The age of the K-25 facilities increases the likelihood that the ballasts will fail; the number of personnel at these facilities makes it likely that people will be exposed to PCB material in the future. Each time PCBs leak from a ballast, Energy Systems is in non-compliance with OSHA standard 29 CFR 1910.1000. In order to comply with the DOE mandate to meet OSHA requirements, Energy Systems must handle PCB ballast leakage in a controlled manner.

A remediation plan must be developed, and "No Corrective Action" is not a recommended solution.

1.4.2 Change Out Ballasts as Bulbs are Replaced

This solution replaces ballasts when the fluorescent light bulbs need servicing. While a ballast has an average life of 8 to 12 years, bulbs have an average service life of 1.37 years or 12,000 hours. Fluorescent light bulbs could require replacement every 1.37 years if operated continuously or every 4.12 years if operated for 8 hours a day. If the ballasts were changed when light bulbs were serviced, the change out would take up to 4 years.

Advantages of this solution are:

- Change out expenses would be distributed over a period of 1 to 4 years.
- Only one trip would be required per fixture, to change out ballasts and bulbs and label as NON-PCB ballasts.

Disadvantages of this solution are:

- It could be more efficient to go through a building servicing one fixture after another.
- The failure rate of the bulbs might not keep the replacement crews busy.
- This plan does not address the need to replace ballasts that fail and require change out before their bulbs are changed. Thus, the greater expense of handling a leaking ballast is not eliminated.

- The potential for personnel to contact PCBs is not adequately addressed if change out program requires four years.
- Adverse employee reaction to the potential for leakage and contact of PCBs continues.

For these reasons, "Change Out Ballasts as Bulbs are Changed" is not a recommended solution.

1.4.3 Change Out Ballasts as They Fail

Service personnel could remove and replace the fluorescent fixtures as the ballasts fail. Since standard ballasts have service life expectancy of 8-12 years at 50% duty cycle, the minimum time to require ballast change out would be 8 years for continuous duty and longer (as much as 24 years) for duty cycles of 8 hours a day.

When a ballast fails without overheating or leaking PCBs, there is no imminent danger to building occupants. Removal and disposal could be accomplished without special handling. In another type of failure, the capacitor leaks PCBs on the light fixture, the floor, desks, equipment which may be critical to building operation, there is potential for occupancy contact and there are safety and fire hazard concerns. Such failures have already occurred, and when ballasts fail in this manner, a significantly more complex replacement procedure is required. Such procedures include:

- protective equipment for personnel removing PCB-laden ballast and fixtures,
- proper disposal of PCB waste,
- decontamination and/or disposal of all items contaminated by PCBs,

- appropriate monitoring of the area to determine that PCBs have been satisfactorily removed, and
- proper documentation and reporting of the event.

The advantages of this solution are:

- The expense of change out is spread over a long period of time, maybe even years, rather than being incurred at one time. A fluorescent ballast has a service life of 8-12 years.
- Disposing of non-leaking ballasts could be handled more easily in small quantities than in the large quantities.

The disadvantages to this solution are:

- Extending the project over a longer period of time increases the likelihood of ballast failures and consequently the potential for PCB leaks.
- Personnel are more likely to come in contact with PCBs if the fixtures with ballasts containing PCBs are allowed to fail before they are replaced. Contact with PCBs is not acceptable.
- It is considerably more expensive to handle a leaking ballast than a non-leaking ballast. It is also more expensive to deal with several separate events that require special handling than to establish an orderly procedure to remove ballasts before they leak.

- This method does not show a preventive effort toward compliance with DOE Order 5483.1A, 29 CFR 1910, and 40 CFR 761.
- Adverse employee reaction to the potential for leaks and contact with PCBs continues.

For these reasons, "Change Out Ballasts as They Fail" is not a recommended solution.

1.4.4 Defined Ballast/Bulb Change Out Plan

The removal of PCBs from the fluorescent light fixtures at the K-25 site is a major project due to the large number of fixtures (28,000) in 91 buildings with different installation conditions. Some fixtures are in offices which are easily serviced; while others are in radiological areas requiring protective equipment for proper access. The hazardous character of PCBs requires involvement of several departments to safely remove, clean up any PCB spills, dispose of PCB waste properly, decontaminate and dispose of any radioactive waste properly, and maintain required documentation in accordance with applicable health and safety standards. The size and complexity of this project requires that it be conducted in an orderly manner. This solution defines a systematic plan for the removal, replacement, and disposal of fluorescent ballasts containing PCBs at the K-25 site. This plan takes into account the following factors:

- reducing potential hazard to personnel and environment to insignificant levels,
- establishing building priorities to reduce future exposure to PCBs,
- complying with applicable regulations for removal, storage, and disposal of PCBs,
- documenting action for removal, storage, and disposal of PCBs,
- interfacing of appropriate personnel from needed disciplines, and
- reducing cost through scheduled implementation.

Advantages to this solution are:

- This solution complies with DOE's mandate for Energy Systems to establish requirements and procedures to ensure occupational safety and health protection for DOE contractor employees in government-owned contractor-operated (GOCO) facilities consistent with the protection afforded private industry employees by the Occupational Safety and Health Act of 1970, Public Law 91-596.
- This solution uses personnel trained in removing, replacing, and disposing of ballasts containing PCBs, which reduces the potential for health risks or injury.
- An organized plan for removing, replacing, and disposing of ballasts containing PCBs will be the most cost effective since materials can be procured at best prices, and work can be scheduled to minimize interruption to operations.
- Employee relations will be strengthened when aggressive action is taken to protect personnel.
- Changing ballasts and bulbs permits installation of state-of-the-art, energy-efficient units that will provide short-term pay back for equipment installation and long-term operational savings.
- Removing ballasts that contain PCBs will have a positive impact on the environment. The possibility of PCBs leaking, contaminating the soil and water supplies, and finding their way into the adipose tissue of humans through the food chains from this source is eliminated.
- Also, the reduction in electrical energy consumed reduces the amount of CO₂ and sulfur dioxide discharged to the atmosphere from electricity production.

Disadvantages to this solution are:

- Removing ballasts in large quantities presents a waste-handling problem because of the present moratorium on offsite shipments of hazardous waste.
- The large number of ballasts and bulbs to be changed (perhaps as many as 47,000 ballasts and 94,000 bulbs) requires significant expenditure of funds.

For these reasons, the "Defined Ballast/Bulb Change Out Plan" is the recommended alternative and is detailed in the following section as the Remediation Plan for Fluorescent Light Fixtures Containing PCBs.

1.5 RECOMMENDED REMEDIATION PLAN

The "Defined Ballast/Bulb Change Out Plan" is the solution recommended for orderly removal, replacement, and disposal of all ballasts containing PCBs at K-25. The Plan consists of two distinct areas: short term actions and long-term actions.

1.5.1 Short Term Actions

The first area of the plan details activities to identify and label all fixtures that are serviced in period after the Remediation Plan is approved but before it is implemented. This would involve labeling the light fixture to show that the fixture does or does not contain ballasts with PCBs.

This includes:

- When "bulbs only" are changed, the ballast should be inspected, and the appropriate PCB label, Figure 12, or NON-PCB label, Figure 13, should be attached to the fixture.

- When a ballast fails and requires change out, both ballasts (if so equipped) should be replaced with new, NON-PCB, energy-efficient ballasts and bulbs and labeled "THIS FIXTURE CONTAINS NO PCBs," Figure 13. Fixtures should not be left with a mixture of PCB-containing ballasts and NON-PCB ballasts or with a mix of standard ballasts and energy-efficient ballasts in the same fixture.

1.5.2 Long Term Actions

The second area of the plan details the long-term activities required to remedy the problem of fluorescent light fixtures with ballasts containing PCBs at K-25. It includes:

- inspection of the fixtures,
- specify actions to be taken,
- training of appropriate personnel,
- prioritization of buildings,
- development of work packages and schedule of work to be done, and disposal of PCB units
- documentation of removal, replacement, spill cleanup, and disposal of ballasts.

These activities are described in Corrective Action Section 2.0.

1.6 ALTERNATIVE REMEDIATION SOLUTIONS COSTS

The cost of remediation is difficult to determine because there are several variables. These variables include: (1) the variety of fluorescent light fixtures used in the buildings, (2) the number of ballasts that are leaking PCBs and require greater effort to change out than non-leakers, (3) the total count of fixtures may be in error since some ballasts have been changed before a marking system was implemented, (4) some fixtures are easily accessed while reaching others will require special equipment and (5) some fixtures are installed in radiological areas.

Thus, the time and number of people required to change a ballast will vary according to circumstance. The following cost estimates are based on engineering estimates of man hours required, material costs, and protective equipment costs shown in Figure 19 of the Appendix.

The material and labor, technical support, and disposal/storage cost for fixture, ballast, and bulb change out are considered for each alternative solution below.

1.6.1 Defined Ballast/Bulb Change Out (THE PLAN)

1.6.1.1 Material and Labor - THE PLAN

The change out process will be separated into fixtures in non-radiological areas and fixtures in radiological areas since each area has different working conditions. Approximately 32 percent of the fixtures are located in radiological areas.

- Non-Radiological Areas (68% of fixtures)

The simplest work condition is non-leaking ballasts in non-radiological areas. Protective equipment is not required to change out these ballasts.

Non-Leaking (1B2B) Cost*

Material	One Ballast	\$12.62
	Two Bulbs	3.84
Labor	One Man Hour	<u>59.37</u>

Ballast/Bulb Change Out Costs

Non-Leaking (1B2B)/Unit \$75.83 \$76.00

* See Figure 19 of Appendix for material and labor cost information.

Non-Leaking (2B4B) Cost*

Material	Two Ballasts	\$25.24
	Four Bulbs	7.68
Labor	1.5 Man Hours	<u>89.06</u>

Ballast/Bulb Change Out Costs

Non-Leaking (2B4B)/Unit \$122.28 ≈ \$122.00

If ballasts are leaking, the fixture is expected to be contaminated; thus, requiring a fixture changeout. Protective equipment is required for this work.

Contaminated Fixture with (1B2B) Cost*

Material	(1B2B) Fixture	\$ 47.89
	Protective Equipment (3 sets)	45.00
Labor	Electrical 2 Man Hours	118.74
	Spill Cleanup 1.5 Man Hours	<u>89.06</u>

Contaminated Fixture Change Out Costs (1B2B)/Unit \$300.69 ≈ \$301.00

Contaminated Fixture with (2B4B) Cost*

Material	(2B4B) Fixture	\$ 56.55
	Protective Equipment (3 sets)	45.00
Labor	Electrical 2 Man Hours	118.74
	Spill Cleanup 2 Man Hours	<u>118.74</u>

Contaminated Fixture Change Out Costs (2B4B)/Unit \$339.03 ≈ \$339.00

• Radiological Areas (32% of fixtures)

About one third of the fluorescent fixtures are located in a radiological area, Health Physics personnel must perform proper monitoring and all personnel must use protective equipment in order for the same change out to be accomplished safely.

* See Figure 19 of Appendix for material and labor cost information.

Non-Leaking (1B2B) Cost*

Material	One Ballast	\$12.62
	Two Bulbs	3.84
Labor	Protective Equipment (3 sets)	45.00
	Electrical - 1 Man Hour	59.37
	RAD. Monitor 1 Man Hour	<u>72.25</u>

Rad Area Non-Leaking Ballast/Bulb Change Out Cost (1B2B)/Unit \$193.08 ≈ \$193.00

Non-Leaking (2B4B) Cost*

Material	Two Ballast	\$ 25.24
	Four Bulbs	7.68
Labor	Protective Equipment (3 sets)	45.00
	Electrical 1.5 Man Hours	89.06
	Rad Monitor 1.5 Man Hours	<u>108.38</u>

Rad Area Non-Leaking Ballast/Bulb Change Out Cost (2B4B)/Unit \$275.36 ≈ \$275.00

Contaminated Fixture with (1B2B) Costs*

Material	(1B2B) Fixture	\$ 47.89
	Protective Equipment (4 sets)	60.00
Labor	Electrical 2 Man Hours	118.74
	Spill Clean Up 1.5 Man Hours	89.06
	Rad Monitor 1 Man Hour	<u>72.25</u>

Rad Area, Contaminated Fixture Change Out Costs (1B2B)/Unit \$387.97 ≈ \$388.00

Contaminated Fixture with (2B4B) Costs*

Material	(2B4B) Fixture	\$ 56.55
	Protective Equipment (4 sets)	60.00
Labor	Electrical 2 Man Hours	118.74
	Spill Clean Up 2 Man Hours	118.74
	Rad Monitor 2 Man Hours	<u>144.50</u>

Rad Area Contaminated Fixture Change Out Costs (2B4B)/Unit \$498.53 ≈ \$499.00

*See Figure 19 of Appendix for material and labor cost information.

Using the number of fixtures obtained from survey the following material and labor costs for the Defined Ballast/Bulb Change Out Plan can be calculated:

Non-Leaking Ballasts (1B2B)

4,729	Non-Rad Area @ \$76.00	\$359,404
2,226	Rad Area @ \$193.00	429,618

Non-Leaking Ballasts (2B4B)

12,830	Non-Rad Area @ \$122.00	1,565,260
6,085	Rad Area @ \$275.00	1,673,375

Contaminated Fixture (1B2B)

388	Non-Rad Area @ \$301.00	116,788
183	Rad Area @ \$388.00	71,004

Contaminated Fixture (2B4B)

992	Non-Rad Area @ \$339.00	336,288
467	Rad Area @ \$499.00	<u>233,033</u>

Material and Labor Costs for THE PLAN	\$4,784,770
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1.6.1.2 Technical Support - THE PLAN

In addition to direct costs of material and labor, there will be costs of technical support personnel such as: Health Physics, Waste Management, Plant Shift Superintendent, Environmental Management, and Project Coordinator. The following are technical support costs estimates for circumstances described in 1.6.1.

Non-Leaking Ballasts (1B2B)/(2B4B)

Non-Radiological Area

HPD 0.25 Manhour	\$18.06
WMD 0.25 Manhour	<u>14.84</u>

Non-Leak/Non-RAD Technical Support Cost/Unit	\$32.90 $\approx$ \$33.00
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17,559 Units @ \$33.00	\$ 579,447.00
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Radiological Area

HPD 0.5 Manhour	\$ 36.13
EMD 0.5 Manhour	44.69
WMD 2.0 Manhour	<u>118.74</u>

Non-Leak/RAD Technical Support Cost/Unit	\$199.56 $\approx$ \$200.00
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8311 Units @ \$200.00	\$1,662,200.00
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Contaminated Fixtures (1B2B)/(2B4B)

Non-Radiological Area

HPD 0.25 Manhour	\$ 18.06
WMD 0.5 Manhour	44.69
WMD 2.0 Manhour	<u>118.74</u>

Contaminated Fixture Non-RAD Technical Support Cost/Unit	\$181.49 $\approx$ \$181.00
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1,380 Units @ \$181.00	\$249,780.00
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Radiological Area

HPD 2.0 Manhours	\$144.50
EMD 1.0 Manhours	89.38
WMD 2.0 Manhours	<u>118.74</u>

Contaminated Fixture RAD Technical Support Cost/Unit	\$352.62 <u>≈</u> \$353.00
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650 Units @ \$353.00 \$229,450.00

The cost for Plant Shift Superintendent, Project Coordinator, and Waste Disposal Coordinator will be estimated by considering support time required over the duration of the Remediation Plan project.

Using estimated time to change out ballasts and bulbs of 1.6.1 and project time of one year, the number of two man electrical teams can be estimated.

$$\frac{\text{Total electrical Manhours}}{\text{Team Manhours/Yr.}} = \frac{38,000}{4,000} = 9.5 \text{ teams/year}$$

Thus, 10 to 12 teams of 2 men each would be required to change out the ballasts and bulbs in one year. This is a practical number of workers and would permit efficient handling of PCB wastes to comply with time restraints of 30 day temporary storage and offsite shipment within nine months.

For a project time of one year, the Remediation Plan project costs for PC, PSS, and WCD are estimated to be:

PC	Full Time Effort	1.25 Manyears	\$166,764
PSS	Quarter Time	0.25 Manyears	52,322
WDC	Half Time	0.50 Manyears	92,945
			<hr/>
Project Staff PC, PSS, WCD (THE PLAN)			\$312,031

Should the Remediation Plan implementation period be greater than one year, the technical support costs would be proportionately greater.

Summary of Technical Support Costs for THE PLAN

•	Non-Leaking Ballasts (1B2B)/(2B4B)	
	Non-Radiological Area	\$579,447
	Radiological Area	1,662,200
•	Contaminated Fixtures (1B2B)/(2B4B)	
	Non-Radiological Area	249,780
	Radiological Area	229,450
•	Project Staff PC, PSS, WCD	312,031
Total Technical Support Costs for THE PLAN		\$3,032,908

1.6.1.3 Disposal/Storage of PCB Laden Ballasts and Bulbs - THE PLAN

The Maintenance Division personnel will remove the ballast(s) from the fixtures, place them in a plastic bag, then place them in a Department of Transportation (DOT) specification 17C 55-gal drum, which is labeled and dated. One gallon of absorbent material is placed in the drum. The PCB ballasts and/or fixtures may be held in storage outside a TSCA approved storage area for

no more than 30 days. If the ballasts leak, the Waste Management Department (WMD) shall begin clean up of all PCB-contaminated surfaces within 24 hours. The Health Physics Department (HPD) will check all ballasts and fixtures removed from radiological areas. Radioactively-contaminated PCB ballasts will be kept in drums separate from nonradioactively-contaminated PCB ballasts. Drums will be appropriately tagged by HPD to allow for offsite commercial disposal within 9 months.

The estimated cost of disposal for each barrel of PCB ballasts is:

*DOT 17C Barrel	\$ 27.00
** 4' x 4' Pallet = 8.00/4	2.00
Handling .25 Mhr	15.00
Shipping \$2200/Trip (44 barrels) *** (Baton Rouge, LA)	50.00
Disposal Fee	<u>1500.00</u>
Total Cost per Barrel	<u>\$1594.00</u>

*55-Gal barrel will hold approximately 209 ballasts wrapped in plastic bags.

**Barrels are to be packed 4 per pallet.

***Freight costs range from \$1900 to \$3115 per trip (40,000 lb payload).

There are an estimated 38,531 ballasts containing PCBs in the list of selected buildings. To determine the number of barrels needed, divide the number of ballasts by the number of ballasts per barrel (209).

$$\frac{38,531 \text{ ballasts}}{209 \text{ ballasts per barrel}} = 184 \text{ Barrels}$$

Of the 184 barrels, it is estimated that 125 barrels will contain PCB "Hazardous Waste" suitable for offsite disposal and 59 barrels will contain radioactive "Mixed Hazardous Waste" requiring disposal in the K-1435 TSCA Incinerator.

Offsite disposal 125 barrels @ \$1,594.00 = \$199,250

K-1435 TSCA Incinerator Disposal 59 barrels @ \$9,000 = \$531,000

Estimated Cost of Disposal/Storage - THE PLAN \$730,250

The "Defined Ballast/Bulb Change Out Plan" is the recommended alternative solution at the following cost estimate:

Labor and Material	\$4,784,770
Technical Support	\$3,032,908
Storage and Disposal	<u>\$730,250</u>
Total Estimated Cost for Defined Ballasts/Bulb Change Out (THE PLAN)	\$8,547,928

1.6.2 Change Out Ballasts as Bulbs Are Replaced

This alternative solution will incur the same costs as the base plan plus costs resulting from additional ballasts leaking during the 4.12 years estimated to accomplish change out. If ten percent of the non-leaking ballasts became leakers the additional costs due to treating them as PCB contaminated fixtures would be:

1.6.2.1 Material and Labor - As Bulbs Are Replaced

The increase in cost is calculated from the change in handling method for the quantity of units.

Non-RAD (1B2B)	5117 units @ 0.10 x (\$301 - 76)* =	\$ 115,133
RAD (1B2B)	2409 units @ 0.10 x (\$388 - 193) =	46,976
Non-RAD (2B4B)	13,822 units @ 0.10 x (\$339 - 122) =	299,937
RAD (2B4B)	6552 units @ 0.10 x (\$499 - 275) =	<u>146,765</u>
	Increase in material and labor	\$ 608,811
	THE PLAN Material and Labor	<u>\$4,609,178</u>
	Material and Labor - As Bulbs Are Replaced	\$5,217,989

* See Section 1.6.1.1.

1.6.2.2 Technical Support - As Bulbs Are Replaced

Additional technical support will be required as non-leaking ballasts are handled as PCB contaminated fixtures. If ten percent of the ballasts become leakers during the change out period, the increased technical support cost would be:

Non-RAD (1B2B) (2B4B)	18,939 units @ 0.10 x (\$181 - 33)* =	\$ 280,297
RAD (1B2B) (2B4B)	8,961 units @ 0.10 x (\$353 - 200) =	<u>\$ 137,103</u>
The Increase in Technical Support		\$ 417,400
THE PLAN Technical Support		<u>\$3,032,908</u>
Technical Support - As Bulbs Are Replaced		\$3,450,308

1.6.2.3 Disposal/Storage - As Bulbs Are Replaced

There is no significant increase in disposal and storage costs expected for the alternative solution since both leaking and non-leaking ballasts are placed in the same DOT 17C barrel for disposal as Hazardous Waste or Mixed Hazardous Waste.

The total estimated cost for alternative solution Change Out Ballasts As Bulbs Are Replaced is summarized as follows:

Material and Labor	\$5,217,989
Technical Support	3,450,308
Disposal/Storage	<u>730,250</u>
Total Estimated Cost for Change Out Ballasts as Bulbs Are Replaced	\$9,398,547

* See Section 1.6.1.2.

1.6.3 Change Out Ballasts as They Fail

This alternative solution is the most expensive and least desirable from a health risk consideration of the three plans requiring corrective action. This solution would require that all ballasts be left until failure and the chances of the fixtures becoming PCB contaminated is highly probable. This would require the fixture containing the ballast to be changed in lieu of the ballast only. This increases the costs of remediation significantly.

1.6.3.1 Material and Labor - As They Fail

The material and labor costs for changing out all ballasts and fixtures are estimated as follows:

Contaminated Fixtures (1B2B)*

Non-Radiological Area

5117 Fixtures @ \$301.00/unit	\$1,540,217
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Radiological Area

2409 Fixtures @ \$388.00/unit	934,692
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Contaminated Fixture (2B4B)*

Non-Radiological Area

13,822 Fixtures @ \$339.00	4,685,658
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Radiological Area

6552 Fixtures @ \$499.00	<u>3,269,448</u>
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Material and Labor - As They Fail	\$10,430,015
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*See Section 1.6.1.

1.6.3.2 Technical Support - As They Fail

The technical support costs for changing out ballast as they fail would also increase due to all ballast being handled as PCB contaminated. The technical support cost for this solution is estimated as follows:

Contaminated Fixtures (1B2B) (2B4B)*

Non-Radiological Area

18,939 Fixtures @ \$181.00	\$3,427,959
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Radiological Area

8961 Fixtures @ \$353.00	3,163,233
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Project Staff PC, PSS, WCD	<u>312,031</u>
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Total Technical Support - Costs As They Fail	\$6,903,233
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1.6.3.3 Disposal/Storage - As They Fail

Disposal costs will increase due to the additional PCB waste of the fixtures and the labor to cut out the PCB contained part from the balance of the fixture. The non contaminated portion of the fixture will be disposed of as clean scrap metal. The disposal and storage costs for changing out the ballasts as they fail are estimated as follows:

*See Section 1.6.1.2

Offsite disposal of hazardous waste cost/barrel section 1.6.1.3	\$1,594.00
Labor to separate ballasts from fixture and cut out PCB-contaminated portion	35.00
Offsite disposal cost/barrel of contaminated fixtures	\$1,629.00

The mixed hazardous waste (radioactive) would be sent to the K-1435 TSCA Incinerator. The cost of incinerator is \$10.00/pound, thus a 900 pound barrel would cost \$9,000 to incinerate.

Assuming that PCB contaminated fixture scrap will be 50% of ballast volume, $1.5 \times 184^* = 276$ barrels will be required if all the ballasts fail before change out. The breakdown of barrels needed for hazardous waste and mixed hazardous waste is estimated to be 32% and 68% respectively. The disposal/storage costs for changing ballast as they fail is estimated as follows:

Offsite disposal 188 barrels @ \$1629 =	\$ 306,252
K-1435 Incinerator 88 barrels @ \$9,000 =	<u>792,000</u>
Disposal/Storage - As They Fail	\$1,098,252

The total estimated cost of Changing Ballasts as They Fail is summarized as follows:

Material and Labor	\$10,430,015
Technical Support	6,903,223
Disposal/Storage	<u>1,098,252</u>
Total Estimated Cost Change Out Ballasts As They Fail	\$18,431,490

*See Section 1.6.1.3

The "Change Out Ballasts As They Fail" alternative is more than twice as expensive as the recommended Remediation Plan.

1.6.4 No Corrective Action

The "No Corrective Action" alternative solution does not have an initial cost but has future potential liabilities and costs. The potential future health risks do not have a cost that is definable but any impact of PCBs on human health is unacceptable. The costs of changing ballasts on a demand basis will be more expensive than any of the organized efforts described about. Therefore, "No Corrective Action" is expected to be greater than \$18,431,490.

The alternative solutions are ranked by increasing cost as follows:

• "Defined Ballast/Bulb Change Out"
(The Remediation Plan)	\$8,372,336
• "Change Out Ballasts as Bulbs are Replaced"	9,398,547
• "Change Out Ballasts as They Fail"	18,431,490
• "No Corrective Action"	Greater than any
of the above

2.0 CORRECTIVE ACTION

2.1 SCOPE

The corrective action provides the guidelines necessary to correctly identify, remove, handle, and dispose of fluorescent light ballasts containing PCBs, PCB-contaminated fixtures, and PCB spills from the ballasts, and to properly label the refurbished fixtures.

2.2 SAFETY

All applicable safety regulations will be followed in identifying, removing, handling, disposing of PCB ballasts, and in installing new ballasts and bulbs. This includes, but is not limited to, electrical circuit repairs, lockout/tagout procedures, equipment used to reach light fixtures (such as ladders or lifts), use of protective equipment in working with leaking ballasts that contain PCBs and in radiological environments, handling of PCB waste materials, handling of radioactive waste materials, and disposal of such wastes. All work will be done in a safe manner.

2.3 QUALITY ASSURANCE

The implementation of this remediation plan will be carried out in accordance with Quality Assurance (QA) Program SPP-705 to ensure achievement of quality performance in the removal, handling, and disposal of PCB ballasts, and the installation of new fixtures, ballasts, and bulbs. Appropriate steps will be taken to ensure that the implementation action of the plan is properly planned and monitored. Progress reports will be maintained to obtain timely completion within budgeted cost.

2.4 PRIORITIZATION OF BUILDINGS

K-25 has a large number of buildings with various uses. Some buildings are fully used, others are only partially used, while some are on the Decontamination and Decommission (D&D) list with only periodic occupancy to ensure that proper security and health concerns are maintained. Table 1 shows those facilities with greatest activities and thought to present greatest risk for personnel contact with PCBs from fluorescent light fixtures. The list does not show facilities built after 1978, or ones that have fewer than three occupants. Some of the buildings are on the D&D list and, therefore, only the breakroom or office space being used is listed for remediation. The age of the building, the number of people in the building, and the amount of time the building is occupied were used to set priorities. Thus, the buildings with the greatest potential for occupant contact with PCBs are at the top of the list. Changing out PCB ballasts in accordance with this list provides the greatest reduction in potential for personnel contact with PCBs.

This Remediation Plan deals only with the buildings listed in Table 1. If it is determined that ballasts containing PCBs are to be removed from all buildings at K-25 site, an additional survey should be conducted to determine the number of fluorescent light fixtures with PCBs in the inactive buildings. The Remediation Plan is still applicable but to a greater number of fixtures.

2.5 ORGANIZATIONAL RESPONSIBILITIES AND ACTIONS

It is proposed that a Project Coordinator be selected to oversee the implementation of this remediation plan. Figure 1 presents a chart of the departments and related personnel who must work together to carry out the plan. Responsibilities for each department and the interfacing with other departments are described below and shown in the Remediation Plan Task Matrix, Figure 2. These departments carry out the procedures of the Plan.

2.5.1 The Remediation Plan Project Coordinator (PC)

The position is responsible for the total operation of the Remediation Plan. Responsibilities include but are not limited to:

- Bringing together personnel from each department shown in Figure 1.
- Conducting briefing on Plan implementation.
- Securing training for all project personnel.
- Establishing project schedule.
- Coordinating work in buildings with building supervisor.
- Coordinating the purchasing of needed materials.
- Monitoring progress on a timely basis.
- Verifying that required documentation is obtained.
- Verifying that appropriate safety and disposal procedures are followed.
- Monitoring project costs.
- Completing project closure and filing of records.

2.5.2 The Plant Maintenance Division (PMD)

The Plant Maintenance Division is responsible for:

- Attending Employee Information and Awareness Training (Module 305) and Carcinogen Control for Employees (Module 348). Module 348 requires an annual refresher. These modules identify precautions for handling PCBs prior to conducting any maintenance activity in which PCBs are involved, such as changing fluorescent light bulbs and ballasts. PCB spill cleanup is also covered. All personnel who will work on the PCB project shall attend.

- Securing necessary materials (ballasts, bulbs, and fixtures) and equipment (ladders, lifts) needed for building to be worked.
- Obtaining applicable permits for building to be worked (i.e., safety work permit, electrical work permit, etc).
- Obtaining radiation survey from HPD as required.
- Obtaining personal protective equipment required for building to be worked.
- Coordinating inspection and replacement activities with Building Supervisor to minimize interruption of building operation.
- Obtaining necessary disposal containers, such as 6-mil plastic barrel liners, DOT 17C barrels, and appropriate labels.
- Removing and replacing of ballasts, fixtures, and bulbs.

2.5.3 Health Physics Department (HPD)

The Health Physics Department is responsible for:

- Surveying all ballasts and spill cleanup waste prior to removal from a radiological area.
- Advising and ensuring that personnel of the PMD and WMD wear personal protective equipment, as necessary, when a PCB spill cleanup is required or work is done within a radiological area. Management of each involved divisions must enforce the use of protective equipment.

2.5.4 Waste Management Department (WMD)

The Waste Management Department is responsible for:

- Personnel attending training modules 305 and 348 prior to conducting any activity in which PCBs are involved (including prior to PCB spill cleanup activities).
- Upon notification by the PSS or the EMD, initiate cleanup within 24 hours of any PCB spills from light ballasts (other than those for which all of the materials contaminated, such as the ballast and/or fixture, are disposed of as PCB waste) as spills of high-concentration PCBs in full accordance with the TSCA spill cleanup requirements and complete the spill cleanup promptly. No time limit is set on completion of the cleanup if good faith efforts are made to complete cleanup promptly. The spill cleanup will be conducted in accordance with the TSCA spill cleanup requirements of 40 CFR 761.125(b) and ESH 1.0.
- Arrange for any precleanup sampling, if required to identify the spill boundaries, and postcleanup verification sampling by laboratory personnel.
- Fully document each spill, in accordance with the TSCA spill cleanup record requirements of 40 CFR 761.125(c)(5) and as listed in the definition section of this procedure. Forward a copy of the completed spill cleanup record to the EMD.
- Ensure that all nonradioactively contaminated PCB ballast wastes are shipped off-site within 9 months and disposed of in an EPA-approved Chemical Waste Landfill or Incinerator within 1 year from when the first ballast was placed in the waste container. All radioactively contaminated PCB ballast wastes will be disposed of in the K-1435 TSCA Incinerator as soon as possible.

- Ensure that personal protective equipment is used as required.

2.5.5 Quality Assurance Office (QAO)

The Quality Assurance Office is responsible for:

- Providing consultation to Remediation Plan Project Coordinator in the preparation of quality assurance plan for the project.
- Coordinating the monitoring of project progress and compliance audits.

2.5.6 Industrial Hygiene Department (IHD)

The Industrial Hygiene Department is responsible for:

- Consulting with the EMD as necessary on health hazards associated with the spills of PCBs from light ballasts.
- Ensuring that PMD and WMD personnel use the appropriate personal protective equipment for PCB ballast removal and spill cleanup activities.
 - Neoprene or nitrile gloves shall be worn when handling ballasts and/or fixtures that have PCB or suspected PCB leaks/spills on their surfaces or past evidence of smoke from an overheated ballast.
 - Disposable suits or company issued clothing shall be worn whenever there is a potential to come to contact with a leaking PCB light ballast. If any PCBs or suspected PCBs come in contact with the disposable suit or company clothing, the suit or clothing should be removed as soon as

possible and disposed of as PCB waste. Disposable suits and shoe scuffs shall be worn in any instance where PCBs or suspected PCBs have dripped from the surface of the fixture and spilled to surfaces below the fixture.

- If a ballast is actively smoking and/or an odor of overheated electrical equipment is apparent, full-face respirator with a GMC-H cartridge should be worn throughout the ballast removal activity.

2.5.7 Plant Shift Superintendent (PSS)

The Plant Shift Superintendent is responsible for:

- Notifying EMD, upon receiving notification of a suspected PCB spill from a light ballast. The IHD may also be notified if the spill has potential for personnel exposure.
- Cordoning off immediately, the PCB spill area (all visible traces) plus a 3-ft boundary, labels the area as a "PCB Spill Area -- Do Not Enter to Avoid Spread of Contamination and Exposure to PCBs," and ensures that no one enters the area unless performing spill cleanup. The PSS may choose to give standing instructions to PMD and WMD personnel for routinely handling of leaks which are found during ballast change out.
- Consulting with the EMD personnel to determine whether the spill involves any notification/reporting requirements.

2.5.8 Environmental Management Department (EMD)

The Environmental Management Department is responsible for:

- Responding to any suspected PCB spill upon notification.
- Determining whether the suspected PCB spill involves any notification/reporting requirements.
- Ensuring that appropriate spill cleanup has been or is initiated.
- Ensuring that plant management has been apprised of any notifications/reporting resulting from the suspected PCB spill.
- Ensuring that appropriate spill cleanup records are completed for each PCB spill; retain copies of the completed spill cleanup records for a period of 5 years.

2.5.9 Safety Department (SD)

The Safety Department is responsible for:

- Establishing general safety guidelines for the implementation of the PCB ballast Remediation Plan.
- Establishing general safety guidelines for handling the waste generated in carrying out the PCB ballast Remediation Plan.
- Providing consultation, as required, on disposing of waste generated in carrying out the PCB ballast Remediation Plan.

2.5.10 Procurement Division (PD)

The Procurement Division is responsible for:

- Coordinating contracts on materials necessary to implement the Remediation Plan, for optimum value. Work with Project Coordinator and engineering technical staff to identify materials to be purchased.
- Should the Remediation Plan be handled by an outside contractor, the Procurement Division shall work with Project Coordinator and engineering technical staff to identify requirements and qualifications necessary to implement the Remediation Plan contract. Advertise for bids, evaluate the bids, and award the contract for accomplishing the Remediation Plan. Monitor progress of successful contractor to ensure that work is completed satisfactorily and in accordance with contract.
- Coordinate transportation arrangements for all hazardous wastes shipped off-site to TSCA approved Chemical Waste Landfills for disposal.
- Coordinate the contract arrangements for disposal of PCB waste by off-site TSCA Disposal Facility.

2.6 REMOVAL AND REPLACEMENT OF FLUORESCENT LIGHT FIXTURES CONTAINING PCBs

2.6.1 Routine Change Out of Fixtures and Ballasts Until Remediation Plan is Implemented

All fluorescent light fixtures that require servicing in the period of time from present until the scheduled implementation of the Remediation Plan shall be serviced as follows:

When only the bulbs require change out, the ballast shall be inspected and the appropriate label applied to fixture surface in a location visible from the floor level to indicate that the fixture has PCBs or NO-PCBs. This will save inspection time when the scheduled implementation occurs.

When a fixture fails requiring a ballast or fixture change out due to a PCB contamination of the fixture, the guidelines for removal and replacement of the electrical equipment and the disposal of PCB waste shall be followed. Should the fixture have two ballasts, both shall be replaced with compatible new NON-PCB energy efficient ballasts and bulbs. Fixtures shall not be left with a mixture of PCB and NON-PCB containing ballasts or a mixture of energy efficient and standard bulbs. Apply label "THIS FIXTURE CONTAINS NO-PCBs," Figure 14, to fixture surface in location visible from the floor level. This will save inspection time in the future.

2.6.2 Implementation of Remediation Plan

This section describes the procedures for the inspection, removal, temporary storage, and disposal of ballasts and/or fixtures containing PCBs, the required spill cleanup, and documentation for the full implementation of the Remediation Plan. The Project Coordinator will secure staffing from the appropriate departments shown in Figure 1, secure required training and briefing, and proceed with the Plan implementation.

The conditions that are expected to be encountered and the corresponding actions that are required by the respective departments to properly change out the ballasts/fixtures and bulbs in the 91 buildings are described below:

- Non-Leaking Ballasts
- PCB Leaks on Ballast or Fixture Only
- PCB Spill Requiring Cleanup

- Non-Leaking Ballast in Radiological Area, and
- PCB Leaks on Fixtures in Radiological Area.

The Decision Tree, Figures 3 and 4, shows the sequence of events under various circumstances.

Non-Leaking Ballasts. Inspect fixture for label indicating previous change out of PCB Ballast. If label is present, move on to next fixture. If no label is present, proceed with inspection and change out as follows: Disconnect electrical power to subject fixture following lockout/tagout procedure, ESP-ESH-1. Remove bulbs and ballast(s) from fixture being careful not to damage ballast enclosure and release PCBs. Separate items removed from fixture into non-hazardous waste (bulbs and defective ballasts marked "NO PCBs") for routine scrap disposal and hazardous waste (Ballasts not marked "NO PCBs") for placement in DOT 17C barrels. Blanket Disposal request should be made to reduce the amount of work throughout the project. Fill out Hazard Identification Tag UCN-2114A, Figure 5, and attach to PCB drum. The drum must be labeled with PCB M_L label, Figure 6, immediately upon placing the first ballast/fixture in the drum. Be sure the label UCN-2114A has the date that the first ballast/fixture is placed in the drum. Approximately one gallon of absorbent material such as sorbal should be added to the drum. Initiate a Request for Disposal of Waste Material and Equipment, form UCN-12463, Figure 7, with the Plant Waste Disposal Coordinator in sufficient time to ensure that the PCB waste containers are moved into TSCA approved storage areas within 30 days from the date which the first ballast/fixture was placed in the drum. Temporary storage of these PCB waste containers cannot exceed 30 days. Maintain a written log of the transfer of the waste drums (including the date of first material accumulation, the date the drum was moved to a TSCA storage area, and the identification of the storage area). These PCB waste containers will be assumed to contain high-concentration PCBs (i.e., greater than 500 ppm). Process UCN-11623 for offsite transfers.

Replace ballast(s) and bulbs with energy savings type compatible with the fixture and return fixtures to service. Apply label "THIS FIXTURE CONTAINS NO-PCBs," Figure 14, to outside fixture surface in location that is visible from floor level.

PCB Leaks on Ballast Fixture Only. The presence of PCBs on the ballast(s) and or fixtures require additional actions to those described in (b)(1) above. Change out personnel are to use protective equipment consisting of: disposable TYVEK suit, neoprene gloves, shoe scuffs, and face respirator. Remove ballast and bulbs and place in appropriate waste containers. Leaking ballasts and non-leaking ballasts are to be placed in the same 17C drum. If only the ballast has PCB contamination, and the fixture has none, new ballast(s) and bulbs will be installed in the existing fixture.

Remove and replace the fluorescent light fixture if the fixture has any PCB contamination. Consult with Plant Waste Disposal Coordinator, Health Physics, or Industrial Hygiene Departments as required to determine if the total fixture should be placed in the PCB container. The fixture might be separated into PCB waste and clean scrap by removing the ballast and by cutting out the portion containing PCBs. Should the total fixture require handling as PCB waste, it may have to be cut into multiple pieces to permit placement in the 55 gallon drum. The labeling and dating requirements are the same as described above. All drop clothes and protective equipment shall be disposed of as PCB waste at end of shift. The face respirators are to be recycled by appropriate decontamination and equipping with new filters. Apply label "THIS FIXTURE CONTAINS NO-PCBs" to outside fixture surface in location visible from floor level. Return light fixture to service after repairs.

PCB Spill Requiring Cleanup. In addition to the procedures above, the following actions shall be taken when a fluorescent light fixture ballast leaks PCBs out of the fixture onto the surroundings surfaces. Upon finding a PCB spill, a dark brown/black molasses like substance, dripping from the surface of the ballast or fixture to the floor or on any object below the fixture, notify the Plant Shift Superintendent (PSS) immediately by telephone that a possible PCB spill has occurred from a fluorescent light ballast. All personnel working with the fixture shall use protective equipment as described previously. The fixture is to be removed within 24 hours and all removed equipment disposed of as PCB waste. The fixtures may require cutting into multiple sections to permit placement in the 17C drums. Use form UCN-5646, Figure 9, "Request for

Decontamination Services" to request decontamination services from Waste Management Department. Spill cleanup shall be done in accordance with 40 CFR 761.120, .123, and .125 requirements for low concentrated spills which involve less than 1 pound of PCBs by weight. Indoor solid surfaces and high contact outdoor solid surfaces defined as high contact residential/commercial surfaces under 761.123, shall be cleaned to 10 micrograms per 100 square centimeters (as measured by standard wipe tests). All PCB contamination items such as carpet or expendable objects shall be removed and disposed of as PCB waste. At the completion of cleanup, the Waste Management Department shall document the cleanup with records and certification of decontamination. The records and certification must be maintained for a period of 5 years. The records and certification shall include the following:

- Identification of the source of the spill.
- Estimated or actual date and time of spill occurrence.
- The date and time cleanup was completed or terminated.
- A brief description of the spill location and material contaminated.
- Precleanup sampling data used to establish the spill boundaries if required.
- A brief description of solid surfaces cleaned.
- Post cleanup verification sampling data and sampling method used.

"Post cleanup sampling is required by 761.130 to verify the level of cleanup under 761.125(c) 2 through 4. This sampling shall be done in accordance with TSCA "Field Manual for Grid Sampling of PCB Spill Site to Verify Cleanup."

Please note that although documentation and records of spills and subsequent cleanups are required by EPA; the amount of PCBs that might leak from a single ballast is approximately 0.1 kg and is therefore less than the 10 pounds (4.54 kg) weight limit to require reporting to National Response Center.

The same labeling and dating requirements comply as stated above. All drop clothes and protective equipment, except face respirator, shall be disposed of as PCB waste at the end of shift. Return light fixtures to service after repairs. Apply label "THIS FIXTURE CONTAINS NO-PCBs" to fixture surface in location visible from floor level.

Non-Leaking Ballasts in Radiological Area. Before inspecting fluorescent light fixture ballasts in radiological area, Health Physics personnel shall survey area and advise if area is radiologically safe in which to work or if additional precautions are required. Likewise all removed ballasts and bulbs must be surveyed by HP prior to removal from the radiological area for disposal.

Form UCN-11635, Figure 8, "Equipment Radioactive Contamination Survey" shall be utilized by HPD to document all radioactive surveys. Maintain proper segregation and characterization of wastes. Items found to be above allowable limits for disposal as hazardous waste shall be evaluated by Health Physics personnel for practicality of decontamination. Form UCN 5646, Figure 9, "Request for Decontamination Services" shall be completed by HP personnel if decontamination is deemed appropriate. Any radioactively contaminated ballasts or fixtures must be kept in separate drums from nonradioactively contaminated ballasts or fixtures. The Plant Waste Disposal Coordinator shall use Form UNC-12463, Figure 7, "Request for Disposal of Waste Materials and Equipment" for drums that contain mixed radioactive and PCB waste. Radioactive Contamination Identification Tag UCN-15A, Figure 10, shall be filled out and attached by HP personnel on all waste containers determined to be radioactively contaminated in excess of the limits set forth in Attachment 1 of SPP 394. Labeling and dating of PCB Waste Containers shall be as described previously.

After necessary repairs, the light fixtures shall be returned to service. Apply label "THIS FIXTURE CONTAINS NO-PCBs" to fixture in location visible from floor level.

All protective equipment shall be disposed of as directed by Health Physics personnel (either as radioactive or non-radioactive waste).

PCB Leaks in Radiological Area. The handling of leaking ballasts in this section is to be handled in manner described above with the added consideration given to possible radiological contamination. Health Physics personnel shall determine whether radiological decontamination is required in addition to the PCB spill cleanup. Waste Management personnel shall do necessary cleanup. There is possibility of having PCB waste, clean scrap metal and mixed radioactive PCB waste. Keep all wastes separate and appropriately tag as described in previous sections. PCB waste tagging shall include: "Hazard Identification" tag, UCN-2114A, PCB M_L label, and "Request for Disposal of Waste Material and Equipment" tag UNC-12463. The clean scrap waste shall be tagged with "Waste Identification" tag UCN-2114B, Figure 11, and "Request for Disposal of Waste Material and Equipment" tag UCN-12463. Mixed radioactive and PCB waste shall be tagged with "Radioactive Contamination Identification" tag UCN-15A, PCB label M_L, "Equipment Radioactive Contamination Survey" form UCN-11635, and "Request for Decontamination Services" form UCN-5646 as required. Appropriate disposal and transfer shall be executed in timely manner to comply with 30 day limit on temporary storage of PCB waste.

Dispose of protective equipment (except face respirator) as directed by Health Physics personnel at end of shift. The respirators are to be recycled.

Return light fixtures to service after installation of new fixtures and bulbs. Apply label "THIS FIXTURE CONTAINS NO-PCBs" to fixture surface in location visible from floor level.

3.0 DISPOSAL OF BALLASTS AND/OR FIXTURES CONTAINING PCBs

3.1 SCOPE

To provide the guidelines necessary to correctly dispose of waste generated by implementation of the Remediation Plan for Fluorescent Light Fixtures containing PCBs.

3.2 ORGANIZATIONAL RESPONSIBILITIES AND ACTIONS

As the PCB ballasts and fixtures are removed, the proper handling of the generated waste requires greater participation by the departments shown in Figure 1. The Project Coordinator shall oversee the disposal activities of the PCB wastes. The responsibilities of each department are described below with interfacing actions shown on the Remediation Plan Task Matrix of Figure 2.

3.2.1 Disposal Requester

The Remediation Plan Project Coordinator shall serve as or shall select a Disposal Requester whose responsibilities include:

- Determines the status of the waste with regard to security classification, hazards, and radioactivity. The security classification must be determined by an authorized classifier. The Disposal Requester must provide the Waste Disposal Coordinator with the information necessary to properly dispose of or store the waste. This may be accomplished by providing a material safety data sheet, laboratory analysis, or by having process knowledge of the material. It may be necessary to consult with the Waste Disposal Coordinator for direction on what information is required to dispose of a particular waste. The level and nature of radioactivity must be determined through surveys by Health Physics personnel. All waste

materials must be surveyed before disposal can be effected. Consults with Waste Disposal Coordinator to determine if Single or Blanket Disposal should be used for Remediation Plan PCB waste. The waste is repetitive in character.

- Properly segregates wastes into categories such as glass, contaminated metal, noncontaminated metal, classified material, plant refuse, and demolition wastes from each other and any other waste materials. Laboratory chemicals must be inventoried and segregated in to acids, bases, organics, oxidizers, and "not otherwise specified" (NOS). Form UCN-16792, "Waste Material Inventory," should be used for the laboratory chemicals and an inventory for each of the categories should be attached when submitting UCN-12463, "Request for Disposal of Waste Material and Equipment."
- Determines number of receptacles needed to contain routinely generated wastes and requests appropriate Maintenance Division personnel to provide properly labeled receptacles accordingly.
- Initiates request for disposal by completing the top portion of form UCN-12463, "Request for Disposal of Waste Material and Equipment," and submitting it to the K-25 Waste Disposal Coordinator. All known hazards of the waste should be listed on the appropriate section of the form. The information blanks in the disposer section of the form must be correctly completed before the disposal process can continue.
- Properly prepares waste for disposal, as instructed by the K-25 Waste Disposal Coordinator. Special attention must be given to the use of proper labeling, tagging, and packaging. Waste material should be tagged by the appropriate group or at the direction of the K-25 Waste Disposal Coordinator. Waste material not properly tagged, labeled, and packaged will not be removed for disposal.

- In the event that scrap metal is determined by Health Physics personnel to contain sufficient radioactivity to warrant decontamination prior to disposal, takes appropriate action to have material decontaminated prior to submitting the disposal request form, UCN-12463, to the K-25 Waste Disposal Coordinator.
- Completes "Property Transfer Records," form UCN-541, for property items and sends first copy to the Property Department. The second copy is submitted with the request for disposal to the K-25 Waste Disposal Coordinator.
- Notifies the K-25 Waste Disposal Coordinator monthly of the amount of material disposed of on blanket disposal request. This is accomplished by using form UCN-16791.
- For TSCA and RCRA waste, ensures that containers are removed or stored in an approved storage satellite or accumulation area according to packaging, quantity, and time limits.
- Takes steps to minimize generation of waste materials.
- Prepares radioactive shipping document for all waste that contains radioactive contamination and is transported off-site. This requirement may require assistance from the K-25 Waste Disposal Coordinator, the K-25 Transportation Safety representative, and/or a Health Physics representative.

3.2.2 Plant Maintenance Division (PMD)

- Provides for disposal of properly prepared materials only as instructed by the K-25 Waste Disposal Coordinator after receiving a receipt of an authorized UCN-12463 form signed by the K-25 Waste Disposal Coordinator.

- Ensures that each waste disposal tag contains the identifying number of the corresponding waste disposal form UCN-12463.
- Checks to ensure that tagged waste is the same as that described on disposal form UCN-12463.
- Effects disposals in the exact manner outlined on the disposal form UCN-12463. Any deviation must be approved by the K-25 Waste Disposal Coordinator prior to disposing of material.
- Reports to the K-25 Shipping and Traffic Department the serial numbers of returnable containers that must be disposed instead of returned.
- Delivers scrap metal to the Property Sales Salvage Yard only during periods when an authorized representative of that department is present.
- In the case of scrap metal, provides the Property Sales personnel with a legible copy of the disposal request form UCN-12463 for each truckload delivered to the salvage yard.
- Ensures that each truck load has been properly tagged by Health Physics.
- Following each disposal assignment, completes and returns all but the yellow copy of form UCN-12463 to the K-25 Waste Disposal Coordinator. The yellow copy should be retained by the department that carries out the disposal or storage operation.
- Works closely with Disposal Requester preparation of material for disposal to keep its required identity.

3.2.3 Waste Management Department (WMD)

- Attend Polychlorinated Biphenyl Employee Information and Awareness Training (Module 305) and Carcinogen Control for Employees (Module 348) training (Module 348 requires an annual refresher), which identify precautions for handling of PCBs, prior to conducting any activity in which PCBs are involved (including prior to PCB spill cleanup activities).
- Upon notification by the PSS or the EMD, initiate cleanup within 24 hours of any PCB spills from light ballasts (other than those for which all of the materials contaminated, such as the ballast and or fixture, are disposed of as PCB waste) as spills of high-concentration PCBs in full accordance with the TSCA spill cleanup requirements and complete the spill cleanup promptly. No time limit is set on completion of the cleanup if good faith efforts are made to complete cleanup promptly. The spill cleanup will be conducted in accordance with the TSCA spill cleanup requirements of 40 CFR 761.125(b) and ESH 1.0.
- Arrange for any precleanup sampling, if required to identify the spill boundaries, and postcleanup verification sampling by laboratory personnel in accordance with 40 CFR 761.130.
- Fully document each spill, in accordance with the TSCA spill cleanup record keeping requirements of 40 CFR 761.125(c)(5) and as listed in the definition section of this procedure. Forward a copy of the completed spill cleanup record to the EMD.
- Ensure that all nonradioactively contaminated PCB ballast wastes are shipped off-site within 9 months and disposed of in an EPA-approved chemical waste landfill or incinerator within 1 year from when the first ballast was placed in the waste

container. All radioactively contaminated PCB ballast wastes will be disposed of in the K-1435 TSCA Incinerator as soon as possible.

- Ensure that personal protective equipment is used as required.
- Following each disposal assignment, completes and returns all but the yellow copy of the disposal form UCN-12463 to the K-25 Waste Disposal Coordinator. The yellow copy should be retained by the department that carries out the disposal or storage operation.
- Contacts Health Physics personnel for a radiation survey of waste that has been decontaminated prior to disposal.
- Maintains separate fenced areas for the storage of radioactive and nonradioactive scrap metal.

3.2.4 Health Physics Department (HPD)

- Establishes general health protection guidelines for safe handling of radioactive waste materials.
- Upon request, monitors and attaches appropriate tag to waste material. Form UCN-15A (yellow tag) is utilized to designate radioactive material. Form UCN-11623 (blue tag) is utilized to designate material that has been exposed to radioactive contamination less than the limits set forth in SPP 804.
- In the case of scrap metal, provides the K-25 Waste Disposal Coordinator with an estimate of the radioactivity contained in each shipment. This information is recorded on form UCN-11635.

- Upon request, provides consultation on specific disposal plans.
- Trains individuals from the various K-25 divisions in the use of self-monitoring procedures.

3.2.5 Quality Assurance Office (QA)

- Provides consultation to Remediation Plan Project Manager in the preparation of quality assurance plan for the project.
- Coordinates the monitoring of project progress and compliance audits.

3.2.6 Industrial Hygiene Department (IHD)

- Establishes general health protection guidelines for the safe handling of toxic and chemically reactive waste materials.
- Upon request, provides for applicable monitoring of waste materials.
- Upon request, provides consultation on specific disposal plans.

3.2.7 Hazardous Materials Coordinator (HMC)

- Performs hazard ratings for hazardous materials procured at K-25.
- Provides Material Safety Data Sheets for hazardous materials at K-25.
- Maintains the K-25 Hazardous Materials Inventory Data Base.

3.2.8 Safety Department (SD)

- Establishes general safety guidelines for the implementation of the PCB ballast Remediation Plan.
- Establishes general safety guidelines for handling the waste generated in carrying out the PCB Remediation Plan.
- Provides consultation, as required, on disposing of waste generated in carrying out the PCB Remediation Plan.

3.2.9 Fire Protection Department (FPD)

- Establishes general guidelines for the safe storage and disposal of flammable materials used in cleanup operations.
- Upon request, provides consultation on specific disposal plans.

3.2.10 Environmental Management Department (EMD)

- Establishes general guidelines to ensure that no waste disposal operation will result in an adverse impact on the environment.
- Ensures that treatment, storage, and disposal operations are performed in accordance with applicable state and federal regulations and DOE directives.
- Provides training of employees in accordance with applicable state and federal regulations and DOE directives.

- Upon request, provides consultation on specific disposal plans.

3.2.11 Traffic Department (TD)

- Reviews and completes radioactive shipping documents and hazardous waste manifests that have been prepared by others.
- Inspects vehicles for hazardous waste and radioactive waste shipments being shipped off-site.
- Contacts the Health Physics Department to arrange for radiological surveys of the shipping containers and transport vehicle to ensure compliance with all applicable Department of Transportation shipping regulations for radioactive materials.

3.2.12 Waste Disposal Coordinator (WDC)

- Directs and oversees the K-25 Waste Disposal Program.
- Provides plant personnel with information, guidance, and assistance in the area of waste disposal, including the completion of the disposal form, and the subsequent packaging, tagging, transporting, and disposing of all types of waste materials.
- Receives and reviews all requests for disposal of waste materials and equipment. Properly completed forms are processed to effect the safe disposal of the waste. Improperly completed forms are returned to the Disposal Requester for correction.
- After ensuring that the disposal form is completed properly and that all needed information is available, makes a determination as to the hazards associated with

the disposal of the material. Other K-25 staff groups (i.e., Safety, Health Physics, Industrial Hygiene, and Fire Protection Engineering) should be consulted to determine hazards as applicable.

- Inspects hazardous waste, on a case-by-case basis, to ensure the accuracy and validity of the information and that no unusual circumstances exist that could complicate the handling and/or disposal activities.
- Based on hazardous and other appropriate information makes a determination as to protective equipment and/or special procedures necessary to effect the safe disposal of the waste. Other K-25 staff groups (i.e., Safety, Health Physics, Industrial Hygiene, and Fire Protection Engineering) should be consulted to determine needed protective equipment and/or special procedures.
- Completes the disposal coordinator section of form UCN-12463, including an explicit description of the protective equipment needed, precautionary measures to be taken, and the location and method of the disposal.
- Determines whether or not the disposal request warrants blanket disposal approval.
- Contacts Disposal Requester and provides instructions as to the packaging, labeling, and tagging requirements. The K-25 Waste Disposal Coordinator will advise disposers on which tag(s) must be attached to the waste material.
- When disposal of a property item is requested, attaches second copy of the Property Transfer Record, UCN-541, to the disposal request form.

- Transmits all copies of the disposal form to the appropriate disposal group (the Waste Management Department or the Maintenance Division).
- Maintains up-to-date records of all disposal activities, including volumes (or weights) of each type of waste, radioactively levels, and sites and methods of disposal.
- Reviews all blanket disposal approvals at least once a year and determines need and applicability of continuation. If it is determined that a blanket disposal should be discontinued, both the disposal requester and the appropriate disposal group are notified that all subsequent disposals of the particular waste must be handled on a single disposal basis.
- After disposals have been completed, receives completed disposal forms UCN-12463 from the disposal groups and subsequently redistributes copies to appropriate personnel. Record copies of all disposal forms are maintained by the K-25 Waste Disposal Coordinator.
- Prepares hazardous waste manifest for all hazardous waste transported off-site including tankers with residual hazardous quantities of hazardous waste. This action is done in conjunction with the traffic department.
- Reviews excess property sales inventory list prior to release to the public to ensure that unauthorized hazardous materials are not inadvertently sold to the public.

3.2.13 K-25 Materials Disposal Committee (MDC)

- Serves in an advisory capacity to the K-25 Waste Disposal Coordinator to assist in the development of plans for disposal of unusual or extremely hazardous waste.

- The committee consists of the shift superintendent and the appropriate support groups deemed necessary.

3.2.14 Transportation Safety Council (TSC)

Serves in an advisory capacity to evaluate transportation safety and policies for K-25 in terms of compliance with regulations and DOE directives.

3.3 DISPOSAL PROCEDURES

The procedures to be followed in the disposal of PCB wastes are those described in Section 3.3 above and through the use of appropriate forms listed in Section 3.2. The removal of PCB-laden ballasts and fixtures will result in the following types of waste:

Demolition Waste - This will include non-contaminated fluorescent light bulbs and non PCB ballasts and construction waste that is to be surveyed by HPD and identified with Tag UCN-2114B by the Disposal Requester at the direction of WMC. This waste is disposed of in conventional landfill.

Scrap Metal - This will include fluorescent fixtures, wire, and scrap conduit removed from buildings that is known not to be contaminated by either PCBs or radioactively beyond limits of SPP-804. HPD must survey and tag with UCN-11623 before it can be sent offsite for clean scrap disposal.

Hazardous Waste - This will include all PCB waste which is not radioactively contaminated beyond limits of SPP-804. Form UCN-11623 shall be attached by HPD, after survey, if radioactive level is acceptable. The Disposal Requester shall use tag UCN-2114A as directed by Waste Disposal Coordinator to identify material as Hazardous Waste. Leaking and non-leaking ballasts, contaminated fixtures, and light bulbs and contaminated protective equipment

are to be handled as Hazardous Waste. All Hazardous Wastes are to be placed in DOT 17C drums and shipped off-site for disposal in a TSCA approved Chemical Waste Landfill or Incinerator.

Hazardous Mixed Waste - Any material that is described as Hazardous Waste and also radioactively contaminated is to be handled as Hazardous Mixed Waste. This will include ballasts, bulbs, fixtures, or protective equipment that is contaminated above limits of SPP-804. Radioactive contamination may be reduced by appropriate decontamination procedures. If decontamination is warranted and is carried out successfully the waste will be classified appropriately by HDP and WDC. Radioactive Waste shall be identified with Tag UCN-15A and UCN-2114A. Should the contaminated waste be a classified material, Tag UCN-10732 shall be used. All Hazardous Mixed Waste shall be disposed of in the K-1435 TSCA incinerator as soon as possible after removal from radiological area.

3.4 DISPOSAL RECORDS

If Energy Systems does not have an EPA identification number for handling PCB wastes, the Waste Disposal Coordinator shall use EPA form 7710-53 to apply for an identification number as required by 40 CFR 761.202. The Waste Disposal Coordinator shall keep appropriate disposal records as required by 40 CFR 761.180, 761.202, 761.205, 761.207 - .211, 761.215, 761.218, and Energy Systems SPP-341(E)(2)(I).

4.0 TRAINING

4.1 SCOPE

The Project Coordinator is responsible for ensuring that all personnel are properly trained before participating in the removal, handling, storage, and disposal of fluorescent light ballasts containing PCBs. Each person shall attend Polychlorinated Biphenyl Employee Information and Awareness Training (Module 305) and Carcinogen Control for Employees (Module 348) training sessions and an orientation of the Remediation Plan describing each department's responsibilities prior to conducting any maintenance activity dealing with PCBs.

4.2 SCHEDULE

The training shall be conducted in a time not to exceed thirty days prior to the department's participation in the plan. New personnel shall be properly trained prior to their working on the project. Since the implementation of the plan may span more than a year, refresher training should be held at intervals not to exceed 12 months.

4.3 DOCUMENTATION

The Project Coordinator shall be responsible for documentation of PCB training provided for personnel working on the Remediation Plan. Records shall be kept of the following:

1. Person presenting training
2. Date(s), time, location of training
3. Name of each trainee
4. Task to be performed by each trainee
5. Beginning date and ending date of each employee's work on the plan
6. Record of any contact with PCBs (eye, skin, and respiratory)

7. Date of refresher courses, if any

These records shall be made a part of project files and kept for at least 5 years from end of Remediation Plan.

5.0 REMEDIATION PLAN CONCLUSIONS

The Remediation Plan addresses the problem and solution of fluorescent light fixtures containing PCBs at the K-25 Site and the Department of Energy's mandate for Energy Systems to take remedial action. Statistical sampling of fluorescent light fixtures at K-25 revealed that approximately 80 percent of the fluorescent ballasts contain PCBs and that about 10 percent of the fixture ballasts are leaking PCBs. There were 69 occurrences of leaking PCB ballasts reported to the Environmental Management Department from September 1990 through August 1991. Clearly, there is great potential for contact by K-25 personnel due to the continued failure of ballasts containing PCBs. This Remediation Plan provides a systematic method for the safe removal of ballasts containing PCBs, installation of new energy efficient ballasts and bulbs, and the disposal of PCB waste.

5.1 PROPOSED K-25 ACTIONS

The Remediation Plan recommends the following short term and long term actions.

5.1.1 Short Term Actions

- As fluorescent fixtures require bulb change out, inspect ballasts and label as having PCB ballasts or as NON-PCB ballasts to assist in future PCB ballast change out
- As ballasts fail and require change out, all ballasts and bulbs for the fixture shall be removed and replaced with new NON-PCB energy efficient ballasts and bulbs. The fixture shall be labeled, "THIS FIXTURE CONTAINS NO-PCBs" in a location visible from the floor level.
- Revise appropriate maintenance procedures to include short term actions.

5.1.2 Long Term Actions

- Approve the "Defined Ballast/Bulb Change Out" alternative as the Remediation Plan
- Select a Remediation Plan Project Coordinator to direct the plan
- Assemble appropriate team members from departmental disciplines listed in the plan
- Orient and train all personnel to implement the plan efficiently and effectively
- Remove all PCB ballasts, cleanup PCB spills, install new energy efficient ballasts/fixtures and bulbs, dispose of PCB waste, and document all change outs, spills, and disposal actions.

5.2 COST COMPARISON OF ALTERNATIVE SOLUTIONS

In evaluating the alternative solutions, they rank by cost from least to most expensive as follows:

		Estimated Change out and <u>Disposal Costs</u>
1.	"Defined Ballast/Bulbs Change out" Material and labor to change out ballast/fixtures and bulbs Technical Support PCB Waste Disposal	 \$4,784,770 3,032,908 <u>730,250</u> \$8,547,928
		\$8,547,928
2.	"Change Out Ballasts as Bulbs are Replaced" Material & Labor to Change out Ballasts/Fixtures and Bulbs Technical Support PCB Waste Disposal	 \$5,217,989 3,450,308 <u>730,250</u> \$9,398,547
		\$9,398,547
3.	"Change Out Ballasts as They Fail" Material & Labor to Change out Ballasts/Fixtures and Bulbs Technical Support PCB Waste Disposal	 \$10,430,015 6,903,233 <u>1,098,252</u> \$18,431,490
		\$18,431,490
4.	No Corrective Action This solution has no immediate cost but could be expected to be plan (3) plus potential health liabilities	 GREATER THAN \$18,431,490

The remediation costs escalate as more ballasts leak PCBs; thus requiring the additional expense of protective equipment and spill cleanup labor. The recommended "Defined Ballast/Bulbs

Change Out" solution provides the most economical and least health risk method of remediation for the fluorescent light fixtures containing PCBs.

5.3 OTHER RECOMMENDATIONS

During the investigation and preparation of this document, the following additional actions, which are beyond the scope of this task, were discovered.

- a. The list of selected buildings, Figure 1 of the Appendix, may not include all ballasts which should be removed and replaced. There are some buildings on the Decontamination and Decommission list that are presently being used. These K-25 buildings should be evaluated for possible change out of PCB ballasts. The Remediation Plan could be extended to cover additional ballasts if required.
- b. Although the fluorescent light fixtures are the primary source of PCB leaks, the K-25 facilities also have High Intensity Discharge light fixtures equipped with separate capacitors containing PCBs. An investigation should be made to determine quantity and merits of including these fixtures in the Remediation Plan.
- c. The Remediation Plan implementation requires that approximately 200 fixtures, 47,065 ballasts, and 95,000 bulbs be replaced at an expenditure of \$8,547,928. The banning of PCBs and the passing of Public Law 100-357 establishing minimum performance standards for ballasts has resulted in the availability of a wide selection of improved ballasts and bulbs. "Federal Energy Management and Planning Programs" (FEMP) Code of Federal Regulations (10 CFR Part 436) Subpart A establishes certain energy conservation measures for existing and new federally owned or leased buildings. An investigation using Life Cycle Cost methods should be made to select the ballasts, fixtures, and bulbs that would yield the optimum return on investment for the Remediation Plan expenditures.

APPENDIX

FORMS AND LABELS USED IN REMEDIATION PLAN FOR FLUORESCENT LIGHT FIXTURES CONTAINING PCBs

Table 1 -	Prioritization of Buildings for Remediation Plan	A-3
Figure 1 -	Organization Chart for Remediation Plan	A-6
Figure 2 -	Task Matrix for Remediation Plan	A-7
Figure 3 -	Decision Tree for Remediation Plan - Non Radiological Areas . . .	A-9
Figure 4 -	Decision Tree for Remediation Plan - Radiological Areas	A-10
Figure 5 -	Hazard Identification Tag, UCN-2114A	A-11
Figure 6 -	EPA PCB Label M _L	A-12
Figure 7 -	Request for Disposal of Waste Material and Equipment, UCN-12463	A-13
Figure 8 -	Equipment Radioactive Contamination Survey Form, UCN-11635	A-14
Figure 9 -	Request for Decontamination Services, UCN-5646	A-15
Figure 10 -	Radiation Contamination Identification Tag, UCN-15A	A-16
Figure 11 -	Waste Identification Tag, UCN-2114B	A-17
Figure 12 -	Offsite Material Transfer Tag, UCN-11623	A-18
Figure 13 -	EPA PCB Label M _S	A-19
Figure 14 -	Repaired Fixture Label	A-19
Figure 15 -	Waste Material Inventory Form, UCN-16792	A-20
Figure 16 -	Monthly Waste Generation Accounting Form, UCN-16791	A-21

APPENDIX

FORMS AND LABELS USED IN REMEDIATION PLAN FOR FLUORESCENT LIGHT FIXTURES CONTAINING PCBs

Figure 17 -	Classified Material Tag, UCN-10732	A-22
Figure 18 -	Property Transfer Record, UCN-541	A-23
Figure 19 -	Remediation and Disposal Labor and Materials Costs	A-24

APPENDIX

TABLE 1
PRIORITIZATION OF BUILDINGS
FOR REMEDIATION OF FLUORESCENT
FIXTURES WITH PCBs K-25 SITE
Page 1 of 3

BLDG #	AGE (YRS)	# OF PEOPLE	AREA SQ FT	# OF RAD. AREA FIXTURES	TOTAL # OF FIXTURES	AGE RATING (A)	OCCUP LEVEL RATING (B)	OCCUP DURATION RATING (C)	PRIORITY RATING A + (B x C)
1. 1401	45	339	473,000	4,397	5862	4	5	4	24
2. 1007	23	430	132,000	0	2312	3	5	4	23
3. 1035	39	142	48,000	85	850	4	4	4	20
4. 1037	46	105	334,000	886	4432	4	4	4	20
5. 1001	44	215	94,000	0	1642	4	5	3	19
6. 1004-A,B,D	43	120	61,000	538	1076	4	3	4	16
7. 1008 - A,B	42	150	20,000	0	319	4	3	4	16
8. 1420	36	65	95,000	404	425	4	3	4	16
9. 1550A - W	17-18	102	26,000	0	460	2	4	3	14
10. 303-7-8*	44	50	40,000	0	708	4	3	3	13
11. 1035	43	53	80,000	142	1416	4	3	3	13
12. 1020	46	41	20,000	0	354	4	3	3	13
13. 1030	45	37	18,000	0	312	4	3	3	13
14. 1003	45	37	16,000	14	283	4	3	3	13
15. 1004-6	33	32	42,000	0	708	4	3	3	13
16. 1002	42	27	42,000	0	368	4	3	3	13
17. 1024	44	26	5,000	0	71	4	3	3	13
18. 1400	36	30	13,000	0	212	4	3	3	13
19. 1006	28	30	23,000	247	411	3	3	3	12
20. 1200	18	29	71,000	439	878	2	3	3	11
21. 1210	15	29	34,000	425	425	2	3	3	11
22. 1008-C, D	45	27	20,000	80	319	4	2	3	10
23. 1004-C	45	25	18,000	160	319	4	2	3	10
24. 791S	36	20	30,000	0	531	4	2	3	10
25. 1004-J	31	13	7,000	19	127	4	2	3	10
26. 601	45	12	17,000	74	297	4	2	3	10
27. 1600	15	21	40,000	142	566	2	2	3	8
28. 1023	20	16	17,000	170	226	2	2	3	8
29. 1407	46	15	4,300	7	71	4	2	2	8

*Buildings in which only break room or limited office space was considered.

APPENDIX

TABLE 1
PRIORITIZATION OF BUILDINGS
FOR REMEDIATION OF FLUORESCENT
FIXTURES WITH PCBs K-25 SITE

Page 2 of 3

BLDG #	AGE (YRS)	# OF PEOPLE	AREA SQ FT	# OF RAD. AREA FIXTURES	TOTAL # OF FIXTURES	AGE RATING (A)	OCCUP LEVEL RATING (B)	OCCUP DURATION RATING (C)	PRIORITY RATING A + (B x C)
30. 1028-45	34	3	680	0	7	4	1	4	8
31. 602-1-6*	39	12	1,660,000	13	14	4	1	3	7
32. 1015	46	7	8,000	134	141	4	1	3	7
33. 1423	23	12	29,000	234	467	3	2	2	7
34. 1414	41	10	15,000	0	127	4	1	3	7
35. 1413	38	5	8,500	106	141	4	1	3	7
36. 1405-6	40	7	3,300	54	57	4	1	3	7
37. 1028-47 49, 50	36	9	1,300	0	21	4	1	3	7
38. 1101	45	6	30,000	0	269	4	1	3	7
39. 1501	45	5	24,000	0	212	4	1	3	7
40. 1407-H	46	15	4,000	0	35	4	1	3	7
41. 1098-D	41	3	1,300	5	21	4	1	3	7
42. 1039	45	3	2,400	0	42	4	1	3	7
43. 1000	22	8	1,700	0	28	3	1	3	6
44. 796-A	36	4	2,800	0	50	4	1	2	6
45. 1098	42	3	1,300	10	21	4	1	2	6
46. 502-1-3*	41	3	582,000	14	14	4	1	2	6
47. 1028-57	30	3	500	0	28	3	1	3	6
48. 722	29	3	13,000	0	56	3	1	3	6
49. 1548	19	10	430	0	28	2	1	3	5
50. 1547	27	6	300	0	7	2	1	3	5
51. 1545-A	13	5	380	0	18	2	1	3	5
52. 1546-C	18	3	1,200	0	25	2	1	3	5
53. 1010-A	15	3	5,000	0	85	2	1	3	5
54. 1052	15	3	7,000	28	92	2	1	3	5
55. 1028-65	15	3	800	0	7	2	1	3	5
56. 902-1-8*	36	1	2,800,000	6	7	4	1	0	5

*Buildings in which only break room or limited office space was considered.

APPENDIX

TABLE 1
PRIORITIZATION OF BUILDINGS
FOR REMEDIATION OF FLUORESCENT
FIXTURES WITH PCBs K-25 SITE

Page 3 of 3

NOTES:

1. Buildings built after 1978 omitted from the list.
2. Factors considered in ranking are:

A. Age of building

<u>AGE OF BLDG</u>	<u>RATING</u>
0-13 YRS (Omitted)	1
14-20 YRS	2
20-30 YRS	3
> 30 YRS	4

B. Occupancy level of buildings

<u>OCCUPANCY LEVEL</u>	<u>RATING</u>
0-10 People	1
11-25 People	2
26-100 People	3
101-200 People	4
> 200 People	5

C. Occupancy duration of building

<u>OCCUPANCY DURATION</u>	<u>RATING</u>
Very Infrequent	1
Occasional	2
Regular	3
Continuous	4

DEFINITIONS:

- Very Infrequent - one to two times per month for very short duration
- Occasional - no personnel assigned to occupy facility, but the facility will be occupied intermittently for monitoring, checking, calibrating, repairs security, etc.
- Regular - Personnel assigned to facility and are expected to be in the facility on day shifts and occasionally on off-shifts
- Continuous - Personnel are assigned to facility on 24-hour basis.

Priority Rating = Age Rating + [Occupancy Level Rate x Occupancy Duration Rating]

Highest number (24) denotes highest priority

Lowest number (2) denotes lowest priority

APPENDIX

**Figure 1. Organization Chart for the
Remediation Plan for Fluorescent Ballasts Containing PCBs**

APPENDIX

Figure 2 - Task Matrix - Page 1 of 2

COMMENT	TASK	PC	DR	PMD	HPD	WMD	QAO	IHD	PSS	EMD	SD	HMC	PD	TD	TSC	FPD	WDC	MDC
	STAFF PROJECT	L	L	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	TRAINING	L		L		L				S								
	SCHEDULE PROJECT	L		S			S										S	
	PROCURE MAT'L'S	S											L					
	MONITOR PROJECT	L		S			S		S				S				S	
	MATERIALS & EQUIPMENT	S		L									S					
	WORK PERMITS	S		L	S	S		S	S	S	S					S	S	
RAD AREA	RAD SURVEY	S		S	L						S						S	
ALL PCB LEAKS	REQUEST SPILL C.U.		S	L		S			L	L								
ALL RAD & PCB LKS	PROT. EQUIP USE	S		L	L	L		L	S		S						S	
ALL RAD & PCBs	CLEANUP SPILL			S	S	L		S	S	S								
ALL RAD & PCBs	SURVEY SPILL	S			L			L		L								
ALL RAD & PCBs	DOC & REPORT SPILLS	S	S	S	S	L	S	S	S	L	S						S	
ALL RAD & PCBs	EVALUATE HEALTH HAZ		S		S	S		L		S								
ALL RAD & PCBs	SECURE SPILL AREA		S	S		S			L									
	EST. SAFETY GUIDES	S	S	S	S	S		S	S	S	L	S				S	S	
	ADMIN OUTSIDE CONTRACT	S	S										L					
	TRANSP. OF WASTE	S	S	S	S	S		S	S	S		S	S	L	S		S	S
	OFFSITE DISPOSAL CONTRACTS	S	S						S	S			L	S			S	
ALL LOCATION	INSPECT FIXTURE			L	S			S										
NON-LEAK, NON RAD	REMOVE BALLAST		S	L		S												
ALL LOCATIONS	REPLACE BALLASTS & BULBS			L														
LEAKING NON RAD	REMOVE BALLAST		S	L	S	S		S	S	S							S	
LEAKING PCB FIXTURE	REMOVE & REPLACE FIXTURE		S	L	S	S		S	S	S							S	
LEAKING - PCB - RAD	REMOVE BALLAST		S	L	S	S		S	S	S	S	S					S	
ALL FIXTURES	NON-PCB LABEL	S		L			S											
ALL WASTES	CLASSIFY WASTE	S	L	S	S	S		S		S		S					L	S
	LABEL & DATE DRUM	S																
	STORE WASTE IN DRUMS	S	S	L	S	S		S		S		S					S	
	REQUEST DISPOSAL	S	L	S	S	S				S		S					S	

Task Matrix Legend:

PC - PROJECT COORDINATOR
 DR - DISPOSAL REQUESTER
 PMD - PLANT MAINTENANCE DIVISION
 HPD - HEALTH PHYSICS DEPARTMENT
 WMD - WASTE MANAGEMENT DEPARTMENT
 QAO - QUALITY ASSURANCE OFFICE
 IHD - INDUSTRIAL HYGIENE DEPARTMENT
 PSS - PLANT SHIFT SUPERINTENDENT
 EMD - ENVIRONMENTAL MANAGEMENT DEPARTMENT
 SD - SAFETY DEPARTMENT

HMC - HAZARDOUS MATERIAL COORDINATOR
 PD - PROCUREMENT DIVISION
 TD - TRAFFIC DEPARTMENT
 TSC - TRANSPORTATION SAFETY COUNCIL
 FPD - FIRE PROTECTION DEPARTMENT
 WDC - WASTE DISPOSAL COORDINATOR
 MDC - MATERIALS DISPOSAL COMMITTEE
 L - LEAD ROLE
 S - SUPPORT ROLE

APPENDIX

Figure 2 - Task Matrix - Page 2 of 2

COMMENT	TASK	PC	DR	PMD	HPD	WMD	QAD	IHD	PSS	EMD	SD	HMC	PD	TD	TSC	FPD	WDC	MDC
	DISPOSE PROT. EQUIP	S	S	L	S			S		S		S					S	
REQ FOR DISPL WASTE MAT'L & EQUIP.	UCN-12463	S	L	S	S												L	
HAZARD I.D.	UCN-21148	S	L	S	S	S		S		S		S					L	
WASTE I.D.	UCN-21148	S	L	S	S	S		S		S		S					L	
YELLOW-RAD CONT. I.D.	UCN-15A	S	S		L	S		S		S		S					S	
EQUIP. RAD CONT. SURVEY	UCN-11631	S	S		L	S		S		S		S					S	
OFFSITE MAT'L TRANSFER (BLUE)	UCN-11623	S	S		L	S		S		S		S					S	
AUTH STOR. RAD CONT. WASTE ORNL	UCN-2109	S	S		S	S		S		S		S					L	
REQ. DECONT. SERVICES	UCN-5646	S	S		S	S		S		S		S					L	
CLASS. MATERIAL	UCN-10732	S	L						S								S	
WASTE INVENT WITH UCN-12463	UCN-16792	S	L			S						S					S	
MON. WASTE GEN. ACCTG	UCN-16791	S	L														S	
REQ FOR CRIT. SAFETY ANALY	UCN-3446A	S	L		S	S		S		S							L	
PROP. TRANSF.	UCN-541	S	L										S				S	
	VERIFY WASTE PROPERLY LABELED	S	S	S	S	L		S		S							S	
	MONITOR WASTE STORAGE TIME	S	S			L			S		S	S				S	S	
	PCB WASTE DISP. OFFSITE	S	S			S			S	S		S	S	S	S	S	L	S
	MIX HAZ WASTE TSCA INCN.	S	S		S	S		S	S	S	S	S		S			L	
	DISP. CLEAN SCRAP	S	L	S	S	S		S	S	S		S					S	
	MAINTAIN HAZ MAT'L'S INV. DATA BASE	S	S			S			S			L					S	
MONITOR MAT'L'S FOR FIRE HAZ.	DISPOSAL OF CLEANUP MAT'L'S	S	S	S		S					S					L	S	S
	MONITOR DISPL REG. COMPL.	S	S			S			S	L							S	S
	PREPARE SHIPPING DOCUMENTS	S	S											L	S		L	S
	INSPECT VEHICLES USED OFFSITE SHIP	S	S											L	S		S	S
	MAINTAIN RECORDS OF ALL DISPOSALS	S	S	S		S			S								L	S
	ANNUAL REVIEW OF BLAT DISPL	S	S						S								L	S

Task Matrix Legend:

PC - PROJECT COORDINATOR
 DR - DISPOSAL REQUESTER
 PMD - PLANT MAINTENANCE DIVISION
 HPD - HEALTH PHYSICS DEPARTMENT
 WMD - WASTE MANAGEMENT DEPARTMENT
 QAO - QUALITY ASSURANCE OFFICE
 IHD - INDUSTRIAL HYGIENE DEPARTMENT
 PSS - PLANT SHIFT SUPERINTENDENT
 EMD - ENVIRONMENTAL MANAGEMENT DEPARTMENT
 SD - SAFETY DEPARTMENT

HMC - HAZARDOUS MATERIAL COORDINATOR
 PD - PROCUREMENT DIVISION
 TD - TRAFFIC DEPARTMENT
 TSC - TRANSPORTATION SAFETY COUNCIL
 FPD - FIRE PROTECTION DEPARTMENT
 WDC - WASTE DISPOSAL COORDINATOR
 MDC - MATERIALS DISPOSAL COMMITTEE
 L - LEAD ROLE
 S - SUPPORT ROLE

FIGURE 3
DECISION TREE DIA
REMEDIATION OF FL
LIGHT FIXTURES CON
IN NON-RADIOLOG

GRAM FOR
ORESCENT
AINING PCBs
CAL AREA

FIG
DECISION TREE
REMEDATION
LIGHT FIXTURE
IN RADIOL

RE 4.
 DIAGRAM FOR
 F FLUORESCENT
 CONTAINING PCBs
 GICAL AREA

APPENDIX

The image shows a hazardous waste identification tag with a black border and a white center. At the top center is a circular logo. Below it, the title "HAZARDOUS WASTE IDENTIFICATION" is printed in bold. The tag is divided into two main sections. The first section, "TO BE COMPLETED BY REQUESTER", contains fields for "DISPOSAL FORM SEQUENCE NO. (OR BLKT. NO.)", "DISPOSAL FORM DATE", "ACCUMULATION START DATE", "MATERIAL DESCRIPTION" (with three lines), "TYPE AND SIZE OF CONTAINER (FOR EXAMPLE, 55-GALLON STEEL DRUM)", "LOCATION OF MATERIAL", "DEPARTMENT", and "SIGNATURE". The second section, "TO BE COMPL. BY PLT. DISPOSAL COORD.", contains fields for "CHECKED BY" and "DATE" (side-by-side), and "COMMENTS" (with four lines). At the bottom left, the text "UCN-2114A (2 2-88)" is printed.

HAZARDOUS WASTE IDENTIFICATION

TO BE COMPLETED BY REQUESTER

DISPOSAL FORM SEQUENCE NO. (OR BLKT. NO.)

DISPOSAL FORM DATE

ACCUMULATION START DATE

MATERIAL DESCRIPTION

TYPE AND SIZE OF CONTAINER (FOR EXAMPLE, 55-GALLON STEEL DRUM)

LOCATION OF MATERIAL

DEPARTMENT

SIGNATURE

TO BE COMPL. BY PLT. DISPOSAL COORD.

CHECKED BY DATE

COMMENTS

UCN-2114A (2 2-88)

Figure 5. Hazard Identification Tag, UCN-2114A

APPENDIX

Figure 6. EPA PCB Label M_L

2

✱

44

EQUIPMENT-RADIOACTIVE CONTAMINATION SURVEY

[illegible]

Figure 8. Equipment Radioactive Contamination Survey Form, UCN-11635

APPENDIX

REQUEST FOR DECONTAMINATION AND FIELD SERVICE

Location		Date	Charge W.O. Number	
Requested By: Name		Location	Phone	
LOCATION OF AND DESCRIPTION OF WORK REQUIRED				
DISPOSITION OF EQUIPMENT:		☐ Salvage ☐ Notify Requester		
WORK PROGRESS	DATE/SHIFT	OPERATOR(S)		
SOLUTIONS AND/OR SOLIDS DISPOSITION				
TYPE	LOCATION	TAGGED BY		
RADIATION READINGS				
LOCATION OR EQUIPMENT	BEFORE DECONTAMINATION		AFTER DECONTAMINATION	
	Alpha d/m/100cm ²	Beta mRem/hr	Alpha d/m/100cm ²	Beta mRem/hr
	Surface	Wipe	Surface	Wipe
Decontamination Completed:		Supervisor	Date	
Decontamination Accepted By:		Supervisor	Date	

DISTRIBUTION: (Whites) 1st Copy - Original to Chemical Operations (ORCOP RC)
 (Culley) 2nd Copy - To requester after completion of decontamination
 (Pine) 3rd Copy - Chemical Operations
 (Burfi) 4th Copy - Returned by Originator

546
 2 821

Figure 9. Request for Decontamination Services Form UCN-5646

APPENDIX

UCN-15A (1 7-89)	86601
<h2 style="margin: 0;">RADIATION</h2> <h3 style="margin: 0;">CONTAMINATION</h3>

SURFACE CONTAMINATION	
ALPHA (Max.) SURFACE _____ d/m/100 cm ² TRANSFERABLE _____ d/m/100 cm ² BETA (Max.) SURFACE _____ d/m/100 cm ² TRANSFERABLE _____ d/m/100 cm ²	
EXTERNAL DOSE RATE	
BETA _____ mrad/hr at _____ _____ mrad/hr at _____ GAMMA _____ mR /hr at _____ _____ mR /hr at _____ NEUTRON _____ mrem/hr at _____	
TOTAL DOSE _____ mrem/hr at _____ RATE _____ mrem/hr at _____	
RADIOISOTOPE(S)	NO. OF CURIES
SEE OTHER SIDE	

UCN-15A BACK	
<h2 style="margin: 0;">RADIATION</h2> <h3 style="margin: 0;">CONTAMINATION</h3>

SPECIAL HANDLING	
DESCRIPTION OF MATERIAL _____ _____ _____	
REMARKS ☐ Use respiratory protection when grinding, buffing, burning, welding, dry machining, or using impact tools on this item. ☐ Wear gloves and protective clothing for handling. (unless safety or work to be done makes this impracticable) ☐ Wash hands and frisk after handling. ☐ This item may have radioactive materials inside.	
FROM _____	TO _____
DATE _____ SURVEYED BY (Health Physics Rep.) _____ SEE OTHER SIDE	

Figure 10. Radiation Contamination Identification Tag, UCN-15A

APPENDIX

The image shows a waste identification tag with a header section and several data entry fields. At the top center is a circular logo. Below it, the title 'WASTE IDENTIFICATION' is printed in bold. A horizontal line separates the title from the 'TO BE COMPLETED BY REQUESTER' section. This section includes fields for 'DISPOSAL FORM SEQUENCE NO (OR BLKT NO)', 'DISPOSAL FORM DATE', and 'MATERIAL DESCRIPTION' (with four lines for text). Below these is the 'TYPE AND SIZE OF CONTAINER (FOR EXAMPLE 55 GALLON STEEL DRUM)' field. Further down are fields for 'LOCATION OF MATERIAL', 'DEPARTMENT', and 'SIGNATURE'. A second horizontal line separates this from the 'TO BE COMPL. BY PLT. DISPOSAL COORD.' section. This section contains a table with 'CHECKED BY' and 'DATE' columns, followed by a 'COMMENTS' field with four lines for text. At the bottom left of the tag is the code 'UCN 2114B (2 2 88)'.

WASTE IDENTIFICATION

TO BE COMPLETED BY REQUESTER

DISPOSAL FORM SEQUENCE NO (OR BLKT NO)

DISPOSAL FORM DATE

MATERIAL DESCRIPTION

TYPE AND SIZE OF CONTAINER (FOR EXAMPLE 55 GALLON STEEL DRUM)

LOCATION OF MATERIAL

DEPARTMENT

SIGNATURE

TO BE COMPL. BY PLT. DISPOSAL COORD.

CHECKED BY	DATE
------------	------

COMMENTS

UCN 2114B (2 2 88)

Figure 11. Waste Identification Tag, UCN-2114B

ORGP HEALTH PHYSICS
MATERIAL TRANSFER
OFF SITE ONLY
RADIATION CLEARANCE

Figure 12. Offsite Material Transfer Tag, UCN-11623

APPENDIX

Figure 13. EPA PCB Label M₅

THIS FIXTURE CONTAINS NO-PCBs

Figure 14. Repaired Fixture Label

APPENDIX

[illegible]

Figure 15. Waste Material Inventory Form UCN-16792

APPENDIX

MONTHLY WASTE GENERATION ACCOUNTING	
	<div style="border: 1px solid black; padding: 2px;">MONTH</div>
	<div style="border: 1px solid black; padding: 2px;">YEAR</div>
BLANKET REQUEST NUMBER	
BUILDING GENERATING WASTE	
MATERIAL DESCRIPTION	
RADIOACTIVE: ☐ YES ☐ NO	
EPA IDENTIFICATION NUMBER	
AMOUNT DISPOSED	
MATERIAL CATEGORY	
STORAGE SITE	
DISPOSAL SITE	
DOT SHIPPING NAME	
	<div style="border: 1px solid black; padding: 2px;">SIGNATURE</div>

UCN-16791 (10 7-89)

Figure 16. Monthly Waste Generation Accounting Form UCN-16791

APPENDIX

CLASSIFIED INFORMATION VERIFICATION TAG	
I CERTIFY THAT THIS EQUIPMENT HAS BEEN THOROUGHLY SEARCHED AND NO CLASSIFIED INFORMATION IS CONTAINED THEREIN.	
RELEASING DEPARTMENT	
NAME	BADGE
DEPARTMENT	DATE
MATERIALS DEPARTMENT	
NAME	BADGE
DEPARTMENT	DATE
PROPERTY SALES	
NAME	BADGE
DEPARTMENT	DATE
UCN-10732- (2 12-87)	

Figure 17. Classified Material Tag, UCN-10732

APPENDIX

PROPERTY TRANSFER RECORD										NO.
REASON FOR TRANSFER		PROPERTY NO.		DESCRIPTION						
☐ A	TRANSFER TO ANOTHER USER	SIGNATURE		BADGE NO.		DATE				
☐ B	UNSERVICEABLE OR OBSOLETE									
☐ C	SURPLUS TO USER	RECEIVER/CUSTODIAN		BADGE NO.		DATE				
☐ D	SALE IN-LIEU OF TRADE-IN									
☐ E	DISMANTLED, DESTROYED	FROM		ACCOUNT NO.						
☐ F	BURIED									
☐ G	HELD FOR FUTURE PROJECTS	PLANT	BLOG	ROOM	FLOOR	ROW	COL	DIV	DEPT	SUB
☐ H	CUSTODIANSHIP	TO		ACCOUNT NO.						
☐ I	OTHER (Explain)									
CUSTODIANSHIP RESPONSIBILITY		PLANT	BLOG	ROOM	FLOOR	ROW	COL	DIV	DEPT	SUB
CODE: INDICATE RECEIVER (X)										
☐ I	INDIVIDUAL									
☐ C	CUSTODIAN									
SEE INSTRUCTIONS ON REVERSE										

UCN-541 (1235 8-87)

TO: PROPERTY DEPARTMENT

INSTRUCTIONS FOR PTR CARDS

PROPERTY TRANSFER RECORD, Form UCN-541, must be properly indicated and approved when —

- (1) Transfer or movement of property between Martin Marietta Energy Systems, Inc., installation division, buildings, rooms, account, or subaccount.
- (2) Property is buried, excessed, obsolete, worn out, lost, stolen, destroyed, dismantled, or damaged beyond repair.

Sender initiates Form and mails 1st copy to Property Department.

2nd copy is retained by the Sender.

3rd copy is sent along with equipment for Receiver to complete and forward to Property Department.

Code "C" is applicable where a property item is used by more than one person but responsibility is assigned to one person such as a shop foreman.

BACK UCN-541 (1235 8-87)

Figure 18. Property Transfer Record UCN-541

APPENDIX

The following labor and material values are Energy Systems 1991 fiscal year values:

LABOR RATES (\$1 MAN HOUR)	K-25 CAPITAL	K-25 EXPENSE	K-25 ***
1. *Electrical Maintenance	\$46.60	\$59.37	N/A
2. *Electrical Supervisor	46.60	59.37	N/A
3. **Health Physics Worker	N/A	N/A	\$72.25
4. *Waste Management Worker	46.60	59.37	N/A
5. **Environmental Management Worker/WDC	N/A	N/A	89.37
6. **Industrial Hygiene Dept Worker/PSS	N/A	N/A	100.62
7. *Technical Division Worker/PC (Health Safety Environmental DIV)		64.14	

All rates include overheads

*Rates approved 14 May 1991 for FY 91

**Rates approved 1 July 1991 for FY 91

***These organizations do not differentiate between capital and expense projects.

MATERIALS

Protective Equipment

1.	Neoprene Gloves	\$ 8.00/pr
2.	Disposal TYVEK Suites	80.00 each
3.	Shoe scuffs	6.00/pr
4.	Recycled full face respirators	22.00 each
5.	HEPA cartridges	3.30 each

Figure 19. Remediation and Disposal Labor and Material Costs
Page 1 of 2

APPENDIX

ASSUMPTIONS: Change out teams of 2 men each would be able to change out 8 fixtures per day with protective equipment being discarded at the end of each shift.

Cost per fixture would be:

Neoprene Gloves	2 pr @ \$8.00	\$ 16.00
TYVEK Suits	2 suits @ 80.00	160.00
Shoe Scuffs	2 pr @ 6.00	12.00
Full Face Respirator	2 @ 22.00	44.00
HEPA Cartridges	2 @ 3.30	<u>6.60</u>
		\$238.60/team/day

$$\text{Cost/Fixture} = \frac{\$238.60/\text{team/day}}{8 \text{ Fixtures/day/teams}} = \$29.83 \quad \$30.00/\text{Fixture}$$

or \$15.00 per person/day

<u>Ballasts:</u>	Energy Efficient	
2 or 4 Bulb Advance Mark III		\$12.62 each
<u>Bulbs:</u>	Sylvania Watt Saver	1.92 each
<u>Fixtures:</u>		
1B2B with Bulbs Lithonia		47.89
2B4B with Bulbs Lithonia		56.55
DOT 17C Drum Stores No. 62-089-6345		27.00
4 x 4 Wood Pallet		8.00
K-1435 TSCA Incinerator Cost		10.00/lb

Figure 19. Remediation and Disposal Labor and Material Costs
Page 2 of 2