ENVIRONMENTAL ASSESSMENT REPORT

FOR THE

RESTORED AND MODERNIZED 12-FOOT PRESSURE WIND TUNNEL FACILITY

NASA - Ames Research Center
Moffett Field, California

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Prepared by

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Abstract: The 12-Foot PWT Restoration Project will replace the defective tunnel pressure shell of this 40 year old facility and significantly modernize the facility for increased productivity. This Environmental Assessment has resulted in a finding of NO SIGNIFICANT IMPACT.

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SUMMARY

This Environmental Assessment was conducted to evaluate the potential impact to the environment of the current Project for the Restoration and Modernization of the existing 12 Foot Pressure Wind Tunnel (PWT), located at Ames Research Center, Moffett Field, California. Extensive use was made of the References listed in Appendix A, which included the Center's Environmental Resources Document and the Closure Plan for the 12 Ft Facility (which identified and located all hazardous materials within the existing facility and identified proposed removal action for these materials).

After review of information contained within the Reference documents and from discussion with the appropriate 12 Foot Restoration Project staff as to design guidelines, planned implementation of the design and long term operational considerations, an assessment was made of a variety of environmental factors which are described in Chapter 4 of this report. A finding of NO SIGNIFICANT IMPACT for all environmental factors has resulted from this Environmental Assessement. It is concluded that an Environmental Impact Statement is <u>not</u> required for the 12 Foot Pressure Wind Tunnel Restoration and Modernization Project.

CHAPTER 1 - INTRODUCTION

The purpose of this Environmental Assessment is to evaluate a variety of environmental factors with regard to the Restoration and Modernization of the existing 12 Foot Pressure Wind Tunnel Facility (Buildings N206 and N206A) at NASA-Ames Research Center, Moffett Field, California. The environmental factors encompass the physical, biological and social aspects of the environment within Ames and the surrounding communities. The assessment of the proposed new actions to restore and upgrade this facility and their relationship to these environmental factors is then used as part of the decision-making process to determine the need for an Environmental Impact Statement.

This Environmental Assessment follows the guidelines set forth in NASA Handbook NHB 8800.11, "Implementing the Provisions of the National Environmental Policy Act."

Purpose

This project provides for the repair and modernization of the 12 Foot Pressure Wind Tunnel (PWT) at Ames Research Center, Moffett Field, California (Fig 1, page 2-2). The Project will return the tunnel to its original operating capability of six atmospheres, and upgrade the facility to modern standards for increased reliability and productivity. The facility is required to support the Nation's rapidly expanding requirements for low speed, low turbulence level, high quality flow, and high Reynolds Number aeronautics testing. This Project will include the replacement of the pressure vessel shell and supports, a test section isolation system allowing model access without depressurization of the tunnel circuit, new model supports, modernized controls and automation, new model preparation areas, new tunnel internal airstream cooling, and increased main drive power.

This major repair and modernization project is the initial project of comprehensive and concepted Aeronautical Facilities Revitalization Plan that is being implemented to restore and modernize the NASA key facilities that are crucial to maintaining United States competitiveness in aeronautical research and development.

Need

The 12 Ft PWT is a significant subsonic pressure wind tunnel which has provided critical high Reynolds Number test capability to NASA, DoD, and the U.S. aircraft industry since 1946. The tunnel has an exceptionally low free stream turbulence level, high quality flow, wide range of flight regimes, and large test section capability for high fidelity models. Since 1965, essentially every military aircraft and civil transport has been tested in the 12 Ft PWT. The discovery of severe, unrepairable weld defects forced the derating of the tunnel from six to one atmospheres of pressure in September 1986 to preclude the possibility of a catastrophic failure. Without repair of the pressure shell to restore the six atmosphere pressure operation, the 12 Ft PWT cannot be used to provide critical high angle-of-attack, high lift, and laminar flow data for the development of the Nation's advanced military and commercial aircraft.

The 12 Ft PWT is a high-demand facility with tests typically scheduled 8 to 16 months in advance with two-shifts-per-day operation. During its past operation, the productivity was severely limited because the entire tunnel circuit had to be depressurized for model changes or adjustments. In addition, the inability to assemble, check out, and calibrate models outside the test section and the use of outdated and obsolete model support systems and controls severely hampered and limited efficient utilization of the facility. The modernization portion of this project will result in a significant increase in productivity with installation of a test section pressure isolation system, a modern measurement and automation system, and dedicated model preparation and calibration areas. This modernization is required to improve both productivity and capability to support a significant testing backlog. Without this tunnel, some testing may have to be performed in European test facilities with consequent potential for further loss of the U.S. aeronautical competitive position relative to foreign competition and potential erosion of National defense.

NASA-Ames Research Center

MODERNIZATION OF 12-FOOT PRESSURE WIND TUNNEL
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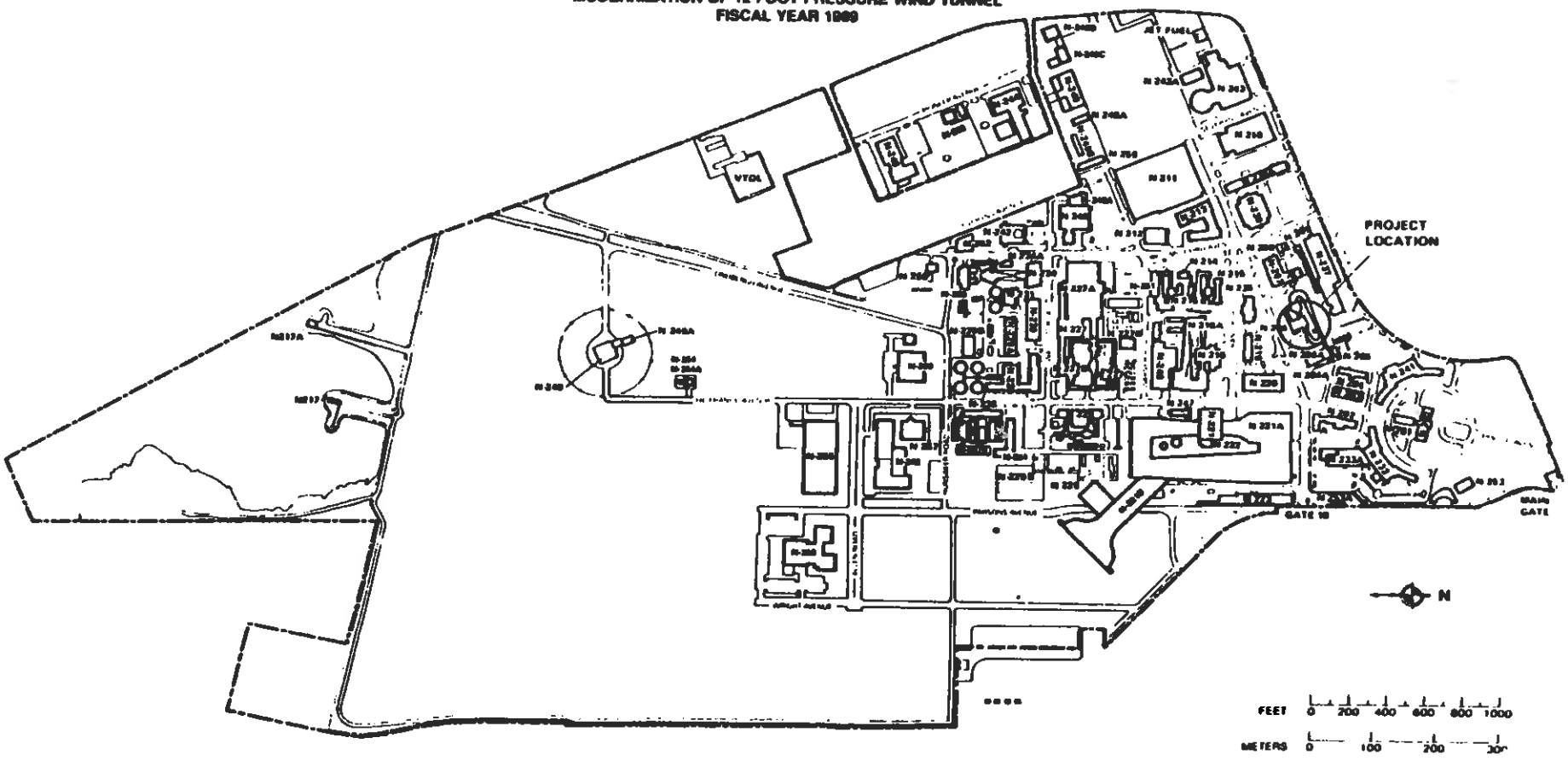

Figure 1. Location Plan

CHAPTER 3 - DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action provides for the restoration of the 12 Foot Pressure Wind Tunnel (PWT) at Ames Research Center. This restoration work will enable the tunnel to meet or exceed its current performance capability and increase its productivity. The existing 12 Foot PWT was designed in 1943 and began operation in 1946 as a research wind tunnel. Due to its low turbulence, wide operating envelope, multiple model supports and high quality of flow, the tunnel is in great demand for support of aerospace development and aerodynamic research programs. The original design of the 12 Foot PWT did not provide adequate operational productivity, but the current demand for the use of this facility has made productivity improvement mandatory.

The original wind tunnel was designed to operate at 6 atmospheres absolute. In recent years, weld flaws were detected in the tunnel shell and a recent partial inspection of the shell welds showed severe, unrepairable defects. As a result, the operating pressure of the tunnel was restricted to atmospheric operation which drastically limited its operating envelope. The shell defects are unrepairable and the pressure shell must be replaced.

The proposed modernization work, that is part of the Project, will more than double the number of wind tunnel tests to be performed per year, thereby allowing faster development cycles for new aerodynamic concepts. The modernization will provide pressure isolation of the test section and plenum for faster model changes and provide model preparation rooms so that fully assembled, checked out, and calibrated models can be inserted into the test section, thereby achieving a major reduction in the time required for installation and configuration changes of models. New model supports with greater range of motion and load capacity together with an automatic tunnel operation control system will allow more data points per hour to be taken at improved accuracy. The total drive power of the compressor will be increased by 25% to enhance high Reynolds number testing and to make up for the anticipated losses from the new internal cooler, not in the existing tunnel.

Consideration of Other Alternatives

In lieu of restoration and modernization of the existing 12 FT PWT, two possible alternatives were considered. The first was to not restore, not modernize or not replace the existing facility. The second was to replace the existing facility with an entirely new facility in an undeveloped area within the Ames Research Center.

The first alternative, which is essentially do nothing, would leave a facility which could only be run at atmospheric pressure, due to the shell weld defects, and drastically restrict the operational envelope to such an extent as to render the facility useless. A facility such as the 12 Ft PWT is urgently needed to continue to maintain U.S. aeronautical research and development supremacy. There are no long-term alternatives that can provide the full range of capabilities that can be provided by the 12 Ft PWT, especially very low turbulence and Mach Number at high Reynolds Number flow. Foreign tunnels cannot match the high Reynolds Number capability, plus security issues arise relative to many of the tests that will be required for sensitive DoD aircraft. An increased backlog of tests will continue by

delaying the restoration of this facility capability. Further, delay in restoration will impose many constraints on important aeronautical research and development that will contribute to further erosion of the U.S. aeronautical competitive position relative to foreign competition and National defense.

The second alternative, build an entirely new facility to replace the existing defective facility in the undeveloped land at the Center, would result in a project with a drastically increased budget, would take longer to get a facility with the 12 Ft PWT capabilities back on line and would potentially result in a larger environmental impact since it would develop land currently not in use. The proposed action of restoring and modifying the existing facility, where it currently is located at the Center, is a less costly alternative since intended use of the existing foundations and piles result in little, if any, needed excavation and foundation construction. Further, all the major utilities, electrical power, water, sewer, drains, etc., currently exist at the site and would not have to be provided. The construction of a new facility in the undeveloped area at the Center would require that all these utilities be brought out to the new site, resulting in a large increase in the required project budget. The increased magnitude of the effort to design and construct an entirely new facility would increase the schedule required to accomplish the project. This would delay further the time required to bring this urgently needed facility capability back on line to support aeronautical research and development.

Selected Alternative

Based on the urgent need to restore the 12 Ft PWT facility capability in the most reasonable time for a reasonable budget, the best alternative is the proposed action to restore and modernize the 12 Ft PWT in its current location at the Center.

In this chapter, the aspects of the Restored and Modernized 12 Foot Facility and the effect of these aspects on a variety of environmental factors is assessed. Each section discusses an environmental factor. Specific facility characteristics are then described that relate to the environmental factor. Finally, an assessment is made as to the level to which the specific environmental factor is affected by these characteristics. At the end of each section, a finding or recommendation is presented.

A. Air Resources

The Restored/Modernized 12 Ft PWT will have no effect on the Air Resources factor as presented in the Center's Environmental Resources Document, Chapter 3 (See Appendix A, Reference 1). There are no significant effects on air resources anticipated from the implementation of the restoration and modernization of the facility. The demolition of the existing facility structures will include the removal of known hazardous materials (Reference 2, Appendix A). The removal of these materials will be done by qualified sources using accepted procedures. No significant release into the atmosphere is likely. Further, there are no effects on air resources anticipated in the eventual operation of this upgraded facility. The incorporation of the new test section isolation system is anticipated to result in less tunnel volume blowdowns per year of the tunnel circuit air into the atmosphere. There are no specific air products generated from or used in this facility which would impact current air quality. Ames, including the 12 Ft PWT, is not considered a major producer of air pollution in the Bay Area (Reference 5, Appendix A). The restored facility will provide no change from the current facility in the area of air resources.

Finding: NO SIGNIFICANT IMPACT

B. Water Resources

The existing and the restored 12 Ft facility fall within the findings of the Center's Environmental Resources Document (See Appendix A, Reference 1). The Center Document concluded that there was no significant impact on water resources for runoff, sanitary sewer discharges or sanitary flows from Ames operations. The restored 12 Foot will not contribute any additional concerns or changes to these findings.

The change in tunnel circuit cooling from the existing exterior deluge cooling to an internal radiator heat exhanger system, will have a possible minor effect of reduced water consumption due to the reduction in evaporative loss from the current deluge system.

The new cooling towers, that will replace the existing towers, will provide more efficient heat exchange. Water treatment to inhibit bacterial growth will conform to practices used in other cooling tower

systems at the Center and are covered by the Center's Environmental Resource Document Findings. Necessary water disposal will discharge into the Center Sanitary Sewer system which conforms to approved practices currently in use at the Center (Reference 6, Chapter 18, Appendix A). These practices have resulted in acceptable discharge of water which conforms to the City of Sunnyvale water quality standards.

Finding: NO SIGNIFICANT IMPACT

C. Land Resources

No changes in Land Use will result from the Restored 12 Foot PWT. The restored facility will be located in exactly the same location as the existing facility. No new land at the Center will be developed to accomplish this project. As a result, the findings and conclusions set forth in the Center Environmental Resources Document (See Appendix A, Reference 1) are not affected by the intended actions.

Finding: NO SIGNFICANT IMPACT

D. Biotic Resources

No changes in biotic resources are expected from the Restored 12 Ft PWT. The restored facility will be located in exactly the same location as the existing facility. The existing foundation and tunnel supports pile caps are to be reused, thereby further reducing the possible effect on biotic resources due to the significant reduction in excavation and land/soil work required for the implementation of the restored facility. In the area of the 12 Ft facility, no natural site vegetation exists thus eliminating the possible disruption or removal of natural vegetation during demolition and construction. Landscaping consistent with the current facility and similar to existing ornamental landscaping in use at the Center is to be replaced at the conclusion of the construction phase. The temporary loss of the existing landscaping during the demolition and construction periods is expected to have extremely minor or no impact on biotic resources.

Due to the nature of the Project, the findings and conclusions on Biotic Resources set forth in the Center Environmental Resources Document are not affected. The action will have no significant impact on biotic resources.

Finding: NO SIGNIFICANT IMPACT

E. Endangered Species

The restored 12 Ft PWT will be located in the same location as the existing facility. Its location is in the main part of the institution. There is no change in the physical or functional use of the site. The restored facility falls under the results and conclusions set forth in the Center's Environmental Resources Document (See Appendix A, Reference 1). There is no discernible impact on federal or state protected species as a result of this Project.

Finding: NO SIGNIFICANT IMPACT

F. Wetlands and Floodplains

The restored 12 Ft PWT will be located in the same location as the existing facility. This area is well beyond the floodplains defined in the Center's Environmental Resources Document (Appendix A, Reference 1) and is not located in the wetlands area of the Ames site. As a result, there is no impact on this environmental factor.

Finding: NO SIGNIFICANT IMPACT

G. Solid and Liquid Waste Generation, Treatment, Storage, and Disposal

There will be no change with regard to this environmental factor from the existing 12 Ft facility to the restored facility. The facility falls within the conclusions and findings set forth in the Center's Environmental Resources Document (ERD) (Reference 1, Appendix A). The 12 Ft facility will have no impact on non-hazardous solid and liquid wastes at the Center. Storage and disposal will conform to standard practices at the Center as explained in the Center ERD.

With regard to hazardous wastes, as explained in the Center's ERD, these are controlled and managed under the direction of the Ames Environmental Health and Safety Office (Reference 6, Chapter 24, Appendix A). The 12 Ft facility does not generate hazardous wastes by its very operation, but it does use various types of hazardous materials in conducting its operations (eg, solvents, acids, other corrosives, alcohols, paints, oils, etc.). These types of materials will be identified by the operating organization as hazardous wastes for cognizance of the Health and Safety Office. The storage and disposal of these materials will be controlled for proper handling and disposal.

There are various hazardous materials that have been identified in the existing facility and that will be removed during the demolition phase of the Project. The Facility Closure Plan (Reference 2, Appendix A) for Ames Buildings N206 and N206A, which documents a site survey conducted by the Project, identifies and locates these materials for removal. The Closure Plan also specifies the proposed removal action for these materials. This Closure Plan is to be followed by the Project. In all cases, the identified materials will be removed and handled in the appropriate manner. They will be disposed of in a manner consistent with State regulations for the type of material.

In light of the similarity of the existing facility with the restored facility in terms of this environmental factor, and as a result of the implementation of the Closure Plan by the Project during the demolition phase, no impact on the environment is anticipated from this Project.

Finding: NO SIGNIFICANT IMPACT

H. Toxic Substances

The existing as well as the future restored 12 Ft facility fits the findings and conclusions set forth in the Center's Environmental Resources Document (ERD) (Reference 1, Appendix A). The Project conducted a site survey and the findings are presented in the facility Closure Plan (Reference 2, Appendix A). The located and identified existing toxic substances of asbestos, zinc/oil/grease contaminated soil and PCB at the facility are to be removed from the site by appropriate sources and handled and disposed of properly as toxic substances. The restored facility will be free of toxic substances currently in the existing facility (eg, asbestos, zinc (coating on present pressure shell) and PCB). The facility itself will not generate nor will it release toxic substances into the environment as a result of its operation. It is concluded that the future facility conforms to the findings of the Center's ERD and that there is No Significant Impact of toxic substances on the environment.

Finding: NO SIGNIFICANT IMPACT

I. Pesticides

For the factor of Pesticides, the 12 Ft facility fits the findings of the Center's Environmental Resources Document (ERD) (Reference 1, Appendix A). The 12 Ft facility has no specific use of pesticides as a result of its operation. The landscaping around the restored facility will be reinstated at the conclusion of the Project. Thus no additional landscaping pesticide requirements will exist. Based on the findings of the Center's ERD, the restored facility will have no significant impact on the environment.

Finding: NO SIGNIFICANT IMPACT

J. Radioactive Materials and Non-Ionizing Radiation

The 12 Ft facility possesses no radiation sources at the facility site, whether ionizing or non-ionizing. The use of radiation materials is not part of the normal operations of this facility. Any possible future, but as yet unknown, requirement to use radioactive materials at the facility would require this use to be in accordance with the Center's Radiation Safety Committee, as set forth in the Center's Environmental Resources Document. Based on these facts, no adverse environmental effects are expected from radiation sources as a result of this Project.

Finding: NO SIGNIFICANT IMPACT

K. Noise

The 12 Ft PWT was identified in the Center's Environmental Resources Document (ERD) (Reference 1, Appendix A) as a potential noise source which was of a sufficient level to possibly affect the nearby outside community as well as the inside Ames community. The ERD noted that while the 12 Ft had noise levels that would indicate that it had a high potential for generating complaints, very few complaints had been received as a result of the operation of this tunnel. Shortly after the ERD was released, the pressurization piping at the 12 Ft was insulated with acoustic material in order to reduce the noise emanating from this facility. A site acoustic survey was conducted after installation of this insulation. The results of this survey were documented in a report, "Acoustical Analysis Around the 12 Foot Pressure Wind Tunnel" (Reference 3, Appendix A). The survey indicated a reduction of 11dBA in the noise level generated during pressurization.

The restored 12 Ft PWT is to be located on exactly the same site within the Center as the existing 12 Ft tunnel. The design of the restored facility is considering the potential for noise and design considerations are being incorporated to reduce the noise emanating from the facility. The restored facility will be as "quiet" or potentially "quieter" than the existing facility. The design of the restored facility will meet or exceed the OSHA requirements for noise abatement.

In light of the acceptability of the existing facility and the anticipation that the restored facility will be the same or better from a noise standpoint, no change in any environmental impact is expected from this Project. Any noise impact from the restored 12 Ft PWT, within or outside the Ames community, appears to be minor.

Finding: NO SIGNIFICANT IMPACT

L. Energy

As stated in Chapter 3, the Project calls for approximately a 25% increase in the tunnel compressor motor horsepower. This initially indicates an increase in electrical energy usage in the restored/modernized tunnel versus the existing tunnel. However, as discussed also in Chapter 3, the modernization portion of the project will include a test section isolation system which will preclude the necessity of nearly as many pressurization and depressurization cycles of the entire tunnel circuit for model changes and model reconfigurations as was required for the existing facility. This will lead to a substantial savings in energy usage for the facility pumping plant.

In addition to the isolation system, the modernization part of the Project will also include automation and a complete new controls system for tunnel operation. This will lead to more efficient operation of the tunnel, more efficient use of tunnel time and a reduction in energy usage for a given test program.

The actual net increase or reduction in energy usage as a result of all the new tunnel systems is not known at this time. However, the overall

effect of the restored 12 Ft PWT with regard to total energy usage at the Center is anticipated to be minor.

The restored 12 Ft PWT will not affect the findings and conclusions stated in the Center's Environmental Resources Document (Reference 1, Appendix A).

Finding: NO SIGNIFICANT IMPACT

M. Archaeological, Historical and Cultural Factors

The findings and conclusions stated in the Center's Environmental Resources Document (Reference 1, Appendix A) apply for the Restored 12 Ft PWT facility. The location of the existing 12 Ft facility does not impact the archaeological, historical and cultural environmental factors. The restored facility will be located in exactly the same location as the existing facility. The archaeological and historical significant areas at the Center are located in areas not in the heart of the institutional community. No significance has been identified with the area around or under the 12 Ft facility. Due to the intended reuse of the existing tunnel foundations and piles caps for the restored facility, extensive excavation will not be required for the restored facility. The uncovering and disturbing of any unknown significance at the 12 Ft site is extremely unlikely. There is no anticipated impact on these environmental factors as a result of this Project.

Finding: NO SIGNIFICANT IMPACT

N. Population, Employment and Economic Factors

As has been stated previously, the restored 12 Ft PWT will be an upgrade of the existing facility. All population, employment and economic considerations will not be affected. The findings and conclusions set forth in the Center's Environmental Resources Document (ERD) (Reference 1, Appendix A) continue to apply. There will be no change or impact as a result of this Project.

Finding: NO SIGNIFICANT IMPACT

CHAPTER 5 - INDIVIDUALS AND AGENCIES CONSULTED

In preparation of this environment assessment report, a great deal of information was obtained from the References listed in Appendix A. Based on the quantity and extent of the information available from these references, consultation with outside agencies was not considered necessary. The author of this report has a great deal of knowledge of the particulars of the proposed action and details of the specific 12 Ft Project. However, in areas where more specific information was deemed necessary, regarding the proposed action and some of the technical details of the design and operational aspects of the Restored and Modernized 12 Ft PWT facility, this knowledge was obtained by discussions with key people within the 12 Ft Project. In addition, key people in the Ames Health and Safety Office were consulted for the areas of noise and other environmental issues.

The following list identifies those individuals that were consulted (Codes indicate Organizations at Ames):

12 Ft Project Personnel

- Nancy F. Bingham - 12 Ft. Restoration Project Manager (Code EEL)
- Harry Gobler - 12 Ft. Restoration Project Deputy Manager (Code EEL)
- Michael Harper - 12 Ft Project Aero/Ops Group Leader (Code EEL)
- Michael Ospring - 12 Ft Project Engineering Manager (Code EEL)
- David Yee - 12 Ft Project Work Package M4 Manager, Auxiliary Cooling Radiators, Piping and Cooling Tower (Code EEF)
- Phil Luna - 12 Ft Project Work Package M5 Manager, Auxiliary Make-up Air System (Code EEE)
- Andy Gonzales - 12 Ft Project Work Package D1 Manager, Demolition (Code EEF)
- Ray Schuler - 12 Ft Project Work Package D1 Support, Demolition and Hazardous Material Removal (Code EEF)

Environmental Consultants

- Sandra Olliges - Office of Safety, Health and Medical Services, Environmental Scientist, Consulted for Environmental Input Concerns (Code DQH)
- Steve Brisbin - Office of Safety, Health and Medical Services, Industrial Hygienist, Consulted for Noise Concerns (Code DQH)

APPENDIX A

REFERENCES

1. ENVIRONMENTAL RESOURCE DOCUMENT for NASA-Ames Research, August 1981, Prepared by Camp Dresser & McKee, Inc.

2. CLOSURE PLAN for NASA-Ames Buildings N206 and N206A (12 Ft Pressure Wind Tunnel Facility), October 4, 1988, Prepared by Safety Specialists, Inc.

3. ACOUSTICAL ANALYSIS AROUND THE 12 FOOT PRESSURE WIND TUNNEL, November 22, 1982, Prepared by Earth Metrics, Inc.

4. NASA Handbook NHB 8800.11, IMPLEMENTING THE PROVISIONS OF THE NATIONAL ENVIRONMENTAL POLICY ACT.

5. ENVIRONMENTAL COMPLIANCE AUDIT, NASA-ARC, MOFFETT FIELD, September 1985, Safety Specialists, Inc.

6. Ames Handbook AHB 1700.1, NASA-AMES HEALTH AND SAFETY MANUAL.