

ENVIRONMENTAL ASSESSMENT

REPLACEMENT OF THE ICING RESEARCH
TUNNEL (IRT) HEAT EXCHANGER
BUILDING 11 (FY 98)

NASA Lewis Research Center
21000 Brookpark Rd.
Cleveland, OH 44135
Bionetics Contract NAS3-26516

Prepared by:

Richard S. Kalynchuk
Richard S. Kalynchuk
Bionetics Corporation

Reviewed by:

Peter W. McCallum
Peter W. McCallum
Chief, Office of Environmental Programs
NASA Lewis Research Center
Telephone; 216-433-8852

September 9, 1996

Abstract

The objective of this Environmental Assessment is to review the proposed action associated with the Replacement of the Icing Research Tunnel Heat Exchanger at NASA Lewis Research Center in Cleveland, Ohio.

**NASA LEWIS RESEARCH CENTER
CUYAHOGA COUNTY, OHIO**

**ENVIRONMENTAL ASSESSMENT FOR REPLACEMENT OF THE
ICING RESEARCH TUNNEL (IRT) HEAT EXCHANGER**

TABLE OF CONTENTS

<u>ITEM</u>	<u>PAGE</u>
1.0 Summary and Conclusions	1
2.0 Introduction	3
2.1 Purpose and Need	3
2.2 Existing Building and General Operations	7
3.0 Description of Proposed Action and Alternatives	7
3.1 Replacement of Icing Research Tunnel at NASA's LeRC (Proposed Action)	7
3.2 No Action	8
3.3 Duplication of Icing Research Tunnel Operations at an Alternate Site	8
4.0 Environmental Impact of Alternatives	8
4.1 Introduction	8
4.2 Air Quality	9
4.3 Groundwater and Surface Water Quality	10
4.4 Waste Generation	11
4.5 Noise and Vibration	12
4.6 Hazardous Substances	13
4.7 Ionizing and Non-ionizing Radiation	14
4.8 Endangered Species and Biotic Resources: Fish and Wildlife Resources	15
4.9 Wetlands and Floodplains	15
4.10 Historical and Archeological Sites	16
4.11 Prime and Unique Farmlands	17
4.12 Land Quality, Vicinity Land Use, Visual, and Recreational Resources	18
4.13 Economic, Population, and Employment Factors	19
4.14 Health and Safety	19
4.15 Coastal Zone Consistency	20
4.16 Environmental Justice	21

5.0	List of Agencies and Individuals Consulted	22
-----	--	----

6.0	References	23
-----	------------------	----

FIGURES

Figure 1	Vicinity Map.....	4
Figure 2	Building Location.....	5
Figure 3	Building Plan View.....	6

TABLES

Table 1-1	Summary of Environmental Impacts of Alternatives	2
Table 4-1	Cuyahoga County Attainment/Non-Attainment Status	9
Table 5-1	Agencies and Individuals Consulted	22

ABBREVIATIONS AND ACRONYMS

IRT	Icing Research Tunnel
EA	Environmental Assessment
NEPA	National Environmental Policy Act
CEQ	Council on Environmental Quality
NASA	National Aeronautics and Space Administration
LeRC	Lewis Research Center
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
HVAC	Heating, Ventilation, and Air Conditioning
OEPA	Ohio Environmental Protection Agency
POTW	Publicly Owned Treatment Works
NPDES	National Pollution Discharge Elimination System
TSCA	Toxic Substances Control Act
PCB	Polychlorinated Biphenyls
OSHA	Occupational Safety and Health Administration
SARA	Superfund Amendment and Reauthorization Act
FEMA	Federal Emergency Management Agency
SHPO	State Historic Preservation Office

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

1.0 SUMMARY AND CONCLUSIONS

This Environmental Assessment (EA), required pursuant to the National Environmental Policy Act (NEPA), and Council on Environmental Quality (CEQ) regulations, concerns a proposed action at the National Aeronautics and Space Administration (NASA) Lewis Research Center (LeRC) in Cleveland, Ohio to replace components in Building 11, the Icing Research Tunnel. Under NASA's proposed action, NASA would replace the Icing Research Tunnel's heat exchanger, other airflow conditioning devices as required, and insulation at discrete points around the tunnel loop.

This Environmental Assessment addresses and evaluates environmental impacts associated with implementing the proposed action and two alternatives. The alternatives considered are no action or duplication of the Icing Research Tunnel facility at an alternate site.

Table 1-1 summarizes the environmental impacts of the proposed action and the alternatives based on issues outlined in NEPA, the CEQ regulations, applicable NASA procedures (14 Code of Federal Regulations (CFR) Subpart 1216.3¹), and other Federal environmental statutes, regulations, and executive Orders. Under the heading of Proposed Action, the question "Are Substantial Impacts Possible?" is addressed as either "No" or "Yes". The answer "No" implies that our assessment of the available information indicates that there is little, if any, likelihood of substantial environmental effects associated with the proposed action. The answer "Yes" indicates that our assessment concludes that some substantial environmental impacts are possible or likely. The final two columns compare the expected environmental impacts of the alternatives against the proposed action. The comparisons indicate whether the alternatives will bear either more severe, similar, or less severe environmental impacts than the proposed action.

In general, the proposed action would result in little impact to the surrounding environment for the following reasons:

The project involves the replacement of a component, not new construction;

The operations conducted in the Icing Research Tunnel facility would not be new to the NASA Lewis Research Center.

There are no substantial problems with air quality, surface water and groundwater quality, waste generation, noise and vibration, hazardous substances, ionizing and nonionizing radiation, endangered species and biotic resources, wetlands and floodplains, historical and archeological sites, prime and unique farmlands, land quality, vicinity land use, visual and recreational resources, economic, population and employment factors, health and safety, and coastal zone consistency associated with Building 11, nor with the replacement or operation of the heat exchange equipment.

The two alternatives evaluated are not likely to strongly impact any environmental parameters addressed in this Environmental Assessment. For the new facility alternative, it is assumed that a site can be found which will not have substantial impacts (e.g., location in a wetland, adverse effects on cultural resources etc.). Neither alternative appears more beneficial to the surrounding environment than the proposed action. Standard demolition and construction activities seem to be the only cause of impact at the NASA Lewis Research Center.

TABLE 1-1— SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES

Environmental Parameters Considered	Proposed Action, Are Substantial Impacts Possible?	No Action, Impacts Relative to Proposed Action	New Facility Location, Impacts Relative to Proposed Action
Land Resources	No	Similar	Greater
Air Resources	No	Greater	Greater
Water Resources	No	Lower	Greater
Noise	No	Lower	Greater
Biotic Resources	No	Similar	Greater
Flood plains and Wetlands	No	Similar	Greater
Solid Waste	No	Lower	Greater
Hazardous Substance and Hazardous Waste Management	No	Lower	Greater
Historical, Archeological, and Cultural Factors	No	Similar	Less
Social and Economic Factors	No	Similar	Greater
Utilities and Transportation	No	Similar	Greater
Environmental Justice	No	Similar	Greater

2.0 INTRODUCTION

2.1 Purpose and Need

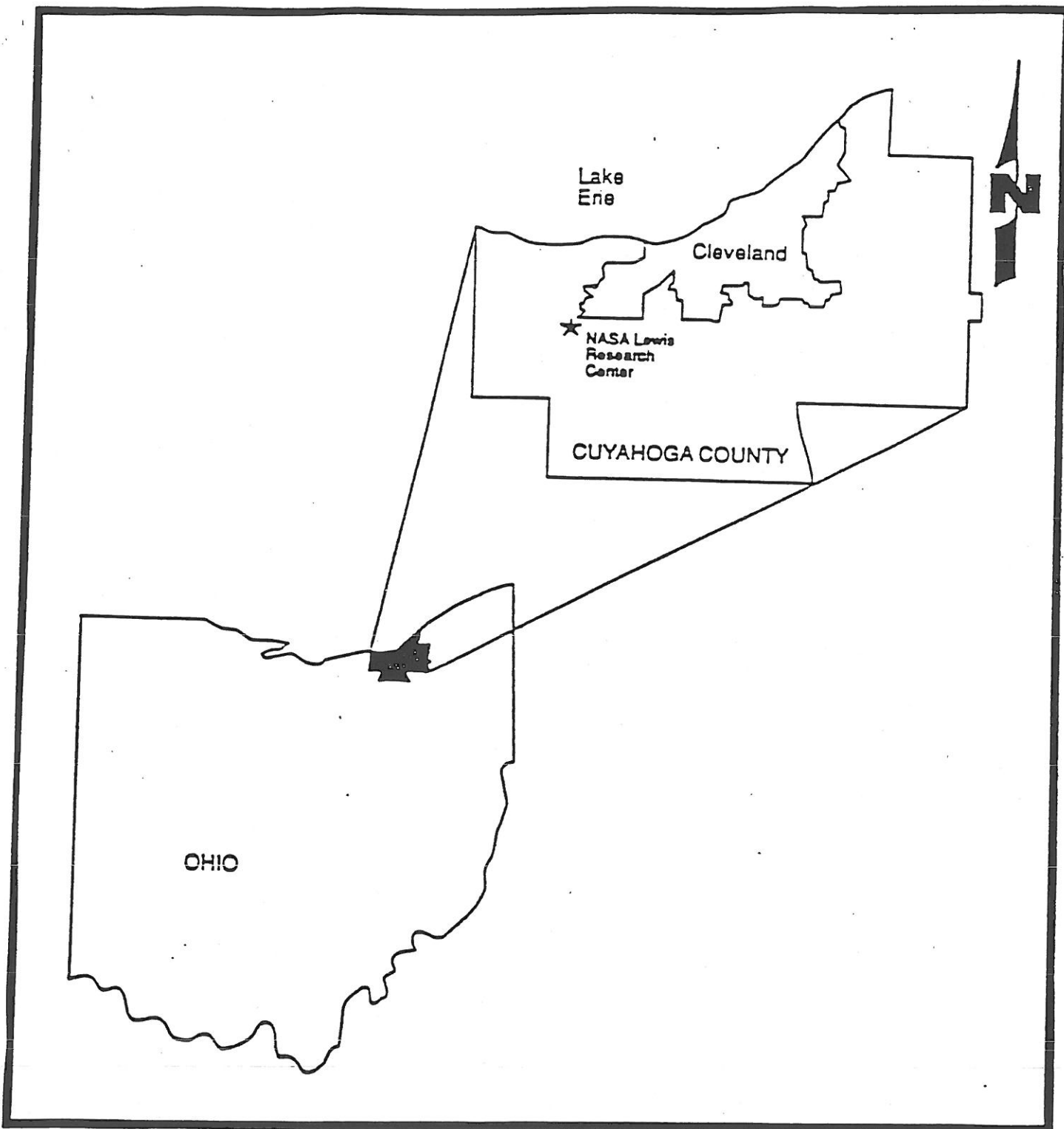
NEPA (42 USC 4321 et seq.) was enacted to articulate the federal government's policy and objectives in environmental protection. Regulations promulgated in support of NEPA are found at 40 CFR Parts 1500-1508. These regulations contain provisions necessary to ensure that federal agencies act within the intent of NEPA. In particular, these regulations address the procedural aspects of conducting environmental analyses and preparing and publishing NEPA-related documents, such as EAs and Environmental Impact Statements (EISs). The regulations also dictate that federal agencies shall adopt procedures to ensure that decisions are made in accordance with the scope and intent of NEPA. As a result, NASA enacted provisions found at 14 CFR Subparts 1216.1 and 1216.3 (NASA/NEPA provisions) for implementing NEPA requirements. This Environmental Assessment has been prepared pursuant to the NASA/NEPA provisions in support of a proposed action at the NASA Lewis Research Center in Cleveland, Ohio (Figure 1).

The Icing Research Tunnel (IRT) (Figure 2) is NASA's only refrigerated icing wind tunnel (Figure 3) and is the world's largest, capable of duplicating the icing conditions encountered by aircraft. Test programs conducted in the IRT can be grouped into three categories, a) research of icing phenomena, b) certification of ice protection systems for aircraft, and c) development of new ice protection systems. Customers include industry (engine manufacturers and airframers), NASA focused programs (High Speed Research and Advanced Subsonic Testing), the Department of Defense, the Federal Aviation Administration, and other miscellaneous organizations.

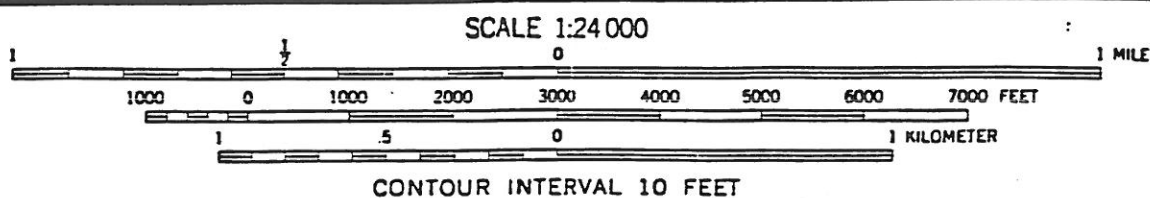
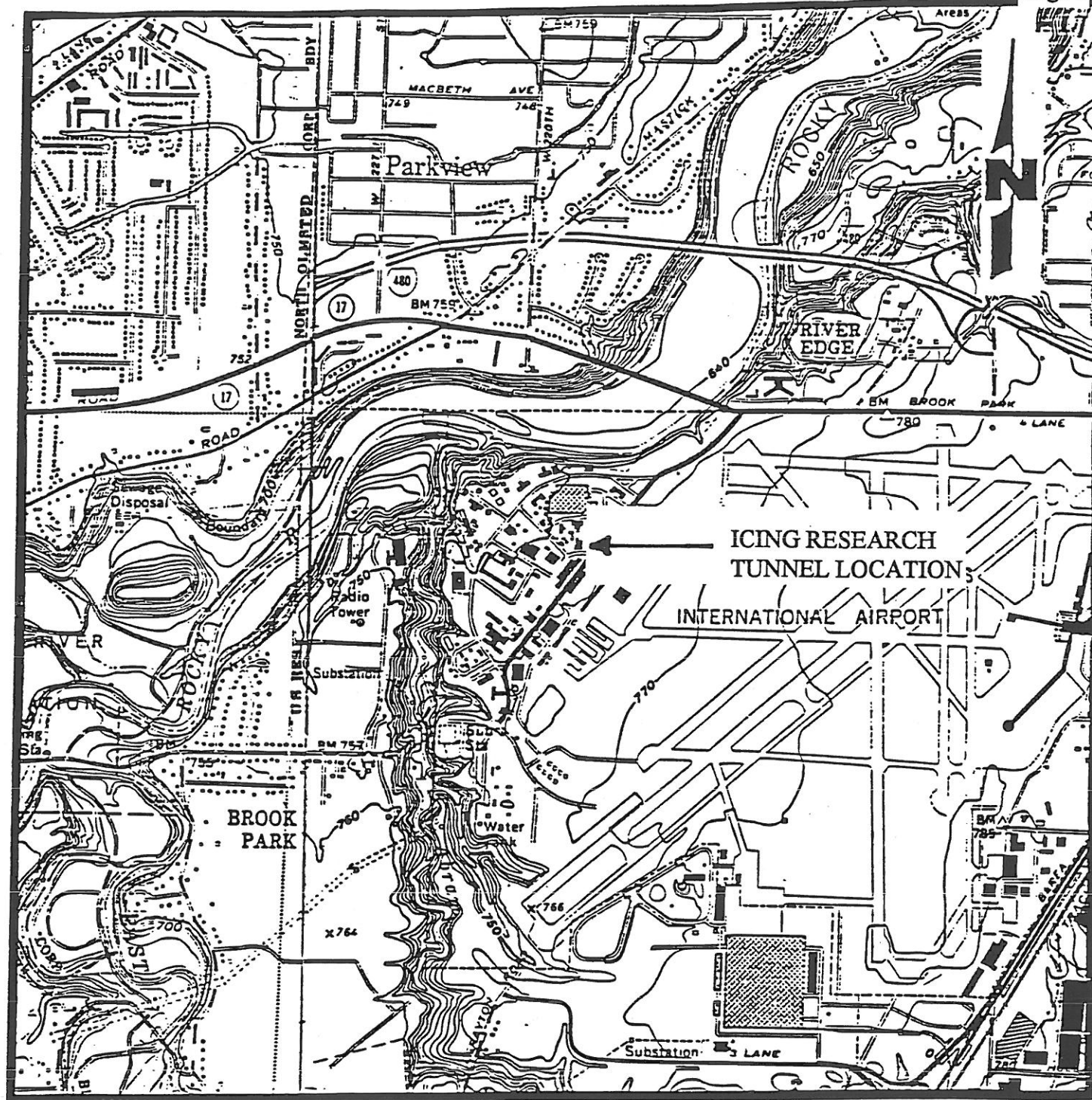
The need for IRT heat exchanger replacement is based upon safety, replacement of aging equipment, and potential wind tunnel airflow improvements via replacement equipment modern design practices.

The IRT has been in service for more than 50 years. It is the busiest wind tunnel at the NASA Lewis Research Center, typically running more than 1000 hours per year. The replacement of its aging heat exchanger will ensure the long term viability and productivity of the facility. Rather than a replacement in kind of the existing unit, the replacement heat exchanger will improve the IRT's dry aerodynamic characteristics, which will enhance the tunnel's icing cloud characteristics (size and uniformity).

In 1993 the Freon refrigerant used in the IRT's heat exchanger was changed for environmental reasons from Refrigerant 12 to Refrigerant 134a. Refrigerant 134a is a non-ozone depleting substance. Since that time, leaks in the heat exchanger have, on approximately six occasions, caused shutdown of the IRT operation. The leaks in the existing unit present workplace safety hazards, especially if such a leak were to occur in a Freon plenum pipe.

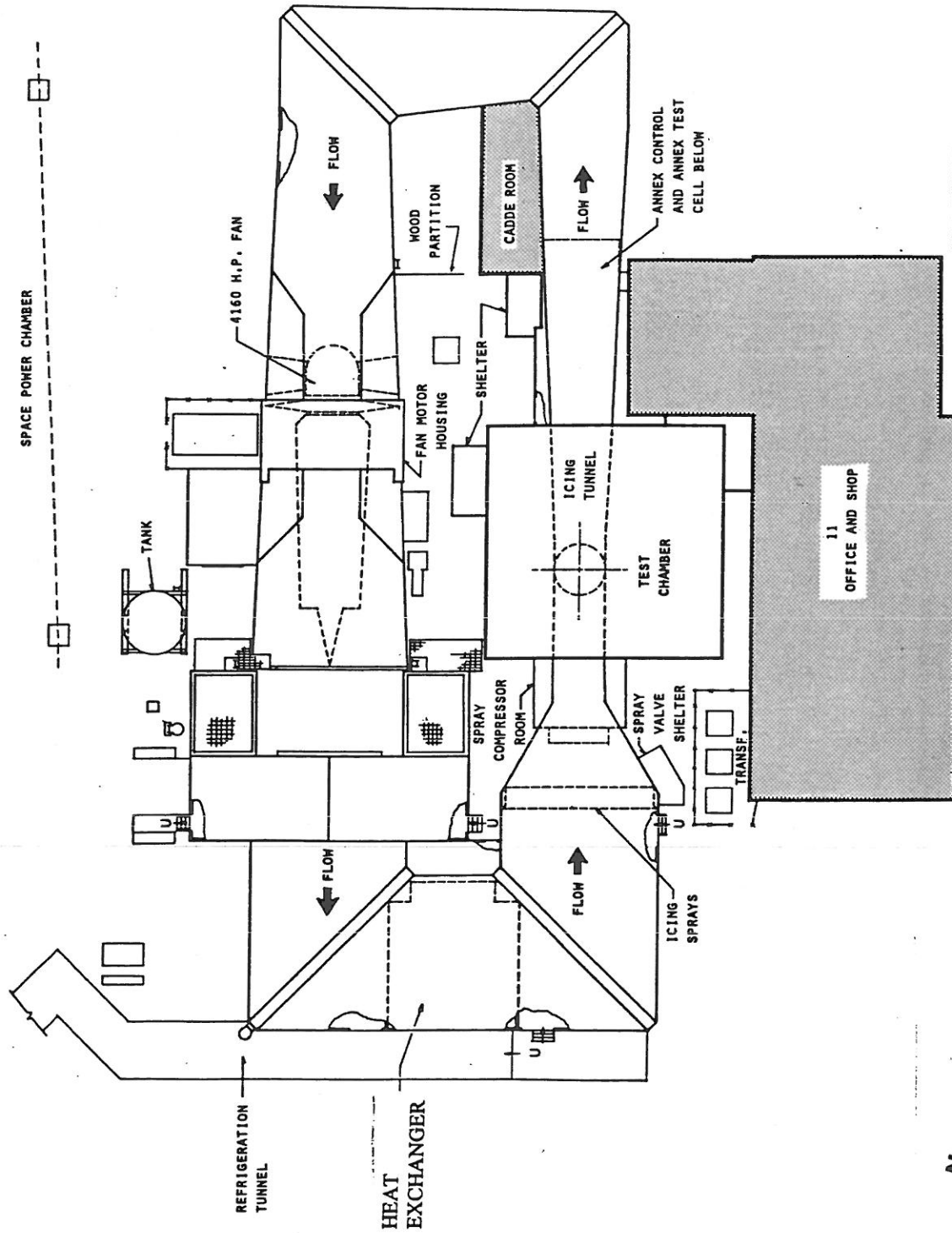


the bionetics corporation
NASA LEWIS RESEARCH CENTER
FIGURE 1
ENVIRONMENTAL ASSESSMENT OF; REPLACEMENT OF THE IRT HEAT EXCHANGER
VICINITY MAP
SCALE; NONE

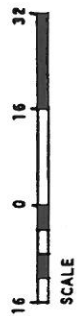


Source: USGS Topographic Map,
Lakewood Quadrangle (Photorevised 1985)
North Olmstead Quadrangle (Photorevised 1979)

the bionetics corporation
NABA LEWIS RESEARCH CENTER
FIGURE 2; BUILDING LOCATION
ENVIRONMENTAL ASSESSMENT OF; REPLACEMENT OF THE IRT HEAT EXCHANGER



() AREA, SQ. FT.



SEE FOLLOWING PAGES FOR BUILDING PLANS

ICING RESEARCH TUNNEL GROUP
PLAN

the blonetics corporation

NASA LEWIS RESEARCH CENTER

FIGURE 3; BUILDING PLAN VIEW
ENVIRONMENTAL ASSESSMENT OF; REPLACEMENT
OF THE IRT HEAT EXCHANGER

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

Air in the IRT is cooled by a 2,100 ton air conditioner. The Refrigeration Building, B. 9, houses the compressors which supply the Refrigerant 134a to IRT. There are no modifications planned for the Refrigeration Building included in this project.

2.2 Existing Building and General Operations

The IRT is a closed-loop refrigerated wind tunnel with a test section 1.8 meters high and 2.4 meters wide (6 feet by 9 feet). The airspeed in the test section can be varied from about 40 km/hr to 650 km/hr (25 to more than 400 mph) at essentially a sea-level pressure. The total air temperature can be independently varied from about -1 °C to -43 °C (30 °F to -45 °F). The heat exchanger is the key to the success of the IRT because it is able to maintain a uniform airspeed and uniform air temperature (± 0.55 °C (± 1 °F)) even after several hours of testing at severe icing conditions. The heat exchanger also serves the important function of preventing droplets from going around the tunnel loop where they might partially freeze and reenter the test section.

Spray nozzles produce the icing spray cloud of very small, unfrozen, subcooled droplets. The liquid water content can be varied from about 0.2 to 3.0 g/m³ (1E-5 lbs/ft³ to 2E-4 lbs/ft³) and the drop size can be varied independently from about 10 to about 40 microns (3.3E-5 to 1.3E-4 feet), volume medium diameter. The previously stated limits of airspeed, temperature, and icing cloud permit most natural icing conditions to be simulated.

The IRT currently runs at 100% capacity as defined by test programs in available test schedule slots. This is anticipated to continue in the future with tests scheduled from now through 1999.

3.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This section describes the proposed action and two alternatives. The alternatives considered are no action or duplication of the Icing Research Tunnel facility at an alternate site.

3.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The scope of the project includes the replacement of the Icing Research Tunnel's heat exchanger, other airflow conditioning devices as required to ensure proper operation of the heat exchanger and icing spray bar systems, and insulation at discrete points around the tunnel loop to reduce the extraneous heating (heat added to the tunnel loop by sources other than fan compression), which will reduce the amount of heat the heat exchanger extracts.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

3.2 No Action

This alternative assumes the proposed action will not be performed. Leaks in the existing heat exchanger can release Refrigerant 134a into the tunnel. Refrigerant 134a has a recommended Permissible Exposure Level of 1000 ppm. If the no action option is chosen, NASA will not eliminate current health risk related problems associated with Building 11 and its operations.

3.3 Duplication of Icing Research Tunnel Facility at Alternate Site

This alternative assumes duplication of the operations of Building 11 and the new heat exchanger at an alternate site within the NASA Lewis Research Center. This alternative was selected because of NASA's policy of consolidating individual research functions at selected Centers. This scenario assumes that the existing Refrigeration Building (Bldg. 9) could be used to support the new IRT facility. The replacement value of the refrigeration building is estimated to be \$32,000,000. Duplication of the Icing Research Tunnel facility would affect the environment in a greater degree than the proposed action during construction. During normal operation, the facility would impact the environment in a degree similar to the proposed action.

4.0 ENVIRONMENTAL IMPACT OF ALTERNATIVES

4.1 Introduction

The scope of this environmental assessment has been outlined following the NEPA, applicable NASA procedures¹, CEQ regulations, and the proposed Replacement of the Icing Research Tunnel Heat Exchanger Statement of Work². This section compares the impact of the alternatives described in Section 3.0 with respect to the following issues:

- Air Quality
- Surface Water and Groundwater Quality
- Waste Generation
- Noise and Vibration
- Hazardous Substances
- Ionizing and Non-ionizing Radiation
- Endangered Species and Biotic Resources: Fish and Wildlife Resources
- Wetlands and Floodplains
- Historical and Archeological Sites
- Prime and Unique Farmlands
- Land Quality, Vicinity Land Use, Visual, and Recreational Resources
- Economic, Population, and Employment Factors
- Health and Safety
- Coastal Zone Consistency
- Environmental Justice

4.2 Air Quality

The Ohio Environmental Protection Agency (OEPA) has designated areas within the state as either attainment or non-attainment for various pollutants. An attainment area for a particular pollutant is an area that meets the national primary or secondary ambient air quality standard for that pollutant. A non-attainment area is one which does not meet (or that contributes to poor ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutants³. Table 4-1 summarizes Cuyahoga County's attainment and non-attainment designations for various pollutants.⁴

**TABLE 4-1
 CUYAHOGA COUNTY ATTAINMENT/NON-ATTAINMENT STATUS**

	NO _x	SO ₂	PM ₁₀	OZONE	CO
ATTAINMENT	X			X	X
NON-ATTAINMENT		X	X		

4.2.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

Construction activities associated with the proposed action will induce short-term impacts on air quality due to painting, scraping, and welding. The proposed action will not have a substantial impact on air quality for the NASA Lewis Research Center as a whole.

Dismantling and installation activities will have the potential to produce short-term nuisance dust and fumes at worst.

4.2.2 No Action

If no action is taken, there will be no short-term impacts on air quality from construction. Refrigerant leaks would continue. This alternative is more severe than the proposed action.

4.2.3 Duplication of Icing Research Tunnel Facility at Alternate Site

If this option is chosen there will be a greater impact on air quality than the proposed action due to the construction activities associated with an entirely new building. After construction of the duplicate Icing Research Tunnel facility, air quality will be similar to the proposed action.

4.3 Groundwater and Surface Water Quality

Surface water hydrology in the vicinity of IRT is dominated by Abram Creek, a tributary of the Rocky River. Abram Creek begins in a low lying area south of Cleveland Hopkins Airport and flows approximately 6.4 kilometers (4 miles) to its confluence with the Rocky River. Abram Creek is classified as warm water habitat.

Ground water is not used at NASA LeRC and minimal ground water use occurs within a 6.4 kilometer (4 mile) radius from the facility⁵.

There exists the potential for direct discharges to be released from Building 11 to surface water. Floor drains in the facility are reported to be tied into the storm sewer system. This situation will be corrected in Fiscal Year 1997, at the latest. Storm water runoff currently discharges into Abram Creek via National Pollution Discharge Elimination System (NPDES)-permitted outfall 001. Discharge from Outfall 001 is consistently in compliance with its NPDES permit limitations. Storm water runoff from Building 11 which is not collected in the storm sewer system is considered a non-point source which may impact both surface water and groundwater quality.

The sanitary sewer discharge ties into the Northeast Ohio Regional Sewer District sewer, which is ultimately treated at a Publicly Owned Treatment Works (POTW), the Southerly Wastewater Treatment Plant.

4.3.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The impact of the proposed action on water quality is expected to be greatest, but not substantial, during construction. Erosion of local soils and occurrences of surface water runoff may result in short-term impacts to Abram Creek. However, standard sedimentation control measures will be implemented. The movement of heavy vehicles over unpaved soil is expected to be negligible.

4.3.2 No Action

If no action is taken, there will be no short-term impacts on water quality from construction.

4.3.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Duplication of this facility at an alternate site is expected to have a greater impact on surface water quality due to increased temporary construction activities. Water quality impacts from the operation of a new facility would be similar to the proposed action.

4.4 Waste Generation

Both solid and hazardous wastes are routinely generated by the operations occurring within IRT. The solid waste fraction is comprised primarily of materials such as paper, cardboard, and packing materials. These wastes are generally collected and transported off-site for ultimate disposal either in a landfill or incinerator. Solid waste transport and disposal are regulated by the OEPA in conjunction with the local County Health Department⁶. NASA Lewis Research Center utilizes third-party contractors for transport and disposal services. These contractors have OEPA approval for solid waste disposal services.

Solid wastes exhibiting hazardous characteristics and listed hazardous wastes are regulated by the OEPA as hazardous wastes. OEPA regulates management of hazardous wastes, including generation, storage, transport and disposal of these wastes. Building 11 operations generate small quantities of hazardous wastes, typically in the form of empty containers which formerly held hazardous substances and spent materials (i.e., solvents). These wastes are stored in satellite collection areas near Building 11. Wastes in the satellite storage areas are collected every 30 to 60 days and stored in Building 212. Once in Building 212, wastes are consolidated, repackaged, and manifested for shipment to an off-site disposal facility⁷. An occasional drum of solvent contaminated rags or clothes is generated. This waste is managed as a hazardous waste.

There are also special wastes that are not hazardous wastes, but which must be managed in accordance with regulations pursuant to the Toxic Substances Control Act (TSCA). The most common of these wastes are asbestos and polychlorinated biphenyls (PCBs). NASA LeRC asbestos removal requirements are listed in Section 02080 of the NASA Site Work document which references several federal publications focused on asbestos removal. This document includes subjects such as safety compliance, quality assurance, asbestos removal and disposal.

Lewis Research Center has a Pollution Prevention Plan, the goals of which have been met to date.

4.4.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

Solid and hazardous waste generation during demolition and construction will increase temporarily over the quantities currently generated at Building 11. However, there will be no substantial net increase in solid and hazardous waste generation at Lewis Research Center as a result of selecting this alternative.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

Wastes generated during the construction phase will be classified as construction debris or a solid waste. Construction debris will be tested for hazardous characteristics, as appropriate, prior to being sent off-site for disposal. Construction debris, including abated lead paint, classified as hazardous waste will be managed in accordance with NASA Lewis Research Center hazardous waste procedures.

To the maximum extent practicable, waste material generated during construction will be recycled or reused.

During modification of Building 11, asbestos containing materials will be abated. These wastes will be removed from the building and managed in compliance with 40 CFR Part 763 and NASA Lewis Research Center policies on asbestos removal and disposal, as well as Occupational Safety and Health Administration (OSHA) guidelines.

4.4.2 No Action

The no action alternative will result in no increase in the quantity of solid and hazardous wastes generated at Building 11. The quantity of solid waste generated will be less than the other two alternatives as there are no construction activities associated with this alternative. However, abatement of asbestos containing materials would still be necessary in the future. This alternative is less severe than the proposed action.

4.4.3 Duplication of Icing Research Tunnel Facility at Alternate Site

A new facility at an alternate site would generate approximately the same quantity of daily operational solid and hazardous waste as the proposed action. Additionally, if this alternative includes demolition of existing Building 11, there would be a substantial amount of solid, and possibly hazardous, waste generated from demolition activities as well as the essential abatement of asbestos containing materials within Building 11 in the future.

4.5 Noise and Vibration

The daily activities planned for the Icing Research Tunnel involve wind tunnel testing of aeronautical components. There will be no substantial community noise and vibration generated by these activities.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.5.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

Construction activities will generate short-term impacts on noise and vibration. Once the project is completed, noise and vibration will decrease to current levels.

4.5.2 No Action

This option results in no noise and vibration generation. This option has a slightly lower impact than the proposed action.

4.5.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Construction activities will generate short-term impacts on noise and vibration while building a new facility. Once the project is completed, noise and vibration will decrease to current levels. This option is similar to the proposed action.

4.6 Hazardous Substances

Hazardous substances are used in small quantities in the shop area at IRT. In the case of IRT, these materials are stored (except for small quantities) in intermediate storage locations elsewhere at LeRC. Bulk materials maintained at LERC are transported to the intermediate storage locations in quantities no greater than 4 gallons (15 liters) for a specific substance. Smaller quantities are withdrawn from the intermediate storage locations for use within the shop areas.

Material Safety Data Sheets are currently maintained in Building 11 for the hazardous substances in use at the laboratories. Personnel working with these hazardous substances participate in a Right-to-Know program, mandated by OSHA, on an annual basis.

The hazardous materials known to be used at IRT include Varsol, a solvent, and ethylene glycol, an antifreeze compound⁸.

4.6.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The quantities of hazardous substances stored at the Icing Research Tunnel will remain the same as current Building 11 storage practices. Overall, there will be no net increase in the quantities of hazardous materials stored at the LeRC as a result of selecting the proposed action.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.6.2 No Action

There will be no substantial change in the quantities of hazardous substances utilized at Building 11 if the no action alternative is selected.

4.6.3 Duplication of the Icing Research Tunnel at an Alternate Site

Duplication of the Icing Research Tunnel at an alternate site will have a greater impact than the proposed action due to building construction. The use of solvents, coatings, and flammable gases would likely increase during the construction of a new facility. Once building activities cease, the quantities of hazardous substances stored will be similar.

4.7 Ionizing and Non-ionizing Radiation.

Building 11 houses a research x-ray unit to radiograph (x-ray) ice formation on aeronautical components. No radiation from this device is measurable outside the tunnel.

Lasers are used in the tunnel to characterize particle physical properties. There is no operator exposure or public exposure to these devices.

4.7.1 Replacement of the Icing Research Tunnel Heat Exchanger

There are no new radiation sources which are anticipated to move to Building 11 upon completion of the proposed action.

Radiographic weld inspection will be performed on the new heat exchanger installation. The radiographer will meet all Nuclear Regulatory Commission requirements.

4.7.2 No Action

Similar to the proposed action, this option results in no additional radiation sources in Building 11 and in no short term radiographic inspections.

4.7.3 Duplication of Icing Research Tunnel at Alternate Site

Construction of a new facility would require moving most of the existing radiation sources to the new site. This option could result in a net increase in radiation sources over the proposed option due to the potential for considerable radiographic weld inspections.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.8 Endangered Species and Biotic Resources: Fish and Wildlife Resources

The Ohio Department of Natural Resources, Division of Natural Areas and Preserves, performed a biological inventory of Lewis Research Center in 1995⁸. No federal or state listed species were found at Lewis Research Center. The State potentially threatened species located at Lewis Research Center were found at a considerable distance from the Icing Research Tunnel.

4.8.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The proposed action should have no impact on endangered species and biotic resources. The vast majority of the work will be performed within the existing facility. Building 11 is located approximately 305 meters (1,000 feet) from the Rocky River valley, the closest area of undisturbed vegetation.

4.8.2 No Action

Similar to the proposed action, there should be negligible impacts, if any, on endangered species and biotic resources.

4.8.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Assuming duplication of the Icing Research Tunnel facility at an alternate site at the NASA LeRC, the location could be selected to minimize any potential impact on biotic resources. This option has a similar impact as the proposed action on endangered species and biotic resources unless a previously unused site would be selected.

4.9 Wetlands and Floodplains

Wetlands are areas of land where the water table is at, near or above the land surface long enough each year to result in the formation of characteristically wet (hydric) soil types, and support growth of water-dependent (hydrophytic) vegetation. Wetlands include, but are not limited to, marshes, swamps, bogs, and other low-lying areas. Wetlands at Lewis Research Center are confined to the floodplain of Abram Creek. There are no wetlands within the vicinity of Building 11.

A review of Flood Insurance Rate Maps for NASA LERC indicates that Building 11 is not in a flood hazard location. These maps are generated by the Federal Emergency Management Agency (FEMA) to display the zone designations for a community according to area of designated flood hazards.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.9.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The proposed action will have no impact on wetlands or floodplains. Building 11 is located approximately 305 meters (1,000 feet) from the Rocky River valley, the closest floodplain.

4.9.2 No Action

Similar to the proposed action, there should be negligible impacts, if any, on wetlands and floodplains.

4.9.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Assuming duplication of the Icing Research Tunnel facility at an alternate site at the NASA LeRC, the location could be selected to minimize any potential impact on wetlands and floodplains. This option has a similar impact as the proposed action on wetlands and floodplains unless the new site borders on or is located in a wetland or floodplain.

4.10 Historical and Archeological Sites

Building 11 is not listed as a national historic landmark. It is not known to be an archeological site. In 1987 it was designated as an International Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers (ASME). No new documentation is required of the ASME for Building 11 to keep its designation.

4.10.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

Following the replacement of the heat exchanger, the exterior of the impacted area will be restored to its original, or a very similar, appearance.

The replacement of the heat exchanger in Building 11 will not visually or actively impact the architecture at Lewis Research Center.

The Icing Research Tunnel heat exchanger may have historical value as an example of a unique engineering research facility in the future. As a consequence, the State Historic Preservation Office (SHPO) was consulted with regards to the proposed action. SHPO has placed no unusual conditions on the execution of this project.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.10.2 No Action

Similar to the proposed action, there should be no impacts, if any, on historical and archeological sites.

4.10.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Assuming duplication of the Icing Research Tunnel facility at an alternate site at LeRC, the location could be selected to minimize any potential impact on historical and archeological sites. The impact of this alternative would be less, because of the IRT's eligibility status.

4.11 Prime and Unique Farmlands

There are no farmlands within the boundary of the Lewis Research Center. The native soil at Lewis Research Center ranges from loam to silt loam, which are typical of northeast Ohio soils. Prime farmland soils in the vicinity of Lewis Research Center are found primarily along the floodplain of the Rocky River.

The Farmland Protection Policy Act was intended to protect unique and prime farmland. This area is zoned commercial/industrial. There is nothing unique or prime about the land in this area.

4.11.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The proposed action will have a negligible impact on prime and unique farmlands. Construction largely involves an existing structure.

4.11.2 No Action

Similar to the proposed action, there should be no impacts, if any, on prime and unique farmlands.

4.11.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Assuming duplication of the Icing Research Tunnel facility at an alternate site at LeRC, the location could be selected to minimize any potential impact on prime and unique farmlands. This option would have a similar impact than the proposed action on prime and unique farmlands.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.12 Land Quality, Vicinity Land Use, Visual and Recreational Resources

The Icing Research Tunnel is located in the central area of a campus-like development which is typical of LeRC architecture and landscaping. To the east and south of IRT, beyond the LeRC property boundary, lies the Cleveland Hopkins International Airport. Both the airport and Lewis are situated on a level plain, whose only relief is the Rocky River Valley and its tributaries. The Rocky River forms the northern property boundary of LeRC.

LeRC does not contain any property with exceptional recreational resources.

There are a few elevated vantage points within LeRC that provide an impressive view of the Rocky River Valley. Building 11 is located in excess of 305 meters (1,000 feet) from these overlooks.

The Rocky River Valley, adjacent to LeRC, is an urban park corridor with a recreational multi-use mandate. The river, a one hundred foot high vertical cliff, and a buffer zone of trees, separate LeRC from the tens of thousands of visitors that the park receives each year.

4.12.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The IRT is located near the center of LeRC and the project will be internal to an existing building. The proposed action will result in no significant impact on land quality, vicinity land use, or visual and recreation resources.

4.12.2 No Action

The no action alternative will result in no impact on land quality, vicinity land use, or visual and recreation resources.

4.12.3 Duplication of Icing Research Tunnel Facility at Alternate Site

Duplication of the Icing Research Tunnel at an alternate site will result in greater impacts on the land use parameters than the proposed action due to the expanded area where construction will occur. The degree of the impact will depend upon the location of the alternate site.

4.13 Economic, Population, and Employment Factors

Economic, population and/or employment factors that are "interrelated with natural or physical environmental factors" can have an impact on an EA. Economic, population, or permanent employment factors associated with Building 11 relate solely to the number of NASA LeRC employees working in the building on a daily basis.

4.13.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

If the proposed action is chosen, approximately 40 to 50 temporary workers will be hired to perform construction and renovation. At this time, new NASA employees will not be hired to work in the Icing Research Tunnel facility. Existing Icing Research Tunnel employees will be assigned to other duties during the construction phase. There will be increased economic activity during the construction phase of the project. Traffic volume will not increase significantly during the time of construction.

4.13.2 No Action

If no action is taken, there will be no change in economic, population, and employment factors for the Cleveland area. As a result, the negative economic impact from no construction is more severe than the proposed action.

4.13.3 Duplication of Icing Research Tunnel Facility at Alternate Site

In this case, the economic impacts should be greater than the proposed action. The magnitude of construction activities and costs associated with duplicating the Icing Research Tunnel facility would be much greater than those of the proposed action. This alternative would impact economic, temporary, and possibly permanent, employment factors.

Consequently, the impact on economy, population, and employment factors is greater than the proposed modification.

4.14 Health and Safety

Health and safety considers not only effects from use of hazardous substances within the Icing Research Tunnel, but also physical hazards present in the environment (i.e., trip hazards, exit facilities). Worker health and safety is regulated primarily by OSHA. Worker protection is also addressed by regulations such as those issued pursuant to the TSCA and the EPCRA Community Right-to-Know regulations.

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

4.14.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

One of the purposes of the proposed modification is to increase worker safety by reducing the risk of a significant leak of Refrigerant 134a into the tunnel. Consequently, the proposed action will result in a safer environment for IRT personnel.

Construction contractors will be required to prepare task-specific Health and Safety Plans to protect temporary workers at the site during construction activities. These plans will adequately address any risks posed by lead-based paint. Although there will be an increased concern for worker safety during construction, LeRC personnel's health and safety will not be adversely affected during the construction period. The health and safety of LERC personnel will ultimately improve as a result of the proposed action.

4.14.2 No Action

The no action alternative will allow the heat exchanger to continue to deteriorate, possibly resulting in a significant leak of Refrigerant 134a.

4.14.3 Duplication of Icing Research Tunnel Facility at Alternate Site

This alternative will provide the same benefits to LeRC personnel as the proposed action. Due to the increased construction time necessary to build the entire complex, there will be an increased impact on temporary worker health and safety.

4.15 Coastal Zone Consistency

Coastal zones include areas extending landward only to the extent necessary to include shorelands, the uses of which have a direct and significant impact on coastal waters. Building 11 is not located in a designated coastal zone or proposed coastal zone. LeRC is located approximately 9 km (5 miles) upstream from a proposed coastal zone along the shore of Lake Erie.

4.15.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The proposed action is not expected to have an impact on this environmental parameter.

4.15.2 No Action

This alternative will have a similar impact to the proposed action.

4.15.3 Duplication of the IRT Facility at an Alternate Site

This alternative will have a similar impact to the proposed action.

4.16 Environmental Justice

Federal agencies are required to make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects resulting from the agency's programs, policies, and activities on minority populations and low-income populations.

LeRC's Environmental Justice Plan⁹ failed to reveal any reasonable likelihood of substantial off-site impacts from normal operations.

4.16.1 Replacement of the Icing Research Tunnel (IRT) Heat Exchanger

The proposed action is not expected to have any disproportionately high and adverse impacts on low income or minority populations..

4.16.2 No Action

This alternative will have a similar impact to the proposed action.

4.16.3 Duplication of the IRT Facility at an Alternate Site

In accordance with regulatory requirements, if NASA were to construct another facility which could duplicate IRT operations, NASA would need to ensure that there would not be a disproportionately high and adverse human health or environmental effect on minority populations and low-income populations. Therefore, the impact would remain at the same minimal level.

ENVIRONMENTAL ASSESSMENT
 ICING RESEARCH TUNNEL
 BIONETICS CORPORATION
 CONTRACT NAS3-26516

5.0

LIST OF AGENCIES AND INDIVIDUALS CONSULTED

TABLE 5-1
AGENCIES AND INDIVIDUALS CONSULTED

ORGANIZATION	INDIVIDUAL(S)	INFORMATION
Office of Environmental Programs NASA Lewis Research Center 21000 Brookpark Rd., Cleveland, OH 44135	Beth Cooper John Cooper Rich Kalynchuk Peter Kennedy Ransook Evanina Daniel Papcke	Noise and Vibration Radiation Wetlands and Floodplains, Endangered Species Waste Generation, Hazardous Substances Wastewater Asbestos
Cleveland Bureau of Air Pollution Control, City of Cleveland (216) 441-7444	George Young	Air Quality
Ohio State Historic Preservation Office Historic Preservation Div. Columbus, OH (614) 297-2470	David Snyder	Information Regarding National Historic Landmarks and the National Registry
Facilities Engineering Division NASA Lewis Research Center 21000 Brookpark Rd., Cleveland, OH 44135	Joseph J. Pishkula	Lewis Historic Preservation Officer

ENVIRONMENTAL ASSESSMENT
ICING RESEARCH TUNNEL
BIONETICS CORPORATION
CONTRACT NAS3-26516

6.0 REFERENCES

1. 14 CFR Subpart 1216.3. Policy on Environmental Quality and Control and Procedures for Implementing the NEPA.
2. Statement of Work, Engineering Design Services for Final Design and Special Studies for Replacement of the Icing Research Tunnel, IRT Heat Exchanger, Building 11. July 19, 1995.
3. 42 USC 7407
4. Telephone discussion with Mr. George Young the Cleveland Bureau of Air Pollution Control, City of Cleveland, Ohio, March 21, 1996.
5. Phase I Remedial Investigation/Feasibility Study for NASA Lewis Research Center. Prepared by R&R International, October, 1995.
6. Ohio Administrative Code §3745-27. Solid Waste Disposal Regulations.
7. Discussion with Mr. Peter Kennedy, The Bionetics Corporation contract with the Office of Environmental Programs, NASA Lewis Research Center, February 29, 1996.
8. Biological Inventory of the NASA Lewis Research Center. Prepared by the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, March 1996.
9. Environmental Justice Implementation Plan for NASA Lewis Research Center. Prepared by Jones Technologies, Inc., April 1996.