Summary Report of Evaluation Panel
Convened to Assess the Health of Keiko
January 28, 1998

Panel Members:

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Dr. Jeffery Stott, University of California at Davis
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Other Contributors:

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This independent evaluation was done with the full backing and support of the Free Willy Keiko Foundation. Foundation liaisons were Mr. Joseph Gaskins, and Mr. Robert Ratliffe.

The Panel wishes to thank the staff at the Free Willy Keiko Foundation and the Oregon Coast Aquarium for their cooperation with this evaluation. The Panel was welcomed with open arms. We wish to thank Dr. Lanny Cornell for his cooperation.

Keiko, a male killer whale, Orcinus orca, was transported to the United States and housed at a newly built facility within the Oregon Coast Aquarium (OCA) in January 1 1996. Since that time the animal has been under the care of the OCA and the Free Willy Keiko Foundation (FWKF). Due to the history and popularity of the whale, his health and well being have been subjected to a high degree of public and media scrutiny. In August 1997, after a change in personnel handling the day-to day care of Keiko and after conflicting reports of his health status, APHIS was asked to facilitate the formation of an independent panel of marine mammal experts who would assess the current health status of Keiko. This panel was formed in October 1997 with the cooperation of the FWKF. The panel included veterinary experts, including a virologist and immunologist, as well as two veterinary clinicians, a behaviorist, and an APHIS representative as a facilitator. The animal was evaluated by the panel members during December 1997 and January 1998.

Keiko is an approximately 18 year old killer whale whose living condition and health concerns came to light when he was chosen to star in the movie, Free Willy. At that time, Keiko resided in a facility in Mexico (Reino Aventura), in which the pool was small and water quality was poor including inappropriate temperature. Keiko has had no conspecific companionship since he resided in Canada, but he did have dolphin companionship at Reino Aventura. After several years of negotiations and attempts to move Keiko to a more appropriate facility, arrangements were made to move him to the OCA facility, which was leased by the FWKF. Keiko's health has been

a constant concern with the most visible problem being a viral (assumed) skin condition which was visible even during the filming of the movie. The skin condition did appear to improve after the transfer to the Oregon facility with its improved water quality.

APHIS has, when deemed necessary, formed and/or overseen ad hoc panels that dealt with specific allegations and concerns raised about regulated animals. This process is not automatic, but is used when the nature and implications of the situation warrants such measures. Due to the media focus and history of this animal. APHIS agreed to help form and facilitate a Blue Ribbon panel to assess the current health status of Keiko. The scope and sole mandate of this panel is to examine Keiko's current health, not to comment on or infer support or opposition to his releasability in The future. The panel was formed to look at the current veterinary and behavioral issues, the current facility status with respect to the Animal Welfare Act (AWA) and to provide recommendations as appropriate

Methodology:

Keiko was examined by a marine mammal veterinarian and samples were obtained for generally accepted routine medical testing, including a complete blood count and chemistry profile. Additional blood and biopsy samples were obtained to run room specialized testing to evaluate the immunological status and viral exposure/response of the animal. Medical tests were carried out at the panel member's own facilities utilizing currently accepted methodologies for the respective analysis. Medical and training records were reviewed as needed by panel members, and FWKF and OCA personnel were interviewed when appropriate. Keiko's behavior was observed by several panel members on two separate occasions during the veterinary examination and sample collection in December 1997, and again during the course of 10 observation sessions in January 1998. Conference calls and one-on-one communications were utilized by the panel to discuss and evaluate the findings. During the tenure of the panel, APHIS inspectors conducted an unannounced compliance inspection.

Results and Evaluation:

To gain the best picture of the health status of any animal, one should monitor appropriate parameters over time, using repeated testing. This panel was formed to evaluate a 'snapshot' of Keiko's medical and behavioral condition. To provide the best evaluation under these circumstances, the panel relied on the medical and behavioral records of the animal, as well as examinations and testing done in November 1997 through January 1998.

Based on clinical pathology results, there is a high probability that Keiko developed a hepatopathy beginning in June 1997. The primary manifestation of this event was a significantly elevated liver enzyme which did not return to normal until December 1997. Keiko was treated with an antifungal drug for a suspected lung infection during the latter period of enzyme elevation. This complicated interpretation of the enzyme values since the antifungal agent used is known to occasionally produce a transient elevation in liver enzymes, which may persist over a long period of time. The return of the liver enzymes to normal levels indicated that, in the very least, the condition is in remission.

During his residency in Oregon, Keiko experienced a tooth fracture which later required extraction. There have also been multiple episodes of hematuria. Recent urinalyses demonstrate that hematuria is no longer present. Dr. Lanny Cornell, attending veterinarian for the FWKF, indicated that Keiko has a penile lesion which was the likely source of blood in the urine. The lesion has healed. Observers have reported the occurrence of behaviors described as 'cramping' and 'twitching.' The Panel's veterinary clinicians have not seen these behaviors, nor is any video available. As a result their cause and significance cannot be determined. The behaviors have been noted since Keiko's arrival in Oregon, and to date no disease condition has been associated with them.

In late December 1997, a small skin lesion on the leading edge of the right pectoral flipper was observed. It was approximately 1' in diameter and visually appeared to be a papilloma. The lesion was biopsied, and although cytopathology was evident on the first but not the second and third growth passages, histology and initial cell culture tend to support the growth being the result of a papilloma (wart) virus. This condition is known to occur in wild and captive whales and is not considered a health challenge to Keiko. Other skin lesions which have been observed on Keiko have been examined and biopsied when appropriate (fresh lesions). Although such lesions resembled possible viral skin lesions, no specific viral etiology has been identified.

Blood (serum and buffy coats) samples were subjected to rigorous viral isolation and/or viral antigen testing for 49 antigens, including 33 serotypes of caliciviruses (oceanic and nonoceanic), marine species virus isolates of herpes virus, rotavirus-like virus, entorvirus-like virus, retrovirus-like virus, and three adenoviruses, as well as other miscellaneous viruses, including morbillivrius, parvovirus, and human hepatitis virus, canine adanovirus, and LDH virus. Antibody testing for 48 to the 49 viruses is complete at this time. Antibody tests were negative, and there were no viruses isolated.

Samples collected to evaluate the immunological status of Keiko revealed that he has a low circulating B-lymphocyte count and a slightly elevated total immunogloubulin level. Immunealactrophoresis of the serum proteins indicated that there may be a missing isotype of IgG. However, the significance of this finding is unknown. T-lymphocyte function appears to be adequate in this animal.

Behavioral observations of Keiko indicate a variation in his behavior patterns. In December 1997, he appeared 'frustrated' and not content. In January 1998, Keiko appeared calm, if bored. Both observers felt Keiko might be feeling the effects of not having any control over his environment. However, no stereotypic or destructive (typical neurotic behaviors such as head butting or staring into the walls) swimming or other behaviors were observed.

Keiko related well to his trainers, but it was felt that the response thresholds for the training sessions were low, and Keiko's response to stimuli, though not normal, was slow. The primary reinforcement tool preferred by Keiko was tactile stimulation after a session. He does not appear to be food driven in his interactions. Keiko was provided enrichment devices and interacted with them randomly, especially enjoying the high-powered water jets used for environmental enrich-

ment.

Overall, Keiko appeared to have no behavioral problems that adversely affected his health. Several panel members expressed concern that Keiko, may not have a great deal of stamina and that even small body movements created visible movement of skin. This apparent flaccidity of Keiko's body could indicate insufficient muscle mass, lack of muscle tone, or recent changes in weight. Keiko continues to gain weight and grown since his move to Oregon.

APHIS inspections, conducted by a 2-person team, showed the facility in compliance with the AWA regulations and standards in July 1997 and December 1997.

Summary and Recommendations

There is no current indication that Keiko is ill. He showed no clinical pathological evidence of chronic deep-seated infection during his residence in Oregon. Immunological test results are apparently within known normal parameters, and there was no evidence of recent viral challenges to 48 different viruses. Keiko appeared to be exhibiting no abnormal behavior patterns. At the time of the study, Keiko was recovering from an illness (probable hepatopathy) of several months' duration. The only known chronic condition in evidence is probable papillomatosis. This snapshot analysis must be viewed as that a look at one point in time. Questions and concerns about Keiko's long-term health status and options for his future need to be studied over a much longer period of time. Given Keiko's past health history and ongoing concerns and scrutiny of his health, the panel makes the following recommendations:

1. Continue monitoring and follow-up testing to further establish a baseline for Keiko's medical results and to provide reliable scientific documentation of his overall health picture.

2. Given Keiko's past health history and potential future plans, a written line of authority must be established, which assures that the husbandry and medical programs are integrated in a way which places a single person in ultimate authority. This will required commitment, cooperation, and communication between the husbandry staff, water quality engineers and operators, and veterinary care personnel.

3. Ancillary to '2' above, complete and useful medical, training, and feeding records are necessary for any future evaluation of Keiko's health. These records should be well organized and readable and provide an accurate picture of all tests, treatments and responses.

4. Keiko appears to have flaccidity in his body, evidenced by highly movable skin. This could bean insufficient muscle mass or lack of muscle tone. Keiko should continue a program to improve his body tone and endurance. Such a program should include, at least, a program of regular, increasing exercise, and monitoring of weight and appetite

6. Although Keiko's dependence on human interaction may facilitate handling by the trainers, killer whales are social creatures and should be afforded interactions with same or other compatible marine species. Section 3.109 of the AWA regulations and standards requires such access. A

companion animal is recommended and should be a compatible cetacean or, if necessary, pinniped species.

6. Any decision on the rehabilitation of Keiko should be made in concert with an ongoing, long-term health study and evaluation. An expert panel assembled by the responsible parties is recommended to oversee this task.