The attached review documents for the 2013 Boeing Santa Susana Field Laboratory building demolition program are being posted to the DTSC SSFL Document Library based on a public request made in March 2022.

RADIOLOGIC HEALTH BRANCH
RADIOLOGICAL ASSESSMENT UNIT

Date: April 30, 2013

To: Roger Lupo

From: Thomas Moore

Re: Review of Documents for SSFL Area IV Building 4005

As requested I have reviewed the Radiological Surveys, Memos, and Reports (see endnotes) for Building 4005, also known as the Uranium Carbide Manufacturing Building, in Area IV of the Santa Susana Field Laboratory (SSFL).

My review included the following documents: (1) Radiological surveys from Rocketdyne-Rockwell International[1,2,3] and ORISE (Oak Ridge Institute of Science and Education)[4]. (2) Release criteria for radiological facilities at SSFL from USNRC[5] and Boeing[6]. (3). Historical documentation of Building 4005 from Boeing and Sapere Consulting, Inc[7].

Having completed review of the above documents, I have reached the following conclusions:

- Historical details for past use and potential radiological issues were well documented so that appropriate radiological survey methods could be used.
- Survey methodology by Rocketdyne-Rockwell International[1,2,3] and ORISE[4], was based upon best industry standards at the time and was adequate for the task. Surveys included measurements of direct and removable contamination (alpha and beta), and gamma exposure rates at 1 meter. Rooms with a history of radiological use received 100% scan coverage.[4] QA&QC processes were adequate to demonstrate instrumentation could achieve detection limits required[1].
- The results of the radiological surveys were within the limits established by NRC[5] and Boeing[6].
- There appears to be no evidence to contradict the conclusions made by DHS in 1995, when the building was removed from Rockwell's radioactive materials license.[8] No further radiological surveys for Building 4005 seem warranted.

Thomas Moore
Associate Health Physicist
CDPH-RHB-RAU

[1] Rocketdyne Report, 005-ZR-0001, "Final Radiological Survey of Building 005,"September 21, 1993.
[2] Rockwell International Document, 005-AN-0002, "Decontamination and Decommissioning (D&D) of the Uranium Carbide Pilot Fuel Facility – Building T005," September 28, 1993
[3] ETEC Document, GEN-ZR-0003, "Radiological Survey of Building T005,"November 16, 1987.
[4] ORISE Report, 94/K-14, "Verification Survey of Buildings 005, 023, and 064, Santa Susana Field Laboratory, Rockwell International, Ventura County, California," October 1994.
[5] USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" June 1974
[6] Boeing Document, N001SSR140131, "Approved Site wide Release Criteria for Remediation of Radiological Facilities at the SSFL", December, 1998
[7] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume I, Sapere Consulting, Inc., May, 2005
[8] Fax from Ben Kapel to Phil Rutherford, "Amendment No.90 to License 0015-70, March 22, 1995", April 5, 1995

DTSC MEMORANDUM TO FILE

Subject: US EPA Comments on DTSC / CDPH Reviews of Radiologic Screening Conducted at Boeing Santa Susana Field Laboratory Sites: (1) B4005 and (2) B4011 Low Bay

Prepared By: Rob Terry, Environmental Scientist, US EPA Region 9 Office

Date Received: July 30, 2013

EPA Comments:

On your request I have reviewed the following documents:

1. Draft letter initially dated June XX, 2013, from Paul Carpenter of DTSC to Arthur Lenox of Boeing, subject DTSC review of notification package for planned removal of concrete and asphalt at former Building 4005 (Area IV), Boeing Santa Susana Field Laboratory, Ventura County, California, accompanied by internal memorandum dated April 30, 2013, from Thomas Moore of CalDPH/RHB to Roger Lupo of CalDPH/RHB, subject Review of documents for SSFL Area IV Building 4005

   together with the following linked supporting documents:

   Rockwell International 1993 verification survey at http://www.etec.energy.gov/library/main/005-ZR-0001_4005_Final_Survey_Report.pdf
   Oak Ridge Institute for Science and Engineering (ORISE) 1994 verification survey at http://www.etec.energy.gov/library/main/1994-Bldgs.005-023-064.pdf
   Boeing demolition proposal for the former Building 4005 site dated February 21, 2013
   Part 1: http://www.dtsc-ssfl.com/files/lib_rcra_soils/BuildingDemo/buildingdemolition/65975_B4005-A.pdf
   Part 2: http://www.dtsc-ssfl.com/files/lib_rcra_soils/BuildingDemo/buildingdemolition/65976_B4005-B.pdf

2. Draft letter initially dated June XX, 2013, from Paul Carpenter of DTSC to Arthur Lenox of Boeing, subject DTSC review of notification package for planned removal of former Building 4011 low bay (Area IV), Boeing Santa Susana Field Laboratory, Ventura County, California, accompanied by internal memorandum dated April 30, 2013, from Thomas Moore of CalDPH/RHB to Roger Lupo of CalDPH/RHB, subject Review of documents for SSFL Area IV Building 4011

   together with the following linked supporting documents:

   Boeing [Rocketdyne] verification survey at http://www.etec.energy.gov/library/main/4011_Final_Survey_Data_Package.pdf
   CalDPH verification survey at http://www.etec.energy.gov/library/main/DHS_Verification_Survey_4011.pdf
   U.S. EPA 2002 verification survey at http://www.etec.energy.gov/Library/Cleanup_and_Characterization/Rocketdyne_Tech_Support_Bldgs_T009_to_T100.pdf
   Boeing demolition proposal for the Building 4011 low bay at dated March 6, 2013 http://www.dtsc-

ssfl.com/files/lib_rcra_soils/BuildingDemo/buildingdemolition/65980_SSFL_Area_4_Bldg__4011_Lowbay_demo_notice.pdf

Draft letter initially dated June XX, 2013, from Paul Carpenter of DTSC to Arthur Lenox of Boeing, subject DTSC review of notification package for planned removal of concrete and asphalt at former Building 4005

On review of the documents that were presented, DTSC does not expect the proposed demolition and removal activities to disturb any chemically impacted soil or other surface media that are currently under investigation by the SSFL remedial investigation program, provided that the activities are implemented in accordance with the Building 4005 Removal Package and DTSC's recommendations. The salient points of those recommendations are:

1. Boeing must notify both DTSC and U.S. DOE before demolishing or removing any subgrade structures, tanks, piping, sumps, discharge, drainage or liquid conveyance and storage features that were not previously anticipated and documented, and must accurately document the descriptions and locations of those items, according to procedures that were included in amendments dated April 2013 to Boeing's Building Demolition SOP. In addition, if any subgrade features are found to be different in character from the features that were previously screened for chemical and radioactive contamination, then Boeing must also collect and submit additional radioactive contamination screening data along with its notification.
2. Boeing must conduct a followup soil investigation, including sample collection and analysis, in the area around the east side of the Building 4005 slab where the 2010-2011 EPA surface gamma scan found measurable concentrations of Eu-152 at two locations, both of which equaled or exceeded a DTSC Provisional Lookup Table Value of 0.0739 pCi/gm. In addition, Boeing must assure that disturbance of soil near those locations is kept to a minimum.
3. Before removal for California Class I landfill disposal, Boeing must screen for radioactive contamination those portions of the concrete slabs, ground cover and paved asphalt surfaces that are currently inaccessible.
4. Boeing must thoroughly survey for radioactive contamination both inside and outside, buried pipes and related features that were previously used to contain liquids or other waste; that material must remain onsite until DTSC completes its review of the survey results.
5. Boeing must notify both DTSC and U.S. DOE for consultation if demolition activities require excavation or disturbance to a depth beyond 3 feet, according to procedures that were included in amendments dated April 2013 to Boeing's Building Demolition SOP.
6. Boeing must consider the existing body of soil chemical data when managing worker safety and the movement of soil, in any demolition areas where the soil will be disturbed,
7. Boeing must conduct focused radioactive contamination surveys of pipe lines that run from underneath the Building 4005 slab to either or both of (1) an interior sump and subgrade pipeline that connects to a storm drain line on the east side of 17th Street; of (2) the cooling tower sump and subgrade pipeline that connects to a subgrade storm drain line on the east side of 17th Street; and of (3) a subgrade vault and utility/pipe system that are thought to be connected to the cooling tower sump.

DTSC is also satisfied that the proposed actions do not require preparation of a more detailed work plan that DTSC had previously requested in a February 11, 2010, letter to Boeing.

DTSC also noted that they do not believe that Boeing's risk-based evaluation of U.S. EPA sample results from the area surrounding Building 4005 is relevant to demolition-related analysis or conclusions, and that they did not consider Boeing's discussion in their decision, relying instead on their evaluation of the site history, site inspections and direct characterization data that Boeing presented.

DTSC's decision relied in part on CalDPH's review of the additional documents that I listed above. The review by CalDPH was thorough and included both thoughtful and detailed review of all the data and facts that Boeing submitted. Based on my review of those additional documents, which due to time constrains

was unfortunately only cursory, I concur with the conclusions that CalDPH transmitted to DTSC in its internal memorandum dated April 30, 2013.

My reading of the linked supporting documents, though cursory, suggests that during operations at Building 4005, all tasks were completed without any significant contamination incident. Although the building closeout surveys predated MARSSIM, the survey design was statistically based in much that same way as MARSSIM-based surveys and very thorough. During building demolition special care was taken to assure that any radioactive materials that could have been held up in the air exhaust plenums was not released to the atmosphere, and demolition also was completed without any significant contamination incident. This appears to form part of the basis for DTSC's confidence that it's unlikely that there is any radioactive contamination in the remaining building foundations and pads that has not already been discovered.

DTSC has also made visits to the Building 4005 site, and together with California DPH has performed contamination surveys of its own. Those findings also form part of the basis for DTSC's confidence that it's unlikely that there is any radioactive contamination in the remaining building foundations and pads that has not already been discovered.

Draft letter initially dated June XX, 2013, from Paul Carpenter of DTSC to Arthur Lenox of Boeing, subject DTSC review of notification package for planned removal of former Building 4011 low bay

On review of the documents that were presented, DTSC does not expect the proposed demolition and removal activities to disturb any chemically impacted soil or other surface media that are currently under investigation by the SSFL remedial investigation program, provided that the activities are implemented in accordance with the Building 4011 Low Bay Removal Package and DTSC's recommendations. The salient points of those recommendations are:

1. Boeing must notify both DTSC and U.S. DOE before demolishing or removing any building features, tanks, piping, or sumps that were not previously anticipated and documented, but that are relevant to soil investigations, and must survey those items in support of the ongoing SSFL Area IV data gap soil investigations. Of particular concern are any previously undocumented outfalls to the Area IV Boeing Building 4011 leach field soil investigation area, for which Boeing must accurately document the descriptions and locations of those items. In addition, if any subgrade features are found to be different in character from the features that were previously screened for chemical and radioactive contamination, then Boeing must also collect and submit additional radioactive contamination screening data along with its notification.
2. Before removal for California Class I landfill disposal, Boeing must screen for radioactive contamination those portions of the Low Bay concrete slab surfaces that are currently inaccessible.
3. Boeing must notify both DTSC and U.S. DOE for consultation if demolition activities require excavation or disturbance to a depth beyond 3 feet, according to procedures that were included in amendments dated April 2013 to Boeing's Building Demolition SOP.
4. Boeing must consider the existing body of soil chemical data when managing worker safety and the movement of soil, in any demolition areas where the soil will be disturbed,

DTSC is also satisfied that the proposed actions do not require preparation of a more detailed work plan that DTSC had previously requested in a February 11, 2010, letter to Boeing.

DTSC also noted that they do not believe that Boeing's risk-based evaluation of U.S. EPA sample results from the area surrounding Building 4011 is relevant to demolition-related analysis or conclusions, and that they did not consider Boeing's discussion in their decision, relying instead on their evaluation of the site history, site inspections and direct characterization data that Boeing presented. In addition, DTSC noted that 10 samples that were collected at approximately the same time as the 2010-2011 EPA surface gamma scan, which contained measurable concentrations of Cs-137 that exceeded preliminary radiological screening levels, were taken from locations that were more than 400 feet away from the

Building 4011 Low Bay and therefore that information does not have any bearing on the current planned removal of the Building 4011 Low Bay.

DTSC's decision relied in part on CalDPH's review of the additional documents that I listed above. The review by CalDPH was thorough and included both thoughtful and detailed review of all the data and facts that Boeing submitted. Based on my review of those additional documents, which due to time constrains was unfortunately only cursory, I concur with the conclusions that CalDPH transmitted to DTSC in its internal memorandum dated April 30, 2013.

My reading of the linked supporting documents, though cursory, suggests that during operations at Building 4005, all tasks were completed without any significant contamination incident. MARSSIM was been published after the building closeout surveys were first requested, but Rocketdyne, the contractor at the time, had not yet incorporated MARSSIM into its survey procedures before the surveys were actually performed. In spite of that fact, the survey design was statistically based in much that same way as MARSSIM-based surveys and the survey was nearly as thorough as a strictly MARSSIM-based survey would have been. TetraTech finally concluded that, in spite of the weaknesses of the 2002 survey, the results were strengthened by confirmatory surveys that were performed by U.S. NRC, and the entire body of data is adequate to support the conclusion that the structure is free of contamination. This appears to form part of the basis for DTSC's confidence that it's unlikely that there is any radioactive contamination in the remaining Building 4011 Low Bay that has not already been discovered.

DTSC has also made visits to the Building 4011 site, and together with California DPH has performed contamination surveys of its own. Those findings also form part of the basis for DTSC's confidence that it's unlikely that there is any radioactive contamination in the remaining Building 4011 Low Bay that has not already been discovered.

CONCLUSIONS AND RECOMMENDATIONS

Having reviewed the documents for which DTSC requested comments, together with the attached and linked supporting materials, it seems to me that DTSC has thoroughly captured and referenced all of the relevant supporting facts and that the correspondence that DTSC proposes to mail out properly directs Boeing to proceed, subject to appropriate constraints.

RADIOLOGIC HEALTH BRANCH
RADIOLOGICAL ASSESSMENT UNIT

Date: April 30, 2013

To: Roger Lupo

From: Thomas Moore

Re: Review of Documents for SSFL Area IV Building 4011

As requested I have reviewed the Radiological Surveys, Memos, and Reports (see endnotes) for Building 4011, which housed the Radiation Instrument Calibration Lab (RICL) from 1984-1996, in Area IV of the Santa Susana Field Laboratory (SSFL).

My review included the following documents: (1) Radiological surveys from Boeing[1], CDHS[2], and EPA[3,4]. (2) Release criteria for radiological facilities at SSFL from USNRC[5] and Boeing[6]. (3) Historical documentation of Building 4011 from Boeing and Sapere Consulting[7].

Having completed my review of the above documents, I have reached the following conclusions:

- Historical details for past use and potential radiological issues were well documented so that appropriate radiological survey methods could be used. When RICL was operational in Building 4011 primarily sealed sources were used for calibration of instruments, and repair of equipment with low levels of internal contamination was performed.

- Survey methodology by Boeing[1] , and CDHS[2] was based upon best industry standards at the time, and was adequate for the task. Survey methodology by EPA[3,4] incorporated MARSSIM[8] methodology, which is the present standard. Surveys included measurements of direct and removable contamination (alpha and beta) and gamma exposure rates. QA & QC processes for all surveys were adequate to demonstrate data quality.

- The results of the radiological surveys were within the limits established by Boeing[6] and the NRC[5].

- There appears to be no evidence to contradict the conclusions made by DHS in 1998 when the building was removed from Rockwell's radioactive materials license[9]. No further radiological surveys from Building 4011 seem warranted.

Thomas Moore
Associate Health Physicist
CDPH-RHB-RAU

[1] Boeing Report, no document number, "FINAL RADIOLOGICAL SURVEY DATA PACKAGE for Building 011 Santa Susana Field Laboratory" 28 July, 1998 Compiled by James G. Barnes

[2] Confirmatory Survey of Building T011 Santa Susana Field Laboratory Boeing-Rocketdyne Ventura County, CA, Roger K. Lupo, Radiation Assessment Unit, Radiologic Health Branch, California Department of Health Services (currently CDPH)

[3] U.S. EPA Report, no document number, "FINAL OVERSIGHT VERIFICATION AND CONFIRMATION RADIOLOGICAL SURVEY REPORT FOR BUILDINGS T-011, T-019, T-055, AND T-100," December 20, 2002.

[4] U.S. EPA Report, no document number, "FINAL ROCKETDYNE TECHNICAL SUPPORT AND FIELD OVERSIGHT DOCUMENT REVIEW FOR BUILDINGS T009, T011, T019, T055, AND T100", DECEMBER 20, 2002

[5] USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" June 1974

[6] Boeing Document, N001SSR140131, "Approved Site wide Release Criteria for Remediation of Radiological Facilities at the SSFL", December, 1998

[7] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume I, Sapere Consulting, Inc., May, 2005

[8] U.S. Environmental Protection Agency (EPA). Multi Agency Radiation Survey and Site Investigation Manual. Revision 1. August 2000

[9] Untitled letter, from Gerald Wong to James Barnes, September 17, 1998

CDPH RADIOLOGIC HEALTH BRANCH
RADIOLOGICAL ASSESSMENT UNIT

Date: May 30, 2013

To: Roger Lupo

From: Ted Ward

Re: Review of Documents for SSFL Area IV Building 4055

As requested I have reviewed the Radiological Surveys, Memos, and Reports (see footnotes) for Building 4055 in Area IV of the Santa Susana Field Laboratory (SSFL).

My review included: (1) Decommissioning radiological surveys from Rockwell International[1], Oak Ridge National Laboratory (ORNL)[2], and USEPA (Tetra Tech)[3].
(2) Release criteria for radiological facilities at SSFL from USNRC[4], and Boeing[5].
(3) Historical documentation of Building 4055 from Boeing[6] and Sapere Consulting, Inc.[7,8].
(4) Final status report from Boeing[9].

Upon completion of my review of the above documents I have reached the following conclusions:

- History of use and past radiological issues were well documented so that radiological survey methods in these areas of concern could be established.
- The Radiological survey techniques used by Rockwell International[1], ORNL[2], and Tetra Tech[3] all addressed the areas of concern. All of the techniques used were based on gridded maps; Rockwell International and ORNL used random grid points within the building while Tetra Tech paid attention to areas likely to be contaminated (i.e., surface cracks, corners, ledges, etc.). All of the radiological surveys included soil samples, direct and removable contamination surveys (Alpha and Beta). Two of the surveys (ORNL, Tetra Tech) included gamma dose rates at 1 meter above the surface in the building and surrounding area.
- The final results of the radiological surveys were well within the limits established by the NRC[4] and Boeing[5]. If a survey point was above the limits on the initial survey the area was remediated and resampled to verify it was less than the established limits. Rockwell International set their remediation point at 80% of the established limits and then verified that the area was less than the limits after the remediation.

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[1] Rockwell International Report, N704SRR990027, "Final Radiation Survey of the NMDF," December 19, 1986

[2] Oak Ridge Associated Universities Report, no document number, "Confirmatory Radiological Survey Nuclear Materials Development Facility (Building T-055), Rockwell International, Santa Susana, California", July 1987.

[3] EPA Report, no document number, "Final Oversight Verification and Confirmation Radiological Survey Report for Buildings T-011, T-019, T-055, and T-100," December 20, 2002.

[4] USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" June 1974

[5] Boeing Document, N001SSR140131, "Approved Sitewide Release Criteria for Remediation of Radiological Facilities at the SSFL", December, 1998.

[6] AI-DOE-13559, "Nuclear Materials Development Facility Decommissioning Final Report", March 31, 1987.

[7] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume I, Sapere Consulting, Inc., May, 2005

[8] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume II, Group X, Sapere Consulting, Inc., May, 2005

[9] 4055 Regulatory Release and Decommissioned Material Disposal, February 25, 2013

- Recommend no further radiological surveys for Building 4055 based on:
  - The final direct and removable contamination survey results[1,2,3] are well below the established limits[4,5].
  - Soil and cement core sample results[1,2,3] from the piping trench and building floor and walls showed only naturally occurring radionuclides.
  - The gamma dose rate surveys[2,3] are at or near background levels for the Santa Susana Field Laboratory area.
  - All radiological material has been removed from the building (including the initial floor linoleum) and shipped as radiological waste as stated in Boeing's final report[6]. After the linoleum was removed the cement floor was 100% surveyed and remediated below established limits.

Ted Ward
CDPH-RHB-RAU
(208) 757-0266

RADIOLOGIC HEALTH BRANCH
RADIOLOGICAL ASSESSMENT UNIT

Date: May 30, 2013

To: Roger Lupo

From: Ted Ward

Re: Review of Documents for SSFL Area IV Building 4100

As requested I have reviewed the Radiological Surveys, Memos, and Reports (see endnotes) for Building 4100 in Area IV of the Santa Susana Field Laboratory (SSFL).

My review included: (1) Decommissioning radiological surveys from Rockwell International[1], USNRC[2], USEPA (Tetra Tech)[3] and Boeing[4].
(2) Release criteria for radiological facilities at SSFL from USNRC[5], and Boeing[6].
(3) Historical documentation of Building 4100 from Boeing and Sapere Consulting, Inc.[7,8].

Upon completion of my review of the above documents I have reached the following conclusions:

- History of use and past radiological issues were documented so that radiological survey methods in areas of concern could be established.
- At the time of the radiological survey performed by the USEPA (Tetra Tech)[3], Rooms 112,113, and 114 were still being used as Radiological Counting and Calibration labs. These labs were surveyed by Boeing[4] in 2012 and CDPH in 2013.
- The Radiological survey techniques used by Rockwell International[1], USNRC[2], and Tetra Tech[3], and Boeing[4] all addressed areas of concern. The technique used by Tetra Tech3 was based on detailed gridded maps. The radiological surveys by USNRC[2], and Tetra Tech[3] included soil, drain, and concrete samples. Direct and removable contamination surveys (Alpha and Beta) and gamma exposure rates at one meter above the surface was performed in all radiological surveys[1,2,3,4].
- The final results of the radiological surveys were well within the limits established by the USNRC[4] and Boeing[5].
- Boeing[4] established DCGL and Investigation Levels (as stated in Table 2 of their report) for rooms 112, 113, 114, and the annex. If an Investigation Level was exceeded the action to be taken was that the area be resurveyed and decontaminated below the Investigation Levels (if required).
- Recommend no further radiological surveys for Building 4100 based on:
    - The final direct and removable contamination survey results[1,2,3,4] are well below the established limits[5,6].
    - Soil, drain, and concrete sample results[2,3] from the trench, drains, and core samples showed "no significant radioactivity"[2] or naturally occurring radionuclides[3].
    - The gamma dose rate surveys [1,2,3,4] are at or near background levels for the Santa Susana Field Laboratory area.
    - All radiological material has been removed from Building 4100 and shipped as radiological waste as stated in Boeing's final report[6].
    - No Investigation Level or DCGL as stated in Boeing[4] was exceeded during their initial survey.

Ted Ward
CDPH-RHB-RAU

[1] Rockwell International Report, 80 esg-3900, "Radiological Survey Report following Dismantling and Decontamination of facility" December 19, 1986
[2] NRC Report, Docket Number 50-147, "NRC Inspection of Rockwell International's FCEL Facility" July 11, 1980
[3] EPA Report, no document number, "Final Oversight Verification and Confirmation Radiological Survey Report for Buildings T-011, T-019, T-055, and T-100," December 20, 2002.
[4] Boeing, "Final Status Report for Area IV Building 4100 (Rooms 112,113,114, and the Annex)", November 2012
[5] USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" June 1974
[6] Boeing Document, N001SSR140131, "Approved Sitewide Release Criteria for Remediation of Radiological Facilities at the SSFL", December, 1998.
[7] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume I, Sapere Consulting, Inc., May, 2005
[8] Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California, Volume II, Group BB, Sapere Consulting, Inc., May, 2005