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River Corridor
Closure Contract

Bat Surveys of Retired Facilities Scheduled for Demolition by Washington Closure Hanford

June 2011

For Public Release

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

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1.0 INTRODUCTION

This project was conducted to evaluate buildings and facilities remaining in the Washington Closure Hanford (WCH) deactivation, decontamination, decommissioning, and demolition schedule for bat roost sites. The project began in spring of 2009 and was concluded in spring of 2011. A total of 196 buildings and facilities were evaluated for the presence of bat roosting sites. The schedule for the project was prioritized to accommodate the demolition schedule. As the surveys were completed, the results were provided to the project managers to facilitate planning and project completion. The surveys took place in the 300 Area, 400 Area, 100-H, 100-D, 100-N, and 100-B/C Area. This report is the culmination of all the bat surveys and summarizes the findings by area and includes recommended mitigation actions where bat roosts were found.

Before impacting any biological resource during a remediation or demolition project, it is necessary to understand the impact that the planned actions will have on these resources. The plant and animal species present must be identified to determine if any are listed on state or federal protection lists. If so, alternatives must be developed to mitigate the impacts. This process is required as part of the implementation of the *National Environmental Policy Act of 1969* (NEPA) while conducting remediation projects under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The *Hanford Site Biological Resources Management Plan* (DOE/RL 96-32) provides guidance for determining which biological resources require mitigation on the Hanford Site. The document also provides guidance on the various levels of mitigation in order to protect species of concern and protect loss of critical habitat.

The Washington State Department of Fish and Wildlife (WDFW) has two different listings for protecting plant and animal species: the Species of Concern list and the Priority Habitats and Species (PHS) program. Species of Concern are also considered Priority Species under the PHS program. Many of the bat species known to occur on the Hanford Site are included on the Washington State Priority Species list (e.g., pallid bat [*Antrozous pallidus*] and Yuma myotis bat [*Myotis yumanensis*]).

The Species of Concern (http://wdfw.wa.gov/wlm/diversty/soc/concern.htm) list includes all state endangered, threatened, sensitive, and candidate species; as well as facilitates management and development of species recovery plans.

The following text is a description of the PHS program (http://wdfw.wa.gov/hab/phslist.htm):

> "The PHS List is a catalog of habitats and species considered to be priorities for conservation and management. *Priority species* require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. *Priority species* include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable."

The evaluation process began by developing a list of remaining facilities in each of the operational areas of the Hanford Site. Of the 196 facilities listed, 59 were mobile offices (with a prefix MO-XXX) that were located throughout the operational areas. Included in this list were

the 183-D Water Treatment Facility and the 183-B Clearwells that had not yet been added to the contract but were evaluated in anticipation of being included because of their high potential to contain bat roosts.

2.0 SURVEY METHODS

A graded approach was used to conduct the bat surveys during this investigation. First, a walkdown of the exterior of the facilities was conducted to inspect for likely roosting habitats, bat access to the buildings, and any presence of fecal pellets that would indicate bat use. Then, remote monitoring was conducted using an AnaBat™ SD2 acoustic bat detector set out for several nights to record bat calls in the area. When the presence of bats was established with the AnaBat detector, further investigations included internal and external building walkdowns of the facilities during the day to look for accumulations of bat guano that might indicate the presence of a roost site. If significant bat activity and/or accumulations of guano were found, or the building appeared to provide a typical roosting habitat, a night visit was scheduled. Manual and automated acoustic monitoring was conducted using a Pettersson D240x ultrasound detector to capture high quality bat calls that would later be analyzed to help determine the species of bats present. In addition, mist netting was conducted to capture bats to take morphological measurements that would aid in identification of the species. If a roost site was suspected, infrared video photography was used to count individuals flying in or out.

2.1 BAT INVESTIGATION PERFORMED IN THE 300 AREA

The remaining buildings to be demolished by WCH in the 300 Area were evaluated for the presence of bat roosts from May to August 2009 (Table 1). Initial walkdowns were conducted to identify buildings that provided access to bats and potential roosting habitats. Buildings that are maintained for personnel occupation are typically sealed and do not provide access for bats. Therefore, many buildings do not provide an adequate habitat. Mobile offices (Table 2) are included in this group and none of the 59 (from all locations) on the list provided roosting habitats for bats.

Table 1. Buildings in the 300 Area. (2 Pages)

305-P	315-C	325-B	331-BA	350-B	3503-B	3718-P
305-A	315-D	325-C	332	350-C	3506-A	3723
307	318	325-D	335	350-D	3506-B	3730
308	318-B	325-E	336	351	3506-C	3760
308-A	318-C	325-BA	337	351-A	3507	3763
309	318-BA	326	337-B	351-B	3614-A	3766
310	320	326-BA	337-BA	352-F	3621-BC	3790
310-S	320-BA	327	338	352-E	3621-D	3802-A
310-T1	321	327-BA	339-A	366-A	3701-U	3906
310-T2	323-BA	328	340	382	3703-A	3906-A
310-T3	324	328-A	340-A	382-B	3704	3906-B
310-T7A	324-A	328-BA	340-B	382-C	3707-E	3906-C
310-T7B	324-B	329	342	382-D	3707-F	

Table 1. Buildings in the 300 Area. (2 Pages)

310-V	324-D	331	342-A	382-BA	3709-A	
312	324-BA	331-C	342-B	3220	3709-B	
315	325	331-D	342-C	3229	3714	
315-A	325-A	331-G	350	3231	3717-C	
315-B	324-B	331-H	350-A	3232	3718-M	

Table 2. Mobile Offices.

MO-013	MO-226	MO-271	MO-403	MO-443	MO-745	MO-929
MO-048	MO-229	MO-274	MO-415	MO-474	MO-765	MO-955
MO-054	MO-236	MO-275	MO-417	MO-495	MO-766	MO-969
MO-059	MO-237	MO-293	MO-422	MO-500	MO-767	MO-980
MO-060	MO-258	MO-323	MO-423	MO-506	MO-848	MO-999
MO-100	MO-262	MO-374	MO-425	MO-507	MO-889	
MO-101	MO-263	MO-382	MO-426	MO-718	MO-907	
MO-102	MO-265	MO-401	MO-427	MO-740	MO-917	
MO-214	MO-270	MO-402	MO-442	MO-744	MO-928	

Buildings in the 300 Area that were identified for further evaluation were located near the river and had been abandoned for several years. An AnaBat acoustic detector, which automatically records bat echolocation calls, was deployed on May 19, 2009, at the southwest corner of the 337 Building. The data was downloaded from the detector on May 26, 2009, after 7 nights of recording, and 68 calls were recorded during that time, or approximately 10 calls per night. The calls appeared to be from Yuma myotis and silver-haired bats (*Lasionycteris noctivagans*).

The detector was then re-deployed at the northwest corner of the 337 Building, also on May 26, 2009. The data was downloaded on June 1, 2009, after 6 nights of monitoring. The data showed that 120 calls had been recorded; an average of 20 calls per night. The majority of the calls (105) appeared to be silver-haired bats, while the remainder appeared to be Yuma myotis (12) and western small-footed myotis (*Myotis ciliolabrum*) (3).

The detector was then re-deployed at the east side of the 315 Building on June 1, 2009. The data from the detector was downloaded on June 4, 2009, after 3 nights of monitoring. A total of 252 calls were recorded over the 3 nights, for an average of 84 calls per night. Of these, 238 appeared to be silver-haired bats, 13 Yuma myotis, and 1 western small-footed myotis.

Because of the number of calls recorded in the area, a night-visit was conducted at the 315 Building on August 12, 2009. Two mist nets (one 9-m and one 12-m net) were deployed near the building. An infrared video camera was set up to record activity near the open, second-story door on the east side of the building, and two hand-held Pettersson acoustic detectors were used to listen for bat echolocation calls. After leaving the nets open for 2.5 hours, no bats were captured. No bats were recorded on the video camera, and only one bat call was recorded. Acoustic analysis of this call showed the bat to be a Yuma myotis.

The bat activity recorded near the 337 Building was relatively low. The level of bat activity near the 315 Building was higher, but still moderate when compared to activity levels near known roost locations. The majority of the calls recorded in both locations were silver-haired bats,

which are migratory, solitary bats that do not form maternity colonies. It is apparent that the silver-haired bats that were using the area in June had moved on by August, as is evidenced by the lack of bat activity during the mist netting session. The migratory habits of bats are not well understood, but the demolition of the buildings in the area is not likely to adversely impact silver-haired bats. The bats are likely roosting in the trees in the area, rather than on the buildings. No bat roosts were identified in any of the 300 Area buildings; therefore, no mitigation is required for building demolition. The trees surrounding the 337 and 337-B were recommended to be left in place, if possible, so they could continue to provide bat roosting habitat. These trees also provide valuable nesting habitat for migratory birds during the spring and summer. The findings of this investigation were included in Ecological and Cultural Resources Reviews for the 337 (CCN 143867) and 315 Buildings (CCN 142444).

2.2 BAT INVESTIGATION PERFORMED IN THE 400 AREA

A site walk-down was conducted in the 400 Area on April 2, 2009, to determine the potential for maternity bat roosts in the 31 buildings that were on the D-4 schedule for demolition. The buildings evaluated are listed in Table 3. The 4702 Building was the only building that appeared to have any potential roosting habitat. An AnaBat acoustic detector was deployed on the north side of the 4702 Building on June 22, 2009, and was left onsite for 6 nights. During that time, the detector was set to automatically record if an echolocating bat came within range of the detector. Over the 6 nights of monitoring, only three bat calls were recorded. All the calls were approximately 27 kHz with a max at (2) 33 kHz and (1) 29 kHz and appeared to be characteristic of silver-haired bats. Silver-haired bats do not form maternity colonies, therefore, no evidence was found that would suggest a maternity colony of bats is present in the 4702 Building. No mitigation is required for bat maternity roosts during the demolition of the 400 Area buildings included in this survey. The findings of this investigation were included in Ecological and Cultural Resources Review (CCN 157863) that was performed for these buildings in April of 2009.

Table 3. Buildings in the 400 Area.

4220	4704-N	4722A	4732-A	4734-D	4802	6224A
4221	4704-S	4722-B	4732-B	4760	4814	
4701-B	4706	4722-C	4732-C	4790	4831	
4701-C	4707	4726	4734-B	4790-A	4843	
4702	4719	4727	4734-C	4791-TC	6224	

2.3 BAT INVESTIGATIONS PERFORMED AT THE 100-N AREA

Buildings that were surveyed for bat roosts in the 100-N Area are listed in Table 4. A survey for bat roosts was previously performed at the 105-N Reactor during October 2008 as part of the Ecological Resources Review on that building (CCN 141685). Relatively small amounts of bat guano were found in several portions of the 105-N Facility during the walkdown. The scattered and relatively small amount of guano did not suggest that a maternity colony was using the facility. However, because the extent of bat use at the building could not be fully assessed because some areas could not be accessed prior to the start of demolition activities, bat boxes will need to be installed on the exterior of the building, following the completion of the Interim Safe Storage project, to replace any roosting habitat that may have been lost.

Table 4. Buildings in the 100-N Area.

105-NE	186-N	1607-N2	181-N	1322-NA	1902-N	1904-N
107-N	1120-N	1607-N3	181-NE	1322-NB	1903-N	1908-N
116-N	1143-N	1607-N9	181-NA	1322-NC	1904-NA	1908-NE
117-N	1303-N	1614-N	181-NB	1310-N	1904-NB	1909-N
117-NVH	1322-N	1902-N81	182-N	1607-N1	1904-NC	1926-N

The only 100-N Facilities that were identified for further bat investigation were the 181-N, 181-NE, and 1908-NE Facilities because of their location along the river. A walkdown was conducted on August 4, 2009, to search for the presence of bats and/or guano that would indicate a roost site. Scattered guano was found indicating that bats are using these facilities, but not as a maternity roost, because no bats or concentrated piles of guano were observed during this walkdown. The facilities were also inspected for penetrations into concealed areas of the structures that could potentially be used as roost sites, and no penetrations were found.

An AnaBat acoustic detector was deployed near the southeast corner of the 181-NE Building on June 11, 2009. The detector was left out for 4 nights and was picked up so the data could be downloaded on June 15, 2009. The bat detector recorded 150 to 200 calls per night while deployed at this location. This represents a relatively high level of bat activity when compared with other areas around the Hanford Site. However, there are several factors that likely contributed to this increased activity. The 181-NE Facility is located on the bank of the Columbia River, protruding out into the water. The building is large and made of concrete, so it absorbs heat during the day and remains warm at night, which attracts insects. Because of the proximity to the river, and the increased insect activity, this location is likely used by bats for drinking and feeding.

Although the level of bat activity is relatively high in the area, this is to be expected due to the proximity to the river and the level of insect activity in the area. None of these, or other buildings in the 100-N Area, were suspected to be housing maternity colonies at the time of these surveys, and further demolition activity at the buildings was not restricted due to bat use.

2.4 BAT INVESTIGATIONS AT THE 183-H CLEARWELL

Investigations at the 183-H Clearwell began in April 2009 and concluded in August 2009. An inspection of the exterior of the facility was conducted to look for openings that could provide easy fly-in access for bats. Although some small openings and cracks in the expansion joints were identified, no large (>30 cm diameter) openings were found and all hatches were in place. Mist-net sessions were conducted on May 6, 2009, and August 27, 2009, and no bats were captured during these sessions. Acoustic monitoring was performed during both mist-net sessions using a Pettersson D240X recorder. During the May 6, 2009, session the recorder was set in the automatic mode and because of noise from wind, no bat passes were recorded. Calls recorded in the manual mode during the August session yielded eight bat passes that identified two species, western small-footed myotis and Yuma myotis.

Acoustic monitoring outside the 183-H Clearwell was performed on the evening of April 21, 2009, using a remote AnaBat SD-1 detector set to record all night. Eight bat passes were recorded in the 25 kHz range. The bat species present could not be identified with the

AnalookW software data filter scan. The AnaBat acoustic recorder was set out again on the outside of the clearwell from April 22 to April 29, 2009, to listen for bat activity in the area. Forty-five bat passes were recorded over the 7 nights that were in the 25 kHz range, which were identified by the software data scan as silver-haired bat and big brown bat (*Eptesicus fuscus*). Videorecording of bat activity using a Sony Nightshots camera was also conducted outside the 183-H Clearwell, but no bats were observed near or exiting the structure.

Although bats were recorded in the area (the low number of calls, lack of captures during mist netting, and no observations of bats entering or leaving the small openings in the roof), there was no indication that a maternity roost was present in the clearwell. Therefore, no mitigation was recommended for demolition of this facility with respect to bats.

2.5 BAT INVESTIGATIONS AT 100-B/C AREA

The facilities that were surveyed for bat roosts in the 100-B/C Area are listed in Table 5. Only the 183-B Clearwells were identified for follow-up monitoring after an initial walkdown of the listed facilities. One of the hatches on the north clearwell was found partially open and could provide access to bats. Acoustic monitoring using an AnaBat detector was performed at the 183-B Clearwells from May 12 to May 18, 2009. An average of 20 calls per night were recorded at the facility, which represents a low level of activity. Mist netting was performed at the facility on June 10, 2009. No bats were captured and a low level of bat activity was observed. Two bats were observed exiting the partially open hatch. A facility entry was conducted on May 25, 2011, to determine if any part of the facility was being used as a roosting habitat by bats. The north and south clearwells were inspected for maternity roosts or evidence of maternity roosts (concentrations of guano on the floor). Entry into the facility was made at two locations using clearwell hatches. The interior of the floor, the top of the columns, and associated flumes within the north and south clearwells were inspected. Very little bat guano was observed in the north clearwell and no bats were observed. The south clearwell had significantly more scattered bat guano on the floor, and five to seven bats were observed. The bats were roosting as solitary individuals, indicative of male behavior. No clusters of bats were observed and no concentrated piles of guano were found that would indicate the presence of a maternity colony. The scattered guano does indicate that bats are using the facility on a limited basis.

Table 5. Buildings in the 100-B, 100-D, and 100-H Areas.

100-B Area	100-D Area	100-H Area
116-B Exhaust Stack	151-D Substation	183-H West Clearwell
119-B (Stack Sample shed)	188-D	
151-B Sub-Station	1606-D	
183-B Clearwells	1904-D	
1608-B Waste Water Sump	183-D Water Treatment Facility	

The water inlet flumes on the west side of both clearwells appeared to be caved in as a result of the demolition activities conducted on the filter building during the 1980s and were not accessible for inspection. Because there is some limited use by bats in this facility and because

a small maternity roost could still exist in locations that are not accessible, it is recommended that this facility be demolished during the winter season from November through February, when the bats are not present. If demolition is initiated before the bats return in March, the project could continue to completion without any impacts to bats because of the continual activity at the site.

2.6 BAT INVESTIGATIONS AT THE 183-D

The investigation of the 183-D Facility led to the identification of a maternity roost of pallid bats in the headhouse and extensive use by Yuma myotis indicating they are using the building as a night roost. The details of this investigation and the recommended mitigation actions are documented in a separate report titled *Evaluation of the 183-D Water Filtration Facility for Bat Roosts and Development of a Mitigation Strategy, 100-D Area, Hanford Site* (Lindsey et al. 2011). A summary of the findings at the 183-D Facility is provided here for completeness.

An AnaBat acoustic detector was placed at several locations around the 183-D Facility to document relative levels of activity around the structure. The number of calls recorded at this facility was extremely high compared to monitoring at other locations around the Hanford Site. For example, monitoring at the 183-H Clearwell showed an average of seven bat passes per night recorded April 23, 24, 26, 27, and 29, 2009, whereas 183-D Facility had an average 181.3 bat passes per night recorded during a similar time period. The high level of activity recorded around the headhouse portion of the facility and the presence of an open door on the third level of the headhouse prompted further evaluation concentrating on this portion of the facility. Mist netting, infrared video recording, and acoustic monitoring with a Pettersson D240x was performed on May 20, 2009. During the mist netting event, 29 Yuma myotis were captured between 2112 and 2115 hours. This is an extremely high rate of capture compared to other mist netting events performed around the Hanford Site. Analysis of the acoustic data showed that in addition to the Yuma myotis, pallid bats and, to a lesser extent canyon bats (*Parastrellus hesperus*), were also present in the area. A juvenile pallid bat was also found on one of the mobile offices at the 100-D Area on July 15, 2009, indicating a maternity roost was likely in the area. This information lead us to further investigate the potential for a pallid bat roost and/or a Yuma myotis roost at the 183-D Facility.

A walkdown of the interior of the 183-D headhouse was performed on May 17, 2010. Small accumulations of bat guano were found throughout the building. The amount of guano found inside the structure did not indicate that a maternity colony was using the portions of the building that were accessible to the survey team.

During subsequent video recording on June 9, 2010, bats were observed emerging from a small crack in the cinderblock wall on the south side of the 183-D headhouse. The size and appearance of the bats, and the audible presence of pallid bat social calls, showed that this crack was the entrance to a pallid bat roost. Analysis of the video recording performed on June 9, 2010, showed 14 pallid bats exiting the crack. During a follow-up survey on June 23, emergence observations performed at the same location showed that pallid bats began leaving the roost 1 hour after sunset.

Pallid bats are a state monitor species, and are on the priority species list for the WDFW. Their colonial roost sites are considered priority habitats. For these reasons, it was necessary to develop a mitigation plan for potential impacts to the colony at the 183-D Facility.

In addition to the pallid bats observed exiting the 183-D Building shortly after sunset, bats were observed entering the open door on the third floor of the 183-D Building. No observations were made that would indicate an emergence from a colony inside the building, but the bats entering the building indicate that they may be using the facility as a night roost. Night roosts are used by bats between feeding bouts, and may be important for digestion, energy conservation, shelter from predators, and for information exchange and social interaction. Bats have shown habitual use of night roosts from day to day and year to year (Ormsbee et al. 2007). Night roosts are considered a priority habitat under WDFW's PHS program. Due to the large number of Yuma myotis captured during mist netting near the 183-D Facility, and the presence of echolocation calls with a characteristic frequency near 50 kHz, it was determined that the bats using the facility are Yuma myotis.

It is possible that the bats entering the 183-D headhouse were emerging from another part of the 183-D Facility, from the 190-D/DR Process Water Tunnels (a known roost site), or from an additional unknown roost. An emergence count of Yuma bats was conducted on July 7, 2010, at the 190-D Process Water Tunnel bat gate. Approximately 340 bats were counted leaving the roost. This bat gate is approximately 400 m south-east of the 183-D headhouse. As the bats emerged from the bat gate, they most often flew in the direction of the water treatment plant and the sedimentation basins. Typically when bats fist emerge from a roost, they fly to the nearest water source to get a drink and begin foraging for insects. This could explain some of the bats observed flying around and into the door on the third floor of the headhouse.

An entry into the 183-D Clearwells and connecting flumes was made on October 25, 2010, in order to assess these areas for the presence of bats. Entry was made at two locations using clearwell roof hatches. The interior and floor areas of both clearwells were inspected, along with associated connecting flumes. Bat guano was observed throughout the clearwells and connecting flumes, but no bats were observed during this inspection. No large localized accumulations of guano or urine staining were observed in potential bat roosting areas (under hatch covers and on roof support columns) in the clearwells that would suggest the presence of a maternity roost. The scattered guano throughout the facility does indicate that bats are using the buildings on a limited basis. The bats using the clearwells are potentially solitary individuals using the structure as a day or night roost.

The acoustic monitoring data indicated that the majority of the bat activity was centered around the headhouse. Analysis of the acoustic data indicated that most of the bats observed were Yuma myotis, followed by pallid bats, and a small number of canyon bats. It is very likely that Yuma myotis are using the headhouse for a night roost and possibly an undiscovered maternity roost. A maternity roost of pallid bats was observed emerging from a crack in the side of the cinder block headhouse. Because pallid bats are listed by the state of Washington as a Priority Species, mitigation is required according to DOE/RL-96-32 to maintain the viability of this colony. The recommended mitigation was to construct an alternative roost near the headhouse and leave one clearwell.

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