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Burris Park, California, Site Long-Term Surveillance and Maintenance Plan

January 2026

U.S. DEPARTMENT OF ENERGY | Legacy Management

This document has been designed for online viewing.

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Abbreviations

AEC	U.S. Atomic Energy Commission
BPS	Burris Park, California, Site
CDPH	California Department of Public Health
DOE	U.S. Department of Energy
FIMS	Facilities Information Management System
FUSRAP	Formerly Utilized Sites Remedial Action Program
IC	institutional control
LM	Office of Legacy Management
LMS	Legacy Management Support
LTS&M	long-term surveillance and maintenance
mCi	millicuries
mrem/yr	millirem per year
pCi/g	picocuries per gram
^{90}Sr	strontium-90
UC Berkeley	University of California–Berkeley

1.0 Site Conditions

1.1 Background

The U.S. Atomic Energy Commission (AEC) and the University of California–Berkeley (UC Berkeley), established Burris Park as a research area called the Burris Park Field Station in 1956 to conduct research on removing radioactive contamination from soil. The research efforts continued until 1963.

In 1987, the U.S. Department of Energy (DOE) determined that the renamed Burris Park, California, Site (BPS), formerly the Burris Park Field Station, was not eligible for remediation under the Formerly Utilized Sites Remedial Action Program (FUSRAP) because UC Berkeley had performed adequate remediation in 1963. Remediation activities that took place at the site and a summary of site decommissioning activities are provided in Section 1.2.

The DOE Office of Legacy Management (LM) revisited the BPS eligibility determination in 2014, when UC Berkeley brought the condition of the site to DOE's attention. LM again determined that the site was not eligible for further remedial action under FUSRAP, as documented in the *Elimination Report and Determination of LTS&M Authority for the Burris Park Field Station, Kings County, California* (DOE 2014).

Because there was no evidence that AEC ever issued a radioactive materials license, LM agreed to address conditions at the site. This included providing necessary long-term surveillance and maintenance (LTS&M) (Geiser 2014). In August 2014, the DOE Office of the General Counsel concurred that LM should manage the site as a maintenance-only site to ensure that the remedy remains protective and site knowledge is preserved. The State of California, Kings County Parks and Grounds Department, and UC Berkeley were notified of the decision, and on November 26, 2014, the BPS was formally added to the list of LM sites.

1.2 Operations

The BPS is located at 6500 Clinton Avenue, Kingsburg, California. Kingsburg is a rural agricultural community in the San Joaquin Valley, south of Fresno (Figure 1). The BPS is part of a 57-acre county park owned and maintained by the Kings County Parks and Grounds Department. The BPS consists of a 50 × 50-foot fenced area enclosing a 42 × 42-foot reinforced concrete slab and subsurface containment structure.

In 1956, AEC entered into Contract AT (11-1)-34 Project No. 23 with UC Berkeley to examine methods to remove radioactive strontium fallout from arable land. To accomplish this objective, the university constructed a grid of concrete plots in the ground and introduced 72 millicuries (mCi) of strontium-90 (^{90}Sr) into the soil to study the effectiveness of decontaminating the soil using either displacement by electrolytes and leaching or physical immobilization using asphalt materials. The test plots consisted of 49 6 × 6-foot squares separated by concrete barriers that extended 30 inches underground and 6 inches above the ground surface. The ^{90}Sr experiments used 14 of the 49 test plots. These experiments were later published in a scientific periodical as "Some Experiments on the Decontamination of Soils Containing Strontium 90" (Schulz et al. 1959). AEC terminated the tests in 1963, and UC Berkeley decommissioned the site under the same contract. Decommissioning was

accomplished by filling the unused plots with crushed rock and filling the test plots with 2 inches of sand, placing a 6-millimeter polyethylene liner over all of the plots, and constructing a 4-inch metal-mesh reinforced concrete slab over the entire gridded area. A bronze plaque identifying the ^{90}Sr total activity, UC Berkeley contract number, and names of responsible individuals was embedded in the northeast corner of the slab.

The California Department of Public Health (CDPH) reviewed the decommissioning information and determined that the site posed no threat to human health or the environment in its existing configuration, but CDPH requested that UC Berkeley enclose the area with a 6-foot gated fence and post contact information on each side of the fence (Tarbeshaw 1963). No further cleanup work was required at that time, and UC Berkeley, Kings County, and the State of California have conducted periodic oversight and radiological surveys since its closure (DOE 1987). The site was later used by the Kings County Park museum as a display area for antique farm equipment.

In 2013, UC Berkeley staff contacted LM to discuss maintenance needs at the site. Representatives of LM visited the BPS on January 22, 2014, and observed that the fenced area was in disrepair. The protective concrete slab capping the ^{90}Sr test plots was covered with broken tree limbs and debris. Some pieces of the farm exhibit and a section of the chainlink fence surrounding the protective slab were crushed from fallen dead trees within the fenced area.

1.3 Contaminants

Radioactive contamination at the BPS is solely due to the introduction of 72 mCi of ^{90}Sr into the concrete-encased experimental plots. Radiological surveys conducted by UC Berkeley (Peterson 1981; De Zetter 2013; Eberline Laboratories 2014; Mac Kenzie 2014; UC Berkeley 2014), Kings County (Verheul 1995), and CDPH (Wong 1995) over the last 34 years demonstrate that ^{90}Sr concentrations in soil between the edge of the concrete slab and the fence remain low. The total remaining activity of ^{90}Sr under the slab was calculated to be about 20 mCi as a result of radioactive decay. There are no other AEC contaminants at this site.

1.4 Site Conditions

In December 2014, LM initiated an evaluation and summary of proposed maintenance activities before issuing the *Evaluation and Summary of Proposed Maintenance Activities, Burris Park, California, Site* (DOE 2015). The document describes the condition of the site, including the presence of two fallen dead trees containing very low concentrations of ^{90}Sr as a result of biouptake. The document outlines the path forward to address needed site maintenance and long-term stewardship of the BPS. A detailed sampling history of the trees and soil surrounding the pad and a summary of ^{90}Sr analytical results are attached to the evaluation.

In March 2015, a Legacy Management Support (LMS) contractor conducted a site visit to determine the extent of the work to be conducted, perform radiological scans of the farm equipment, and confirm that the surface of the pad had no measurable contamination.

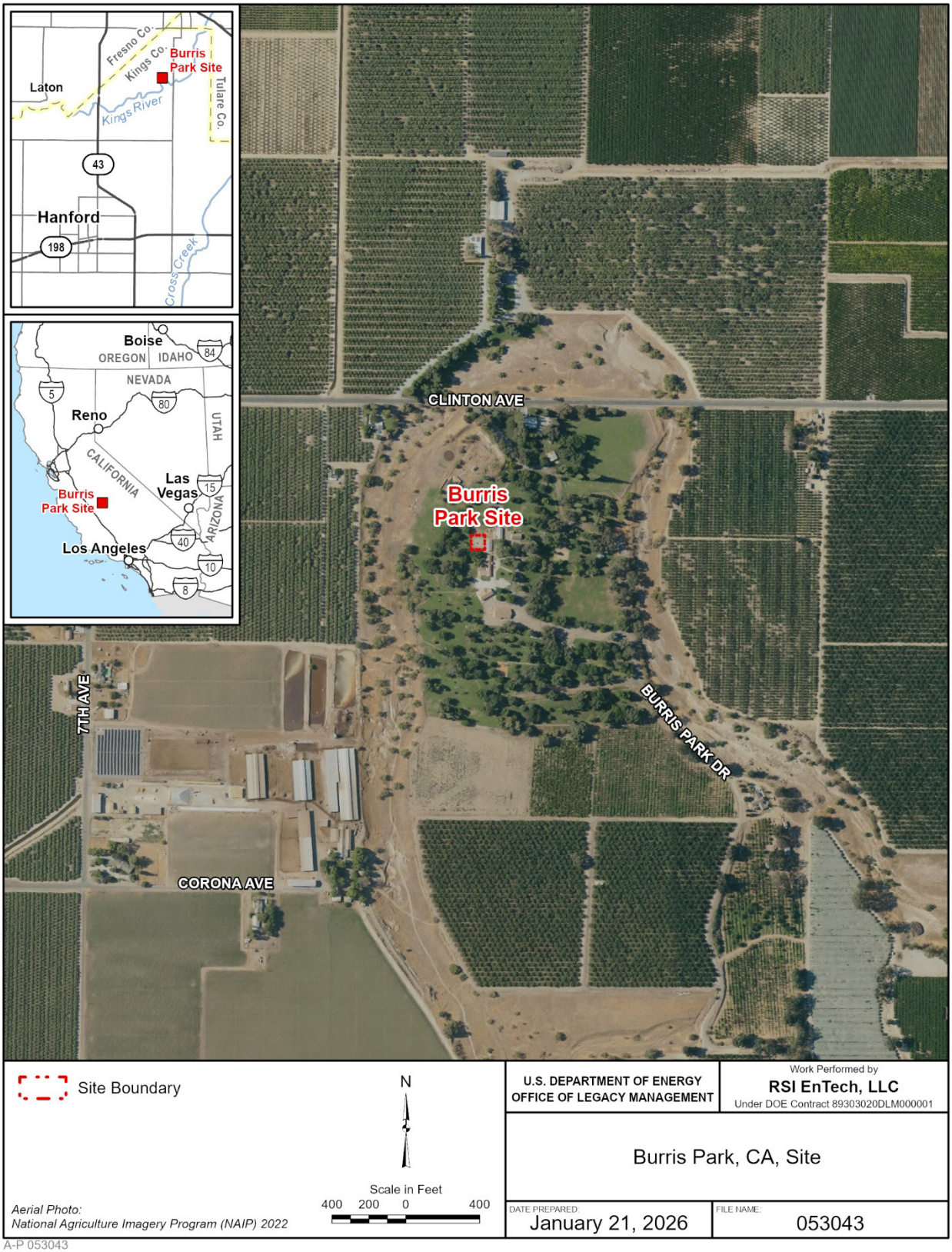

Figure 1. Location of the Burris Park Site

In July 2015, LM began conducting maintenance at the BPS, which included the following:

- Clearing the protective concrete pad of antique farm equipment and debris and inspecting the pad to confirm its integrity
- Continuing to restrict public access to the site by repairing the fence and updating the signage with LM contact information
- Removing undesired trees, associated dead tree limbs, and other perennial vegetation that may adversely impact the concrete containment structure in the future

LM repaired the crushed portions of the fence and entrance gate and removed the barbed wire that surrounded the site. LM also updated the signage with DOE's contact information and requested that Kings County remove the old farm equipment from the pad (Figure 2 and Figure 3). The site contained four large maple trees: Two were alive, and two were dead and had fallen over. UC Berkeley performed 10–15 borings per tree and collected more than 100 grams of sample material from each tree. Samples were collected using multiple cores from different portions of the tree at varying heights and perimeter locations to reduce errors associated with possible distributional heterogeneity of deposited ^{90}Sr. UC Berkeley analyzed composite core samples, as well as samples of branches and bark from the live and dead trees to determine whether they were contaminated as a result of fixed ^{90}Sr. UC Berkeley also selected a tree, distant from the research area and of an equivalent age and species, to collect background samples of core, bark, and branches using the same sampling and analytical methods. The sampling plans and analytical data resulted in a determination that at least two of the trees contained very low concentrations of ^{90}Sr from biouptake. Subsequently, LM cut, packaged, and removed the four trees in September 2015 and disposed of them at a facility licensed to receive ^{90}Sr.

In March 2018, vegetative management and minor site maintenance activities were conducted at the site before the 2018 season opening. Specific activities included landscape barrier and riprap placement around the protective pad within the fence to control dust and deter vegetative growth and animal burrowing. Also, fence improvements were made to the bottom rail to retain the newly placed riprap, and the vehicle gate was altered to swing outward (Figure 4). In February 2019, the annual inspection found the site in excellent condition with no follow-up action required.

The BPS is listed for long-term stewardship as a Category 2 site. LM will maintain the physical condition of the site to ensure that radiological contamination presents no unacceptable risk to the public or the environment. LM's responsibilities at the site consist of managing site records, responding to stakeholder inquiries, managing protective measures, performing an annual verification on the accuracy of site information, and performing Site Inspections on a rolling 5-year schedule, with the next occurring in fiscal year 2029.

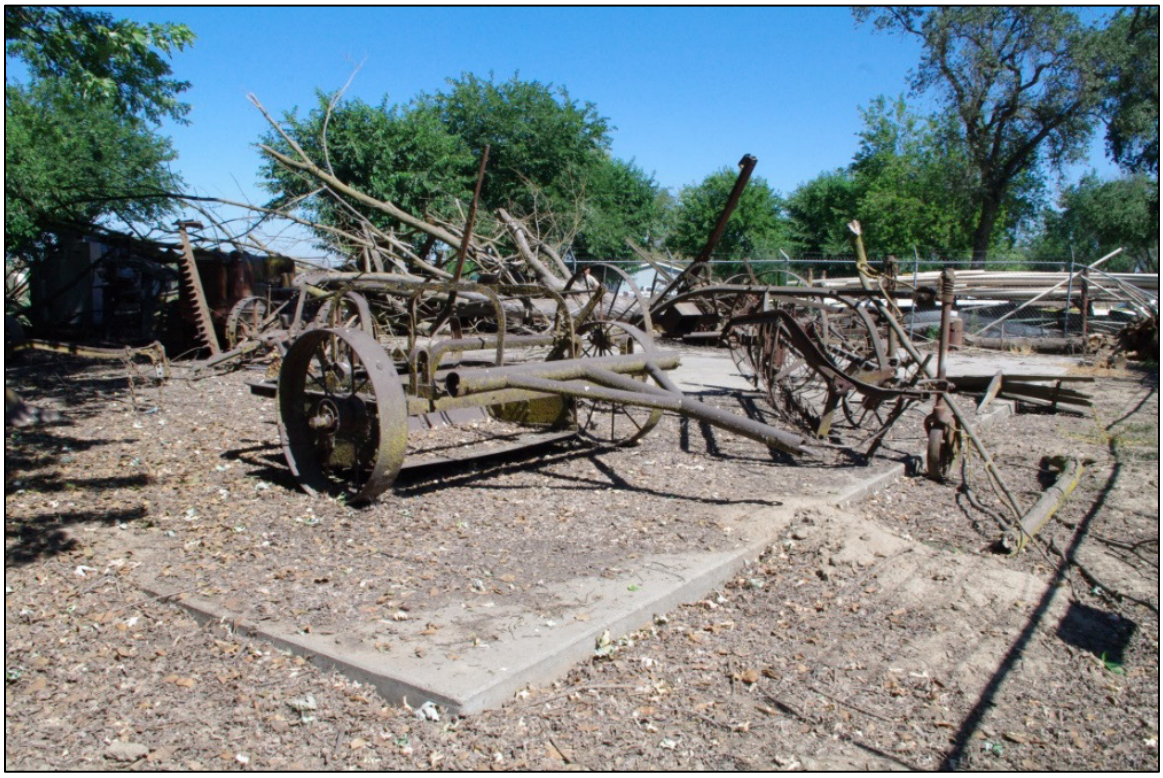

Figure 2. Burris Park, California, Site (Interior Fence), July 2014

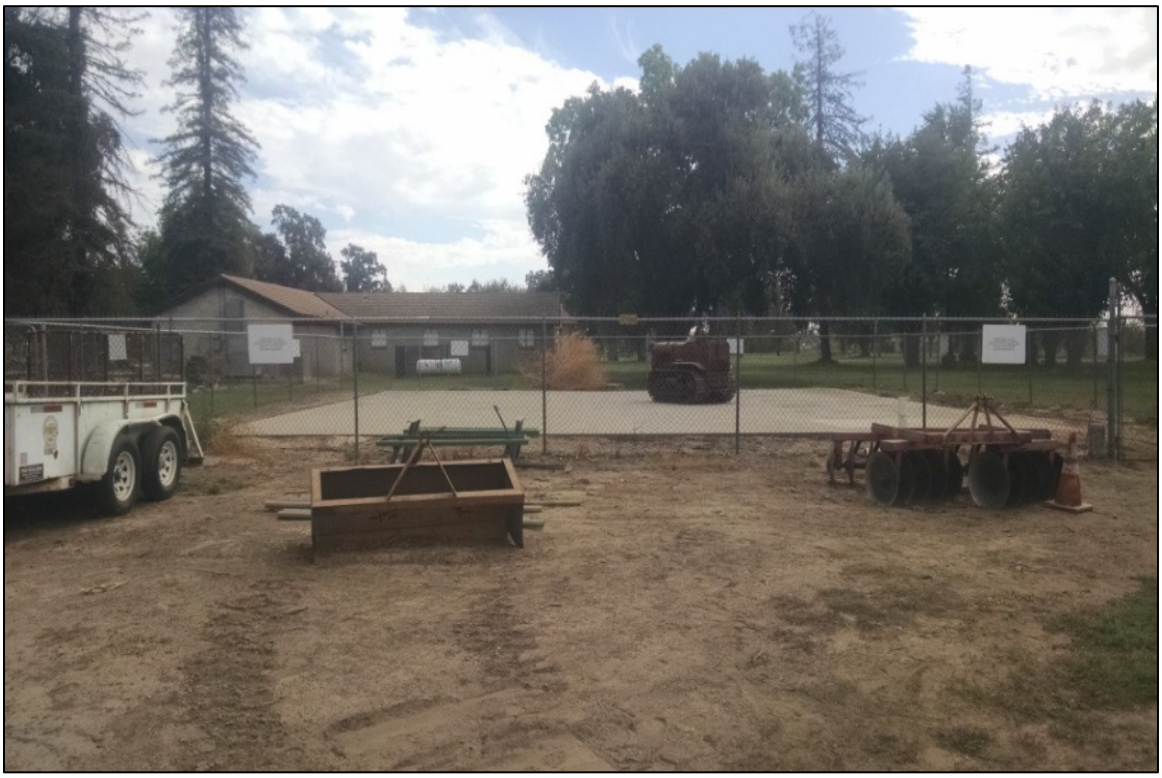

Figure 3. Burris Park Site After Maintenance Activities, Looking West, September 2016

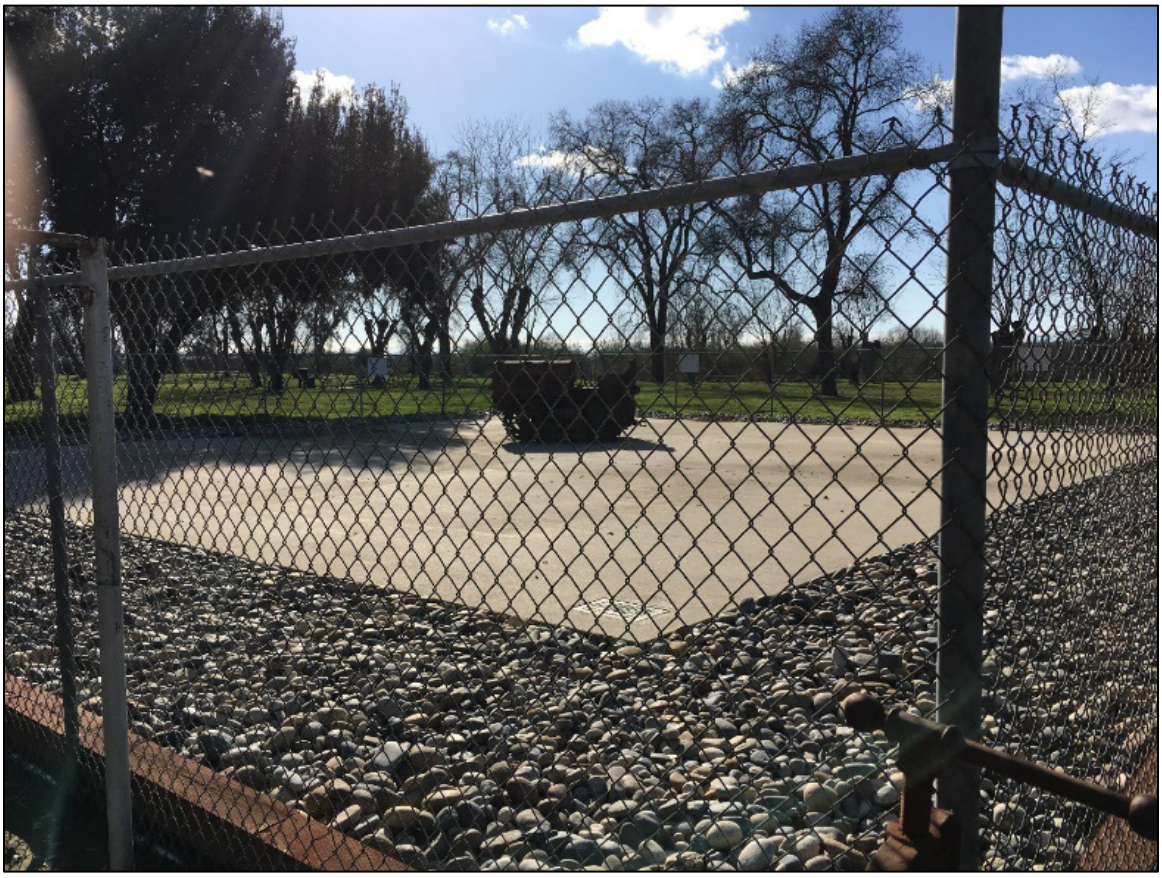

Figure 4. Burris Park Site After 2018 Maintenance Activities, Looking West, February 2019

2.0 Remedial Action

UC Berkeley remediated the ^{90}Sr experimental plots in 1963 while under contract with AEC. On the basis of intermittent surveys by UC Berkeley, Kings County, and the State of California, no further remediation has been required for more than 50 years. In 2015, site maintenance was conducted to remove four large trees that posed a potential threat to the containment structure, repair the fencing, and clean the protective slab to facilitate inspections and radiological surveys as necessary. In 2018, LM included a permanent ground cover between the protective slab and the fence to inhibit the growth of large, deep-rooted vegetation that may adversely impact the protective slab or subsurface containment.

2.1 FUSRAP Eligibility Determination

This site did not meet the eligibility criteria for FUSRAP because it had been remediated in 1963, and no further remedial action was required. The site was reevaluated in 2014 for FUSRAP eligibility and again was found ineligible. LM determined that it had responsibility for long-term stewardship of the site because the radioactive material was related to contracted AEC work and had never been licensed.

2.2 Cleanup Criteria

There was no need for a cleanup standard for ^{90}Sr following the experimental studies because the radioisotope was already contained and simply needed to be adequately covered to minimize radioactive emanation. Remediation was accomplished by covering the plots with 2 inches of sand, a 6-millimeter plastic liner, and a 4-inch metal-mesh reinforced concrete slab over the entire 42 × 42-foot area.

A bronze plaque was affixed to the concrete, and the area was enclosed with a chainlink fence. The following information is inscribed on the plaque:

A TOTAL OF 72 MILLICURIES OF STRONTIUM 90
WAS PLACED ON THIS AREA DURING 1956 AND 1957.

THIS WORK WAS DONE UNDER CONTRACT AT (11-1)-34,
PROJECT 23 BETWEEN THE UNIVERSITY OF CALIFORNIA AND
THE UNITED STATES ATOMIC ENERGY COMMISSION.

ROY OVERSTREET R.K. SCHULZ
UNIVERSITY OF CALIFORNIA, BERKELEY

Radiation surveys of the area performed in 1981 detected no radioactivity above background at the surface. At that time, the UC Berkeley radiation safety officer determined that the reinforced concrete cap constituted sufficient protection to terminate the project. Because the survey detected no radioactivity above background, the use of the protective slab as a foundation for a display area in the park was acceptable.

2.3 Remedial Action

Remedial action included the placement of a protective barrier around and over the soil containing 72 mCi of ^{90}Sr. Upon completion of the ^{90}Sr containment structure, UC Berkeley performed surveys and documented the site closure in a letter to the State of California. CDPH visited the site and reviewed applicable documentation for the remedial action. CDPH determined that the site was adequately protective of human health at that time and into the foreseeable future. This is documented in a letter from the state to UC Berkeley (Tarbeshaw 1963).

2.4 Independent Verification

Several surveys conducted by the State of California, UC Berkeley, and Kings County over the years and, more recently, by LM have resulted in findings similar to the original survey by UC Berkeley. However, no formal independent verification documentation has been identified.

2.5 Use Restrictions

Public access to the site is restricted. Kings County used the concrete pad as a staging area for historical farming equipment. All except one of the heavy pieces of farm equipment have been removed from the pad. LM has agreed to allow an antique tractor to remain on the pad because it is in fragile condition and it is very difficult to remove. LM will continue to monitor the pad to ensure that the weight of the antique tractor does not adversely impact the containment structure.

2.6 Assessment of Risk

In 2013, UC Berkeley concluded that the site is protective in its present configuration. UC Berkeley's risk assessment determined that if a child at the site consumed 500 milligrams of soil per day or 183 grams of soil per year from the area between the concrete slab and the fence, assuming that all soil has a maximum activity of 2.8 picocuries per gram (pCi/g) (based on data provided in Eberline Laboratories Report ID 1309087 [Eberline Laboratories 2013]), the annual dose would be 0.1 millirem per year (mrem/yr). This scenario represents the maximally exposed receptor for this site without access controls (Mac Kenzie 2013).

DOE authorized a radiological evaluation in April 2014. The LMS health physicist who performed the evaluation used a question-and-answer format to describe various scenarios and their level of protectiveness to the public. Based on the original study parameters, the estimated soil concentration under the concrete slab as of 2015 is conservatively about 1000 pCi/g. At approximately the 90-year time frame, the ^{90}Sr under the slab will decay to less than a 25 mrem/yr dose rate to a rancher or farmer receptor (Stoller 2014). It is estimated that concentrations of ^{90}Sr in soil will decay to background levels in about 200 years (Stoller 2014).

2.7 Certification and Regulator Concurrence

CDPH determined that the site was adequately protective of human health at the time of its site visit and into the foreseeable future. This is documented in a letter from CDPH to UC Berkeley (Tarbeshaw 1963).

2.8 Agreements and Permits

LM has a formal access agreement with the Kings County Parks and Grounds that allows LM access to inspect the site and conduct maintenance upon request to ensure that the ^{90}Sr containment structure functions as designed and maintains protectiveness.

3.0 Protective Measures

LTS&M requirements for the BPS are summarized at the end of this section in Table 1 and include the following:

- Managing site records
- Responding to stakeholder inquiries
- Managing institutional controls (ICs) as defined by DOE; see Section 3.1 and Section 3.6 for more details
- Performing Site Inspections (on a 5-year rolling schedule with the next inspection to occur in 2029) to reaffirm that site conditions remain stable as agreed upon by CDPH (Tarbeshaw 1963); see Section 3.1 and Section 3.6 for more details

Table 1. Summary of LTS&M Requirements at the Burris Park Site

Site Name	DOE LTS&M Requirements	Comments
Burris Park, California, Site	Manage site records.	The site records are maintained and managed by LM. Updates to the site records are conducted as necessary to keep the records current.
	Respond to stakeholder inquiries.	All stakeholder inquiries are posed to LM. The LMS contractor helps LM respond to stakeholders, as requested.
	Manage protective measures.	The site fact sheet and the site-specific webpage on the LM public website will be reviewed annually and updated as necessary.
	Perform an annual verification on the accuracy of the site information. Effective in 2026, this verification will be documented on a desktop assessment.	The site information (e.g., site ownership, site conditions, current and adjacent property use, and near-term and long-term developmental property goals of the site and the surrounding area) is reviewed annually to ensure that future use of the property is understood.
	Perform a site inspection on a 5-year rolling schedule to reaffirm that site conditions remain stable and protective.	The site is inspected on a 5-year rolling schedule that began in fiscal year 2024. Contact with Kings County will be made before the inspection in accordance with the access agreement.
	Perform a FIMS inspection during site visits.	The FIMS inspection will be performed during site visits on a 5-year rolling schedule that started in fiscal year 2024.

Abbreviation: FIMS = Facilities Information Management System

This site was determined to be ineligible for remediation under FUSRAP in 1987 and again in 2014. However, because LM has taken responsibility for LTS&M, the BPS has been added to the list of LM sites under long-term stewardship. As such, measures that LM deems necessary to protect human health and the environment can be added to this LTS&M Plan and implemented to enhance protections.

After remediation in 1963, UC Berkeley and Kings County continued some maintenance at the site and conducted several radiological surveys. In 2013, UC Berkeley collected samples of soil and vegetation within the fenced area. Very low ^{90}Sr concentrations were detected in a few soil and vegetation samples. Kings County and UC Berkeley representatives agreed that ^{90}Sr posed no unacceptable risk within the fenced site. In 2015, LM removed all vegetation from between the fence and the cement pad. In 2018, LM took the additional action to include a permanent ground cover between the protective slab and the fence to inhibit the growth of large, deep-rooted vegetation that may adversely impact the protective slab or subsurface containment.

3.1 ICs

DOE Policy 454.1 Chg 1, *Use of Institutional Controls*, expands the term "institutional controls" to include legal instruments (e.g., land use restrictions), physical or engineering controls (e.g., fences and signs), and methods of providing information to people (interpretive displays) that help minimize the risk of human exposure to contaminants and maintain the remedies at a site. The policy uses this broader application of the term ICs to encompass the diverse nature of ICs and measures used throughout DOE in a consistent yet flexible policy framework integrated into an overall sitewide program.

The following engineering and physical controls are associated with the site under DOE's broad application of ICs:

- A concrete containment structure, which entombs the radioactive isotope to prevent exposure to the remaining 20 mCi of ^{90}Sr
- A chainlink fence with a locked gate to prevent public access to the containment structure
- Signage to provide information and an emergency contact number
- Site visits to verify that the aforementioned controls are adequate, intact, and operating as intended
- A formal access agreement between LM and Kings County to assure unencumbered access to the site to conduct inspections and maintenance as necessary

3.2 Annual Review and Data Verification

Effective in 2026, a desktop assessment will be conducted annually to verify the accuracy of site information. This verification includes site ownership, site conditions, current use, adjacent property use, and developmental property goals of the owner and the Kingsburg area (both near term and long term). Site records are maintained and managed by LM. Updates to the site records are conducted as necessary to keep the records current.

3.3 Site Visit Report

A site visit to assess any changed conditions and to conduct a Facilities Information Management System (FIMS) inspection will be performed on a 5-year rolling schedule, with the next site visit occurring in fiscal year 2029. The verified information and results of the 5-year site inspection will be reflected in the FIMS inspection report and in the site's LTS&M Plan update.

3.4 Site Fact Sheets

Protective measures for sites transitioning to LM can be identified to fulfill DOE's postclosure responsibilities and to ensure the future protection of human health and the environment. The LM protective measures include the following:

- Maintenance of an LM site fact sheet
- Maintenance of a site-specific webpage on the LM public website

The public fact sheet and the site's webpage on the LM public website are reviewed annually and updated as necessary.

3.5 Beneficial Reuse Reviews

Beneficial reuse is not applicable to the BPS.

3.6 Site Inspections

Annual Site Inspections were conducted in 2016 through 2019. Currently, Site Inspections are carried out every 5 years with the next inspection scheduled for 2029. LM remains responsible for the site to ensure that the following conditions are maintained:

- The area surrounding the protective slab has not degraded or become overgrown with unwanted vegetation
- The area just outside the fence is not cluttered with surplus construction materials, and the fence is not used to hold up heavy materials
- The fence is in good condition
- The gate opens and closes easily and is not tilted or bent
- The signs are in good condition and legible, and all eight signs are present and secured to the fence in a level manner
- Vegetation is not overgrown, and no deep-rooted trees or shrubs have become established within the fenced area
- Rodent holes are not present under the containment structure
- The information plaque in the pad is present, secure, and legible
- The pad does not contain deep cracks or concrete fragments
- The corners of the pad are intact, with no new indications of heavy equipment use within the fenced area

The *Burris Park Site Path Forward* (DOE 2014, Appendix A) and the *2016 Annual Inspection Checklist Burris Park, California, Site* (DOE 2017, Appendix B) present a detailed stewardship strategy designed to get input from regulators, Kings County, and other interested parties when considering the future of the park and the surrounding areas, as well as to provide a regulatory perspective as to how the site can be managed to best protect the community and the environment. During the long-term stewardship inspection and discussion on December 6, 2016, the group reached a consensus on several issues. A few of the most significant points include:

1. In fall 2018, DOE conducted work at the site to add fabric and stone cover between the pad and the fence and reverse the gate so it opens outward for easier access.
2. DOE will replace the entire perimeter fence once it reaches its 25-year life expectancy in 2039.
3. DOE will retain responsibility for the site and maintain the fence and concrete containment until ^{90}Sr activity within the enclosure reaches background concentrations. This occurs around year 2240, unless the State of California establishes ^{90}Sr standards sooner.
4. The park custodian will continue to apply herbicide and pesticide as needed to control vegetation and undesirable animals.

3.7 Field Operations

There are no field operations required at the site.

3.8 Environmental Monitoring

There are no environmental monitoring requirements at the site.

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