The USDA Agricultural Research Service Capital Investment Strategy

April 2012

Cover Image: USDA National Centers for Animal Health, Ames, Iowa –
a world-class biocontainment facility complex for animal health research and diagnostics.
Formally dedicated in 2010 after a 10-year, $462 million capital improvement project.

The USDA Agricultural Research Service
Capital Investment Strategy

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Preface

Highly specialized and quality laboratory facilities are among the essential assets of organizations that conduct scientific research. As the principal intramural scientific research agency of the Department of Agriculture (USDA), the Agricultural Research Service (ARS) operates an extensive network of more than one hundred Federally-owned research facilities. Over the past 25 years USDA has invested significant levels of public funds to maintain and enhance this valuable resource in order to sustain its capacity to address important technical problems and explore new scientific opportunities to benefit the nation's food and agriculture system and the public.

For much of the past decade the Federal budgetary process for capital improvements to ARS buildings and facilities was focused almost exclusively on the new $462 million biocontainment science facility complex for the National Centers for Animal Health in Ames, Iowa. During this period when budget requests for other new construction or recapitalization of research facilities were being deferred by the Administration, more than 25 Congressionally-directed facility projects received partial funding. To assess the merit and priority for fully funding those pending research facility projects and others in need, the USDA Secretary directed ARS to review its laboratory portfolio and develop a plan for future capital investments. Additionally, Senate Report (111-221) on Fiscal Year 2011 appropriations from the Committee on Appropriations "…directs the Secretary to evaluate the agency's [ARS'] capital asset requirements…" Similarly, House Report (112-101) on Fiscal Year 2012 appropriations, "…directs ARS to establish a long term, multi-year plan to guide capital asset construction decisions for new agricultural research buildings and facilities consistent with program missions, goals, and requirements."

This report presents a Capital Investment Strategy for recapitalization and new ARS research facilities based on facility condition, needs, and research program priorities. Recommendations also are made for near term investments. This report does not constitute a USDA request for funding, but the recommendations and overall strategy will inform and support the development of Administration budget requests for ARS research facilities in the out years.

Executive Summary

Specialized scientific laboratories and related facilities are essential to the ability and capacity of the USDA Agricultural Research Service (ARS) to carry out its research responsibilities. The portfolio of ARS science facilities consists of more than one hundred major Federally-owned laboratory buildings and many additional research support structures. These facilities are strategically located throughout the U.S., reflective of the wide geographic diversity and site specificity of agricultural production; distinct climatic and agroecosystem zones; and the numerous research partners, cooperators, and customer/users with which ARS works. About 30 percent of ARS research is housed in cooperator (i.e., non-ARS-owned) facilities.

USDA research facilities are valuable public assets. The process and criteria provided in this report for identifying the regular and periodic ARS infrastructure improvements needed, and the specific investment recommendations made, will sustain USDA's capacity to conduct quality scientific agricultural research in support of its mission and responsibilities to enhance agricultural productivity and sustainability and otherwise help to advance the nation's food and agricultural system for public benefit. This research capacity will also importantly address the ever increasing challenges to global food, agricultural, and natural resource systems in the next three to four decades, including world population growth, doubling of food demands, changing climates, dwindling availability of arable land and water for food production, and the growing needs for renewable bioenergy production.

While considerable levels of public funds have been allocated over the past 25 years to maintain and improve the ARS laboratory infrastructure – now valued at nearly $3.7 billion and consisting of many new and outstanding facilities – investments have not kept pace with standards and needs. In recognition of these unmet needs, and given current and expected continued national economic constraints, the Secretary of Agriculture and the U. S. Congress have directed ARS leadership to develop a strategy for future capital investments in USDA research facilities.

Building upon the already well-established real property management system in ARS, the Capital Investment Strategy described in this report provides a data- and

criteria-based process for assessing capital investment needs based upon facility conditions and program priorities. Applying these criteria to 122 major ARS-owned research facilities, 21 low-condition facilities judged to be among those currently in greatest need of improvement -- and housing high priority programs and/or having the capacity to do so in the future -- are identified for recapitalization over the next decade. Also identified for priority investment are three ARS facilities to be constructed to house priority research now located in cooperator-owned facilities.

To sustain the capacity of ARS' substantial though constantly aging infrastructure for quality scientific research, such facilities require regular maintenance and periodic upgrades throughout their 35 to 40 year functional lifespans; eventually they require major renovation/modernization or replacement. Industry standards suggest that an average annual investment of about 4 percent of the capitalization value of a facility portfolio would be required. Thus, to maintain and upgrade the capacity of the USDA facility portfolio to support quality agricultural science, nearly $150 million in capital investments will be needed on a regular and recurring basis to address current backlogs and the constantly aging infrastructure. As those facilities in least adequate condition and relatively greatest need are improved, other facilities in need will move to a position of higher priority consideration for investment.

Criteria for determining priority capital investments can also be used to inform and support cost-effective decisions for divesting some low condition facilities and consolidating the research housed in them to adequate facilities located elsewhere, thus minimizing overall capital investment requirements.

While not constituting a request for Congressional appropriations, the report recommendations can be used to shape the development of future annual USDA budget proposals as economic conditions and opportunities permit.

Introduction: Sustaining the ARS Infrastructure

The Agricultural Research Service (ARS) is USDA's principal intramural scientific research agency and the Nation's primary public institution that conducts agricultural research. From field to table, ARS scientists find solutions to technical problems that affect agricultural producers and American consumers every day. ARS is supported by an annual appropriated research budget of about $1.1 billion, and operates an established supporting network of laboratories and research facilities and world-class scientific expertise in food and agriculture, consisting of 8,800 employees of which 2,200 are Ph.D. scientists, and 800 research projects at nearly 100 research locations throughout the Nation and in several foreign countries. ARS addresses public good and emerging and critical national agricultural research needs on a scale that only the Federal government can muster.

ARS research priorities are driven by the Administration, Congress, customers, and stakeholders, focusing on the areas of research most crucial to American agriculture where Federal research is inherently suited to make innovative contributions. ARS program managers ensure that research programs remain relevant to national priorities and the ARS peer review system ensures that this research meets high standards of scientific merit.

Agriculture is inherently location specific. ARS' network of specialized research facilities located throughout the Nation reflects the diversity and site specificity of agriculture, climates and natural resources, stakeholders, and research partners. ARS programs focus on core, long-term agricultural concerns, while maintaining the capacity and readiness to respond to emerging and pressing problems when the need arises.

ARS manages substantial real property assets having a capitalization value of nearly $3.7 billion. These assets include over 400,000 acres of Federal land on which ARS-owned research facility complexes are located consisting of 4,600 individual buildings and structures totaling 14 million square feet of space. This collective ARS-owned and managed infrastructure houses about 70 percent of all ARS staff and programs, as well as those of numerous cooperators. About 30 percent of ARS staff and programs are housed in cooperator-owned or leased

facilities for which ARS has varying degrees of management and maintenance responsibilities.

Scientific research facilities, like all physical infrastructures, deteriorate over time. In fact, due to their highly specialized nature many are more demanding in terms of maintenance and repair and have an average functional lifespan of only 35 to 40 years. During this span, facilities require increasingly regular repair and maintenance to sustain their capacity for effective research. If not regularly maintained, the costs of needed repairs and major upgrades could ultimately exceed the value of the facility. Federal research facilities need additional regular attention and periodic upgrades in order to comply with municipal and Federal building code requirements, adhere to standard engineering safety principles and physical security and biosecurity requirements, and provide contemporary information technology and biosafety infrastructure.

Dale Bumpers National Rice Research Center
Stuttgart, Arkansas

ARS has many highly adequate and state-of-the-art research facilities constructed anew or modernized in the past several decades. It also has a significant number of older facilities and a constantly aging infrastructure overall. Many of these facilities are at the limit or well in excess of their functional lifespan according to engineering standards.

ARS scientists need to have adequate and up-to-date facilities on a sustained basis in order to produce research results that will help the U.S. continue to lead the world in agricultural innovation. In recognition of this principle, ARS real property management is an ongoing process of very high priority. This process entails timely and accurate assessments and inventories of facility conditions, and their periodic repair, maintenance, and recapitalization as needed and as the availability of resources permits. This report builds upon ongoing real property management, and describes a Capital Investment Strategy (CIS) that establishes an updated and enduring framework for prioritizing future investments in ARS facilities. The plan is consistent with Federal asset management standards and requirements, and has been benchmarked against similar strategic plans and best practices of other Federal agencies (see Appendix A).

This CIS provides a systematic, data- and criteria-based process for assessing capital investment needs based on facility physical conditions, lifespan criteria, cost estimates, and research program priorities. The CIS provides a blueprint for future capital investments that will allow ARS to continue to meet its mission, and provides specific capital investment recommendations for the near term, that is, during the next 10 years.

Grand Forks Human Nutrition Center
Grand Forks, North Dakota

ARS Facility Evaluation and Prioritization Process

Background information presented in the subsections that follow provide the context and basis for identifying and recommending near-term priority capital investments for current and future highest priority research programs housed in least adequate facilities.

ARS Real Property Asset Management

ARS has well-established processes and databases for managing its real properties in accordance with Federal policy requirements. These functions are carried out by the Facilities Division (FD) of the headquarters-based ARS Administrative and Financial Management (AFM) staff. AFM provides business support to all of ARS programs and some client agencies. FD consists of a professional staff of about 60 FTE that provides management expertise for engineering projects, construction contracts, real property acquisition, space utilization, energy use efficiency, and facility safety and security.

FD carries out these activities within the context of Federal executive orders, OMB guidance, and USDA policy. In particular, Executive Order 13327, Federal Real Property Asset Management Requirements, issued in 2004, provides the foundation for OMB Capital Planning and Investment Control (CPIC) guidance (OMB Circular A-11, Part 7). In accordance with this OMB guidance and the Executive Order, USDA in 2007 issued its Real Property Capital Programming and Investment Process (CPIP), which included an ARS-specific component, the ARS Building Block Plan (BBP). A key operational component of the BBP is the use of internal ARS real property Asset Management Review Boards (AMRB) composed of field and headquarters executives and program leaders who review and recommend investment actions for new construction, repair and maintenance, land purchases and disposal (see sidebar for Board membership). FD utilizes a comprehensive USDA facilities inventory database and tracking and reporting system called the Corporate Property Automated Information System (CPAIS) to support these reviews, actions, and the ongoing stewardship of ARS real property. See Appendix B for the types of data included in CPAIS for each facility. These data are updated periodically with new information via a physical facility inventory verification undertaken every five years by agency staff or contractors.

The ARS Asset Management Review Board

Headquarters membership:

- Deputy Administrator, Administrative & Financial Management (Chair)
- Associate Administrator for National Programs
- Associate Administrator for Research Operations
- Director, Budget & Program Management Staff
- Director, Facilities Division
- ARS Real Property Officer

For management purposes, the network of ARS laboratories in the field is grouped into eight geographic regions or "Areas," plus the National Agricultural Library. Each of these field Areas has an asset management review board composed of comparable agency officials. The Area AMRBs make real property recommendations to the headquarters board, which in turn advises and recommends real property actions to the ARS Administrator.

San Joaquin Valley Agricultural Research Center
Parlier, California

Using CPAIS, the FD staff, in concert with ARS research program and budget managers, guide investments for capital improvement and maintenance of ARS real property assets through five principal activities, funding sources, and authorities, as follows:

1. Buildings and Facilities (B&F) account. This is an annual ARS appropriation line item separate from the ARS Salaries and Expenses (S&E) appropriation. S&E is the annual program account that funds and supports research operations on an ongoing basis. The separate B&F account is the principal source of funds for capital investments in ARS. The amounts appropriated vary from year to year depending on facility needs, Administration budget requests via the President's budget, and actual appropriations from the U.S. Congress as approved in Appropriation bills. Over the past 26 years (fiscal years 1985 to 2010), B&F appropriations have averaged about $55 million per year in actual dollars, ranging from zero to $178 million in specific years. Adjusted for inflation, the annual average appropriation in current year dollars is estimated to be $76 million. The annual B&F appropriations are displayed in Appendix C. Capital projects completed with these funds are listed in Appendix D. Selected images of some of these new and modernized facilities are presented throughout this Report. A more complete pictorial portfolio of some of these new and modernized facilities funded with B&F appropriations is provided in Appendix E. Collectively, these facilities are highly valuable USDA assets that are crucial to sustain the U.S. capacity to support and conduct agricultural and food science research that meets the public need for safe and nutritious food.

2. American Recovery and Reinvestment Act (ARRA) of 2009. ARS ARRA projects are itemized and described in Appendix F. They constitute a one-time $176 million appropriation to address critical deferred maintenance of 41 selected high priority mission-critical ARS facilities that had previously been identified through the ARS Capital Project Repair Plan and Asset Management Review Board planning process. ARRA funding importantly complemented B&F funded modernization projects. The renovation and construction work for some of these projects remains underway (2012).

3. Repair and Maintenance (R&M) budget line item in the ARS S&E account. The current R&M line item budget is $18 million annually, a level that has been flat for about 16 years and that has not kept pace with inflation and

the needs of an aging real property inventory and new compliance requirements.

The R&M Program is specifically intended to improve existing ARS facilities within specific guidelines: protection of life, protection of property, implementation of mandated regulations, compliance with building codes, more effective space utilization, and implementation of energy conservation. The definition of repair, as customarily applied to ARS facilities and buildings, is the restoration and renovation of components of an existing facility to a condition substantially equivalent to its original state and efficiency with the repair work complying with the requirements contained in the current applicable codes and standards. Pending the availability of funds, there is no restriction on the amount of funds that can be spent on R&M projects.

National Biological Control Laboratory
Stoneville, Mississippi

A portion of the appropriated R&M funds ($2 to 3 million) is used annually to address recurring mandates such as real property, energy, and sustainability assessments and reporting requirements, as well as seismic studies, accessibility surveys and corrective actions, and physical security upgrades. Another portion of the R&M funds are typically used for phased upgrades and modernization of existing structures, generally in the $1 to $3.5 million range per phase. Such notable projects completed in past years or now underway are modernization of ARS facilities or major components thereof at El Reno, Oklahoma; Fort Collins, Colorado; Newark, Delaware; Frederick (Ft. Detrick), Maryland; Ames, Iowa; and Boston, Massachusetts.

4. Based upon internal ARS policy, Research Leaders and managers assign 4 percent or more of their annual base S&E funding to routine and other local real property repair and maintenance requirements at their respective facilities and locations, unless a portion of the set aside is waived due to adequate condition of the facilities. A total of about $26 million is expended annually ARS-wide from this source. Examples of typical local repair and maintenance expenditures include:

    - HVAC/electrical/plumbing component repair and maintenance
    - Roof replacement
    - Building envelope repair and/or maintenance
    - Site utility system replacement/repair/maintenance
    - Fire protection installation/replacement
    - Fume hood replacement/correction of air flow deficiency
    - Road paving (site pedestrian and vehicular circulation)
    - Correction of site drainage
    - Other life safety systems installation/replacement
    - Miscellaneous repairs (windows, painting, plumbing, etc.)

5. Limited Small Building Authority. Within the S&E appropriation account are line item authorizations for construction and improvement of "small buildings" to support and enhance specific laboratory facilities the costs of which are not to exceed limited amounts. Three authorities are applicable: the Ten Small Building (TSB) authority limited to $750,000 per project; the Unlimited Small Building (USB) authority limited to $375,000 per project; and the Headhouse/Greenhouse authority limited to $1.2 million per project.

    The TSB and USB authorities have been used to construct equipment storage and other support facilities, small laboratory buildings, insectaries, fumigation facilities, chemical handling and storage facilities, grain storage, and similar small structures. From 2001 to 2010, the average annual expenditure on these types of facilities was approximately $2.12 million.

Although variable in amounts from year to year, these collective publicly-funded capital investments and related real property expenditures (items 1 to 5 above) made by ARS over the past 26 years averaged about $125 million per year in

current year dollars. Going forward, this level of annual investment is generally consistent with the order of magnitude amount needed, i.e., the $100 to $150 million range, in current year dollars, on a regular basis to sustain USDA's in-house laboratory infrastructure and capacity to address long-term research priorities and obligations.

The size of this projected annual capital investment needed is reinforced and validated by an alternative estimation approach based upon standard engineering criteria and principles that suggest a 4 percent annual recapitalization rate of the $3.7 billion current ARS capitalization value is required, or about $148 million per year. Another approximation specific to ARS is based upon the current capitalization value and a 35- to 40-year functional life span of individual facilities. Assuming a staggered and evenly spaced facility age distribution among all ARS facilities, a minimum annual investment of about $100 million in B&F funding would be needed each year in current year dollars to recapitalize the $3.7 billion portfolio on a recurring basis.

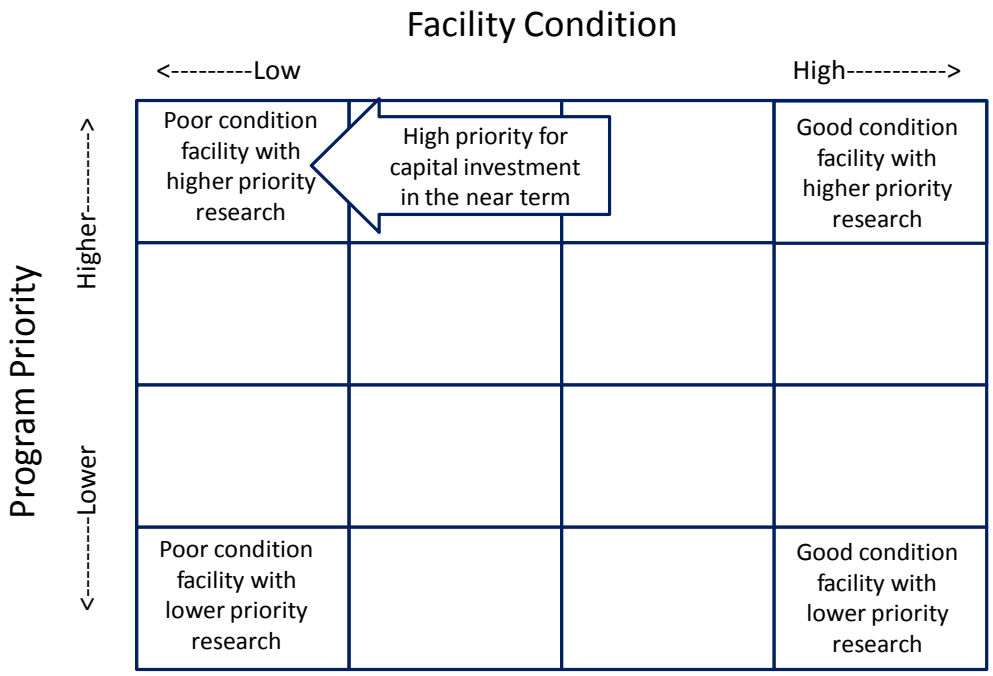
Yet another estimation or approximation of the appropriate level of annual infrastructure support and recapitalization is based on the annual S&E appropriation to ARS. At the current (FY 2012) level of $1.095 billion for conducting research, an additional allocation of 10 to 15 percent ($100 to 150 million) is consistent with the magnitude of recurring investment needed to maintain a quality physical infrastructure to sustain that level of research.

Thad Cochran Southern Horticulture Laboratory
Poplarville, Mississippi

Facility Condition and Program Priority

A conceptual framework for determining capital investment needs based upon the relation of facility condition to program priority is illustrated in Figure 1.

Figure 1: Facility Condition and Program Priority Matrix



For illustrative purposes, the graphic of Figure 1 is shown as a 4x4 grid or matrix comprised of 16 cells of varying combinations of facility conditions and research priorities. On the horizontal axis across the top is Facility Condition ranging left to right from low (least adequate) to high (most adequate). This left to right range is inversely correlated with facility age and facility recapitalization need, both high to low. On the vertical axis on the left side of Figure 1 is Program Priority of the research carried out in facilities. At the top left are high priority programs and at the bottom left are lesser priority programs.

Placement in the upper left cell would be those facilities housing highest priority programs but in the least adequate physical conditions, thus in greatest need of near term recapitalization investments, i.e., replacement or major

renovation/modernization. Such facilities are generally those that have exceeded their functional life span and have high levels of deferred maintenance. Conversely, high priority program facilities in the upper right cell are generally new, in good condition, and not in need of near term investment other than continued routine maintenance.

As facilities age and deteriorate over time, their condition, capacity, and adequacy for housing research generally diminish. Thus, with time the placement of aging facilities on the graphic will trend toward the left along the horizontal axis, regardless of the vertical placement of the priority of the research programs housed in them.

U.S. Arid Land Agricultural Research Center
Maricopa, Arizona

The facilities placed in the entire horizontal bottom tier of cells in Figure 1 house lesser priority research programs over the entire spectrum of facility conditions. Such facilities are those having the greatest potential to be utilized, redirected, and/or retrofitted for higher priority research programs. In times of overall budget reductions, needs for cost savings, and improved operational and program efficiencies, such facilities and the lower priority programs they house are potential candidates for consolidation or closure, thus avoiding the cost of future operations and recapitalization, and allowing ARS to redirect resources toward higher priority needs and opportunities.

As will be shown later in this CIS report, the matrix illustrated in Figure 1 will be used to display the relative conditions and priorities of major ARS owned research facilities.

Conditions of Major ARS Owned Facilities

Among the multiple buildings and structures at each of the nearly 100 locations where ARS has a research presence, 122 major ARS owned research facilities have been identified for consideration in this CIS report. In most cases an identified facility represents a complex of structures that house and support a named Research Center, Laboratory, or other programmatic organizational unit. At some locations (e.g., Beltsville, Maryland; Ames, Iowa; Madison, Wisconsin; Davis, California; College Station, Texas; Stoneville, Mississippi), there are multiple major ARS research programs and owned facilities that are identified separately.

Table 1 lists the 122 major ARS owned facilities, each identified by name, city/state location, and an ordinal number, 1 to 122 (i.e., Site ID). Also indicated in Table 1 for each facility is an important metric labeled Condition Index (CI). The latter is derived from the CPAIS database and is calculated from the ratio of facility deferred maintenance and replacement value (see sidebar). While the CI value is not a precise or absolute metric for determining recapitalization requirements, it is the starting point and relative indicator of investment needs. In Table 1, adjustments have been made to calculated CI values for some facilities, either downward to reflect known facilities deficiencies and needs, or upward to reflect improvements already made or underway, that are not yet reflected in the CPAIS database. Among other important factors and determinants of facility condition and need for recapitalization are facility age, capacity, safety and health issues, security, time since repair or renovation, new capabilities needed, urgency, and of course the current and future priority of the research carried out in the facility.

For the named facilities in Table 1 that consist of multiple buildings and structures, the CI number provided generally represents the main laboratory/office structure that houses and supports the named unit. In some instances the CI number represents a weighted average of the conditions of multiple structures that are more or less equally essential for housing the named unit.

Condition Index

In the CPAIS database one set of fields includes industry-standard measures of deferred maintenance and facility replacement values, which are combined into a Condition Index (CI) for the facility that is calculated as follows in accordance with Federal Real Property Council (FRPC) guidelines and definitions:

CI = (1 – DM/PRV) x 100

where Deferred Maintenance (DM) is the funding amount necessary to ensure that a constructed asset (e.g., facility) is restored to a condition substantially equivalent to the originally intended design, capacity, efficiency, or capability. Deferred Maintenance can also be considered to be equivalent to "Repair Need." Plant Replacement Value (PRV) is the cost of replacing an existing asset at today's standards (in current year dollars).

Calculated CI values in CPAIS can range from 0 to 100, with 100 indicating like-new condition. A calculated CI value can be adjusted downward to reflect recent damage or other known renovation need (i.e., higher DM), or adjusted upward to indicate ongoing or recent investments (i.e., reduced DM) for renovations not yet reflected in the CPAIS database.

National Center for Cool and Coldwater Aquaculture
Leetown, West Virginia

Table 1: Location, Name, and Condition Index of ARS Owned Research Facilities

Site ID	City	State	ARS Laboratory Name	Condition Index
1	Montpellier	France	European Bio Control Laboratory	100.00
2	Washington	DC	National Arboretum	97.70
3	Beltsville	MD	Animal & Nat Res. - An Imp, Gen, Biosci & Biotech (B-200)	95.32
4	Beltsville	MD	Animal & Nat Res. - Env Microbial and Food Safety (B-303)	89.00
5	Beltsville	MD	Animal & Nat Res. - Hydrol, Rem Sens & Env Mgt (B-007)	93.99
6	Beltsville	MD	Animal & Nat Res. - Parasitic Diseases Lab (B-1040)	94.53
7	Beltsville	MD	Animal & Nat Res. - Sust. Ag and Crop Systems (B-001)	96.85
8	Beltsville	MD	Human Nutrition Ctr - Diet, Genomics & Immunology (B-307C)	99.98
9	Beltsville	MD	Human Nutrition Ctr - Food Composition (B-161)	92.23
10	Beltsville	MD	Human Nutrition Ctr - Health & Human Studies (B-307B)	99.89
11	Beltsville	MD	Human Nutrition Ctr - Nutrition Data and Food Surveys (B-005)	93.55
12	Beltsville	MD	Plant Science Inst - Bee Research (B-476)	92.68
13	Beltsville	MD	Plant Science Inst - Food Quality Laboratory (B-002)	91.89
14	Beltsville	MD	Plant Science Inst - Fruits & Veg Imp and Pests (B-010A)	98.06
15	Beltsville	MD	Plant Science Inst - Invasive Insect Biocontrol (B-007)	93.99
16	Beltsville	MD	Plant Science Inst - Molecular Plant Pathology (B-004)	92.66
17	Beltsville	MD	Plant Science Inst - National Germplasm Resources (B-003)	93.55
18	Beltsville	MD	Plant Science Inst - Soybean Genomics (B-006)	92.50
19	Beltsville	MD	Plant Science Inst - Sustainable Perennial Crops (B-007)	93.99
20	Beltsville	MD	Plant Science Inst - Systematic Entomology (B-005)	93.55
21	Newark	DE	Beneficial Insects Introduction Research	100.00
22	Boston	MA	Human Nutrition Research Center on Aging	95.80
23	Franklin	ME	National Cold Water Marine Aquaculture Center	100.00
24	Orono	ME	New England Plant, Soil & Water Research	94.30
25	Geneva	NY	Plant Genetic Resources	100.00
26	Ithaca	NY	Robert W. Holley Center For Agriculture & Health	95.20
27	University Park	PA	Pasture Systems & Watershed Management Research	90.50
28	Wyndmoor	PA	Eastern Regional Research Center	94.00
29	Kearneysville	WV	Appalachian Fruit Research Laboratory	97.20
30	Leetown	WV	Cool & Cold Water Aquaculture Research	99.46
31	Ames	IA	National Animal Disease Center	100.00
32	Ames	IA	National Laboratory for Agriculture and the Environment	92.64
33	Peoria	IL	National Center For Agricultural Utilization Research	98.00
34	West Lafayette	IN	National Soil Erosion Research	97.00
35	East Lansing	MI	Avian Disease & Oncology Research	89.00
36	Morris	MN	Soil Management Research	84.09
37	St. Paul	MN	Cereal Disease Research	94.00
38	Columbia	MO	Biological Control of Insects Research Laboratory	80.00
39	Madison	WI	Cereal Crops Research	99.50
40	Madison	WI	U.S. Dairy Forage Research Center	88.14
41	Marshfield	WI	Institute for Environmentally Integrated Dairy Management	97.65
42	Maricopa	AZ	U.S. Arid Land Agricultural Research Center	100.00
43	Tucson	AZ	Honey Bee Research	84.78
44	Tucson	AZ	Southwest Watershed Research Laboratory	79.56
45	Albany	CA	Western Regional Research Center	97.80

46	Davis	CA	National Clonal Germplasm Repository	91.80
47	Davis	CA	Western Human Nutrition Research Center	100.00
48	Parlier	CA	San Joaquin Valley Agricultural Sciences Center	99.67
49	Riverside	CA	Citrus Repository	94.20
50	Riverside	CA	U.S. Salinity Laboratory	98.01
51	Salinas	CA	Crop Improvement and Protection Research	79.44
52	Hilo	HI	U.S. Pacific Basin Agricultural Research Center	100.00
53	Aberdeen	ID	Small Grains & Potato Germplasm Research	93.65
54	Dubois	ID	US Sheep Station	84.00
55	Kimberly	ID	Northwest Irrigation & Soils Research	84.42
56	Corvallis	OR	Forage Seed & Cereal Research	93.22
57	Corvallis	OR	Horticultural Crops Research	95.00
58	Corvallis	OR	National Clonal Germplasm Repository	92.55
59	Pendleton	OR	Soil & Water Conservation Research	84.56
60	Wapato	WA	Fruit & Vegetable Insect Research	98.32
61	Akron	CO	Central Plains Resources Management Research	93.49
62	Fort Collins	CO	National Center For Genetic Resources Preservation	94.69
63	Fort Collins	CO	Sugarbeet Research	99.22
64	Manhattan	KS	Center For Grain and Animal Health Research	95.76
65	Miles City	MT	Ft Keough Range and Livestock Research	99.00
66	Sidney	MT	Northern Plains Agricultural Research Laboratory	99.98
67	Fargo	ND	Red River Valley Agric Res Ctr - Northern Crops	90.00
68	Fargo	ND	Red River Valley Agric Res Ctr - Plant Bioscience	93.11
69	Grand Forks	ND	Grand Forks Human Nutrition Research Center	95.00
70	Mandan	ND	Natural Resource Management Research	90.00
71	Clay Center	NE	U.S. Meat Animal Research Center	91.79
72	Brookings	SD	North Central Research Laboratory	98.20
73	Logan	UT	Forage and Range Research	91.46
74	Logan	UT	Poisonous Plant Research	99.50
75	Cheyenne	WY	Rangeland Resources Research	82.11
76	Booneville	AR	Dale Bumpers Small Farms Research Center	91.48
77	Stuttgart	AR	Dale Bumpers National Rice Research Center	99.79
78	Stuttgart	AR	Harry K. Dupree Stuttgart National Aquaculture Research Ctr	97.55
79	Las Cruces	NM	Cotton Ginning Research	91.47
80	Las Cruces	NM	Jornada Experimental Range	99.98
81	El Reno	OK	Grazinglands Research Laboratory	95.19
82	Stillwater	OK	Hydraulic Engineering Research	97.25
83	Stillwater	OK	Wheat, Peanut, & Other Field Crops Research	92.01
84	Woodward	OK	Rangeland & Pasture Research	92.70
85	Bushland	TX	Conservation & Production Research Laboratory	96.52
86	College Station	TX	Southern Plains Ag Res Ctr - Areawide Pests	98.50
87	College Station	TX	Southern Plains Ag Res Ctr - Cotton Pathology & Germplasm	98.50
88	College Station	TX	Southern Plains Ag Res Ctr - Food & Feed Safety	98.50
89	Houston	TX	Children's Nutrition Research Center	87.62
90	Kerrville	TX	U.S. Livestock Insects Research Laboratory	91.80
91	Lubbock	TX	Cropping Systems Research Lab - Cotton Ginning	93.55
92	Lubbock	TX	Cropping Systems Research Lab - Livestock Behavior	94.99
93	Lubbock	TX	Cropping Systems Research Lab - Plant Stress	86.22
94	Temple	TX	Grassland, Soil & Water Research Laboratory	87.31
95	Auburn	AL	Aquatic Animal Health Laboratory	97.49

96	Auburn	AL	US Soil Dynamics Laboratory	90.30
97	Bowling Green	KY	Animal Waste Management Research	90.55
98	Baton Rouge	LA	Honey Bee Breeding, Genetics, & Physiology Research	92.02
99	New Orleans	LA	Southern Regional Research Center	99.30
100	Mississippi State	MS	Crop Science Research Laboratory	98.22
101	Mississippi State	MS	Poultry Research	88.24
102	Oxford	MS	National Sedimentation Laboratory	93.30
103	Poplarville	MS	Thad Cochran Southern Horticulture Laboratory	99.95
104	Stoneville	MS	Cotton Ginning Research	87.90
105	Stoneville	MS	Jamie Whitten Delta States Research Center	99.98
106	Stoneville	MS	National Biological Control Laboratory	100.00
107	Canal Point	FL	Sugarcane Production Research	90.87
108	Fort Lauderdale	FL	Invasive Plant Research Laboratory	100.00
109	Fort Pierce	FL	U.S. Horticultural Research Laboratory	99.06
110	Gainesville	FL	Center for Medical, Agricultural & Veterinary Entomology	89.45
111	Miami	FL	Subtropical Horticulture Research	100.00
112	Athens	GA	Richard B. Russell Research Center	94.33
113	Athens	GA	Southeast Poultry Research Laboratory	88.22
114	Byron	GA	Fruit & Nut Research	85.16
115	Dawson	GA	Peanut Research	95.20
116	Griffin	GA	Plant Genetic Resources Conservation Research	98.60
117	Tifton	GA	Crop Protection & Management Research	85.16
118	Tifton	GA	Southeast Watershed Research Laboratory	90.28
119	Raleigh	NC	Plant Science & Soybean N Fixation Research	82.25
120	Mayaguez	PR	Tropical Crops & Germplasm Research	92.51
121	Charleston	SC	US Vegetable Laboratory	99.89
122	Florence	SC	Coastal Plain Soil, Water & Plant Conservation Research	95.71

The calculated or adjusted CI values displayed in Table 1, when rank ordered 1 to 122, range from a low of 79.44 (Salinas, California) to a high of 100.00; there are 11 facilities with this high, maximum value. Because of the relatively small CI value spread from lowest to highest (20.56 difference), further evaluations in this report are based on rank-ordered, rescaled CI values to reflect a full condition index range of 1 to 100.

Jornada Experimental Range
Las Cruces, New Mexico

Table 2 shows the scaled CI values for the 122 major ARS owned research facilities being considered in this report. The facilities are relisted in condition rank order, low to high, over the scaled CI range of 1 to 100. The median scaled condition index value is 50.50, which falls halfway between rankings 61 and 62. Facilities with condition indices lower than the median (i.e., ranked 1 to 61) are those in relatively least adequate condition and in greatest need of repair and renovation/modernization. Within this group those facilities that are also considered to house relatively highest priority research programs will be the primary focus in the remainder of this report with regard to capital investment recommendations.

Table 2: ARS Owned Research Facilities, Ranked According to Scaled Condition Index – Low to High

Rank	Site ID	City	State	ARS Laboratory Name	Scaled Condition Index
1	51	Salinas	CA	Crop Improvement and Protection Research	1.00
2	44	Tucson	AZ	Southwest Watershed Research Laboratory	1.82
3	38	Columbia	MO	Biological Control of Insects Research Laboratory	2.64
4	75	Cheyenne	WY	Rangeland Resources Research	3.45
5	119	Raleigh	NC	Plant Science & Soybean N Fixation Research	4.27
6	54	Dubois	ID	US Sheep Station	5.09
7	36	Morris	MN	Soil Management Research	5.91
8	55	Kimberly	ID	Northwest Irrigation & Soils Research	6.73
9	59	Pendleton	OR	Soil & Water Conservation Research	7.55
10	43	Tucson	AZ	Honey Bee Research	8.36
12	114	Byron	GA	Fruit & Nut Research	10.00
12	117	Tifton	GA	Crop Protection & Management Research	10.00
13	93	Lubbock	TX	Cropping Systems Research Lab - Plant Stress	10.82
14	94	Temple	TX	Grassland, Soil & Water Research Laboratory	11.64
15	89	Houston	TX	Children's Nutrition Research Center	12.45
16	104	Stoneville	MS	Cotton Ginning Research	13.27
17	40	Madison	WI	U.S. Dairy Forage Research Center	14.09
18	113	Athens	GA	Southeast Poultry Research Laboratory	14.91
19	101	Mississippi State	MS	Poultry Research	15.73
20	35	East Lansing	MI	Avian Disease & Oncology Research	16.55
21	4	Beltsville	MD	Animal & Nat Res. - Env Microb and Food Safety (B-303)	17.36
22	110	Gainesville	FL	Ctr for Medical, Agricultural & Veterinary Entomology	18.18
24	67	Fargo	ND	Red River Valley Agric Res Ctr - Northern Crops	19.82
24	70	Mandan	ND	Natural Resource Management Research	19.82
25	118	Tifton	GA	Southeast Watershed Research Laboratory	20.64
26	96	Auburn	AL	US Soil Dynamics Laboratory	21.45
27	27	University Park	PA	Pasture Systems & Watershed Management Research	22.27

28	97	Bowling Green	KY	Animal Waste Management Research	23.09
29	107	Canal Point	FL	Sugarcane Production Research	23.91
30	73	Logan	UT	Forage and Range Research	24.73
31	79	Las Cruces	NM	Cotton Ginning Research	25.55
32	76	Booneville	AR	Dale Bumpers Small Farms Research Center	26.36
33	71	Clay Center	NE	U.S. Meat Animal Research Center	27.18
35	46	Davis	CA	National Clonal Germplasm Repository	28.82
35	90	Kerrville	TX	U.S. Livestock Insects Research Laboratory	28.82
36	13	Beltsville	MD	Plant Science Inst - Food Quality Laboratory (B-002)	29.64
37	83	Stillwater	OK	Wheat, Peanut, & Other Field Crops Research	30.45
38	98	Baton Rouge	LA	Honey Bee Breeding, Genetics, & Physiology Research	31.27
39	9	Beltsville	MD	Human Nutrition Ctr - Food Composition (B-161)	32.09
40	18	Beltsville	MD	Plant Science Inst - Soybean Genomics (B-006)	32.91
41	120	Mayaguez	PR	Tropical Crops & Germplasm Research	33.73
42	58	Corvallis	OR	National Clonal Germplasm Repository	34.55
43	32	Ames	IA	National Laboratory for Agriculture & Environment	35.36
44	16	Beltsville	MD	Plant Science Inst - Molecular Plant Pathology (B-004)	36.18
45	12	Beltsville	MD	Plant Science Inst - Bee Research (B-476)	37.00
46	84	Woodward	OK	Rangeland & Pasture Research	37.82
47	68	Fargo	ND	Red River Valley Agric Res Ctr - Plant Bioscience	38.64
48	56	Corvallis	OR	Forage Seed & Cereal Research	39.45
49	102	Oxford	MS	National Sedimentation Laboratory	40.27
50	61	Akron	CO	Central Plains Resources Management Research	41.09
53	11	Beltsville	MD	Human Nutr Ctr - Nutr Data & Food Surveys (B-005)	43.55
53	17	Beltsville	MD	Plant Science Inst – Nat'l Germplasm Resources (B-003)	43.55
53	20	Beltsville	MD	Plant Science Inst - Systematic Entomology (B-005)	43.55
54	91	Lubbock	TX	Cropping Systems Research Lab - Cotton Ginning	44.36
55	53	Aberdeen	ID	Small Grains & Potato Germplasm Research	45.18
58	5	Beltsville	MD	Anim & Nat Res. - Hydrol, Rem Sens & Env Mgt (B-007)	47.64
58	15	Beltsville	MD	Plant Science Inst - Invasive Insect Biocontrol (B-007)	47.64
58	19	Beltsville	MD	Plant Science Inst - Sustainable Perennial Crops (B-007)	47.64
60	28	Wyndmoor	PA	Eastern Regional Research Center	49.27
60	37	St. Paul	MN	Cereal Disease Research	49.27
61	49	Riverside	CA	Citrus Repository	50.09
62	24	Orono	ME	New England Plant, Soil & Water Research	50.91
63	112	Athens	GA	Richard B. Russell Research Center	51.73
64	6	Beltsville	MD	Animal & Nat Res. - Parasitic Diseases Lab (B-1040)	52.55
65	62	Fort Collins	CO	National Center For Genetic Resources Preservation	53.36
66	92	Lubbock	TX	Cropping Systems Research Lab - Livestock Behavior	54.18
68	57	Corvallis	OR	Horticultural Crops Research	55.82
68	69	Grand Forks	ND	Grand Forks Human Nutrition Research Center	55.82
69	81	El Reno	OK	Grazinglands Research Laboratory	56.64
70	115	Dawson	GA	Peanut Research	57.45
71	26	Ithaca	NY	Robert W. Holley Center For Agriculture & Health	58.27
72	3	Beltsville	MD	Anim & Nat Res. - An Imp, Gen, Biosci & Biotech (B-200)	59.09
73	122	Florence	SC	Coastal Plain Soil, Water & Plant Conservation Research	59.91
74	64	Manhattan	KS	Center For Grain and Animal Health Research	60.73
75	22	Boston	MA	Human Nutrition Research Center on Aging	61.55
76	85	Bushland	TX	Conservation & Production Research Laboratory	62.36
77	7	Beltsville	MD	Animal & Nat Res - Sust Ag and Crop Systems (B-001)	63.18

78	34	West Lafayette	IN	National Soil Erosion Research	64.00
79	29	Kearneysville	WV	Appalachian Fruit Research Laboratory	64.82
80	82	Stillwater	OK	Hydraulic Engineering Research	65.64
81	95	Auburn	AL	Aquatic Animal Health Laboratory	66.45
82	78	Stuttgart	AR	Harry K. Dupree National Aquaculture Research Ctr	67.27
83	41	Marshfield	WI	Inst for Environmentally Integrated Dairy Management	68.09
84	2	Washington	DC	National Arboretum	68.91
85	45	Albany	CA	Western Regional Research Center	69.73
86	33	Peoria	IL	National Center For Agricultural Utilization Research	70.55
87	50	Riverside	CA	U.S. Salinity Laboratory	71.36
88	14	Beltsville	MD	Plant Science Inst - Fruits & Veg Imp and Pests (B-010A)	72.18
89	72	Brookings	SD	North Central Research Laboratory	73.00
90	100	Mississippi State	MS	Crop Science Research Laboratory	73.82
91	60	Wapato	WA	Fruit & Vegetable Insect Research	74.64
94	86	College Station	TX	Southern Plains Ag Res Ctr - Areawide Pests	77.09
94	87	College Station	TX	Southern Plains Ag Res Ctr - Cotton Path & Germplasm	77.09
94	88	College Station	TX	Southern Plains Ag Res Ctr - Food & Feed Safety	77.09
95	116	Griffin	GA	Plant Genetic Resources Conservation Research	77.91
96	65	Miles City	MT	Ft Keough Range and Livestock Research	78.73
97	109	Fort Pierce	FL	U.S. Horticultural Research Laboratory	79.55
98	63	Fort Collins	CO	Sugarbeet Research	80.36
99	99	New Orleans	LA	Southern Regional Research Center	81.18
100	30	Leetown	WV	Cool & Cold Water Aquaculture Research	82.00
102	39	Madison	WI	Cereal Crops Research	83.64
102	74	Logan	UT	Poisonous Plant Research	83.64
103	48	Parlier	CA	San Joaquin Valley Agricultural Sciences Center	84.45
104	77	Stuttgart	AR	Dale Bumpers National Rice Research Center	85.27
105	10	Beltsville	MD	Human Nutr Ctr - Health & Human Studies (B-307B)	86.09
106	121	Charleston	SC	US Vegetable Laboratory	86.91
107	103	Poplarville	MS	Thad Cochran Southern Horticulture Laboratory	87.73
108	80	Las Cruces	NM	Jornada Experimental Range	88.55
109	105	Stoneville	MS	Jamie Whitten Delta States Research Center	89.36
110	66	Sidney	MT	Northern Plains Agricultural Research Laboratory	90.18
111	8	Beltsville	MD	Human Nutr Ctr - Diet, Genomics & Immun (B-307C)	91.00
122	1	Montpellier	France	European Bio Control Laboratory	100.00
122	21	Newark	DE	Beneficial Insects Introduction Research	100.00
122	23	Franklin	ME	National Cold Water Marine Aquaculture Center	100.00
122	25	Geneva	NY	Plant Genetic Resources	100.00
122	31	Ames	IA	National Animal Disease Center	100.00
122	42	Maricopa	AZ	U.S. Arid Land Agricultural Research Center	100.00
122	47	Davis	CA	Western Human Nutrition Research Center	100.00
122	52	Hilo	HI	U.S. Pacific Basin Agricultural Research Center	100.00
122	106	Stoneville	MS	National Biological Control Laboratory	100.00
122	108	Fort Lauderdale	FL	Invasive Plant Research Laboratory	100.00
122	111	Miami	FL	Subtropical Horticulture Research	100.00

Research Program Priorities

ARS has a well established and respected process to work with stakeholders in and outside of government to ensure that it identifies the highest priority areas of research. This process ensures that research needs are well articulated and addressed. Amongst ARS priorities are those inherently governmental, foundational, and core programs, competencies, and obligations critical to meeting the needs of U.S. agriculture and the American consumer. These priorities, identified below as bulleted statements within four broad programmatic categories or areas of ARS research, represent current and near term priorities but may change in importance in future years:

Agricultural Production

- Animal health research
- Animal genetics and genomics research and germplasm conservation
- National plant germplasm collections
- Crop genetics and genomics analysis
- Crop genome database stewardship and bioinformatics
- Genetic improvement research and crop breeding for improved disease and pest resistance, tolerance to weather stress and improved crop productivity
- Invasive species research to develop controls
- Crop production systems research to increase cropping efficiency and productivity
- Sustainable biomass/bioenergy feedstock production systems
- Life Cycle assessments

Food Safety

- Harmful microbiological and chemical contaminants in foods: detection methodology, toxicology and toxinology
- Intervention and control strategies for foodborne pathogens and chemical contaminants
- Predictive microbiology and data acquisition systems for use by regulatory agencies in risk assessment
- Systems biology and population systems studies to understand and track plant and animal pathogens in the food continuum -- from the farm environment to human consumption

Human Nutrition

- Human nutrition research with specialized human nutrition research expertise and facilities covering the lifecycle (children/adults/the elderly)
- National and authoritative food composition databases – "USDA Nutrient Databank"
- Nationally-representative food and nutrient intake survey – "USDA What We Eat in America"
- Capability to conduct large-scale human feeding studies aimed at defining a healthy diet

Natural Resources and Environment

- Long-term agroecosystem research, including landscape-scale sustainable production systems management
- Nationally significant soil and water management research and modeling
- Mitigating greenhouse gases and adapting to climate change

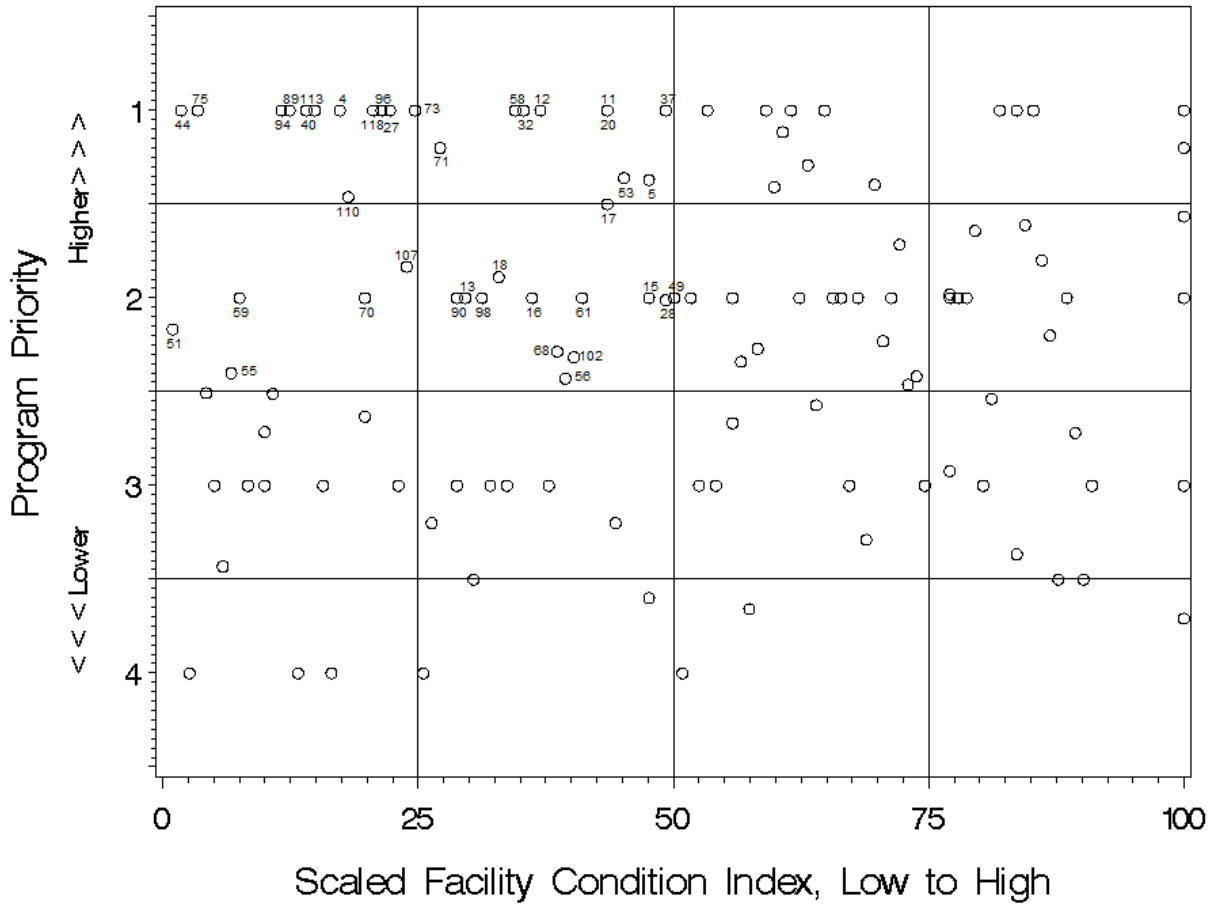
Beltsville Human Nutrition Research Center
Beltsville, Maryland

In accordance with these core and priority research programs, ARS senior research program leaders systematically evaluated the relative priority of the research conducted in each of the 122 ARS-owned facilities listed in Table 1. Ratings of 1 to 4 (relative priority) were assigned to each facility based upon a knowledge based judgment of the ongoing research in the facility. Nominally, about 25 percent of research programs were assigned to each priority band 1, 2, 3, or 4. Within each band, relative priorities and ratings of the research programs can be further assigned on a judgment basis. In cases where an identified and named facility houses more than one type or category of research, the priority band assigned is a weighted average of the ratings of separate program components as determined by program leaders.

ARS Facility Condition and Program Priority Matrix

Using the aforementioned program priority rating process, Figure 2 illustrates a plot of facility condition (scaled CI, 1 to 100) and the assigned program priority band (1 to 4) for the 122 ARS-owned facilities. The facilities that house relatively highest priority research (program ratings in the 1 and 2 bands) and that have low condition indices (scaled below the median level) are identified by site ID numbers in the four upper left cells and to the left of the median line (50.5). These priority program facilities are generally those in the least adequate condition, greatest need of recapitalization, and that will be further considered in this report for recommending near-term capital investments.

Figure 2: A matrix of relative or scaled condition of ARS-owned facilities and program priority. The facility names corresponding to the site identification numbers displayed in the four upper left cells are given in Tables 1 through 4.



ARS research programs assigned the highest program priority (band 1) that are housed in facilities having the lowest condition indices (scaled 1 up to the median of 50.50) are listed and indentified in Table 3.

Table 3: Low Condition ARS-Owned Research Facilities Housing High Priority (Band 1) Research Programs

Scaled Condition Index	Site ID	City	State	ARS Laboratory Name
1.82	44	Tucson	AZ	Southwest Watershed Research Laboratory
3.45	75	Cheyenne	WY	Rangeland Resources Research
11.64	94	Temple	TX	Grassland, Soil & Water Research Laboratory
12.45	89	Houston	TX	Children's Nutrition Research Center
14.09	40	Madison	WI	U.S. Dairy Forage Research Center
14.91	113	Athens	GA	Southeast Poultry Research Laboratory
17.36	4	Beltsville	MD	Animal & Nat Res. - Env Microbial and Food Safety (B-303)
18.18	110	Gainesville	FL	Center for Medical, Agricultural & Veterinary Entomology
20.64	118	Tifton	GA	Southeast Watershed Research Laboratory
21.45	96	Auburn	AL	US Soil Dynamics Laboratory
22.27	27	University Park	PA	Pasture Systems & Watershed Management Research
24.73	73	Logan	UT	Forage and Range Research
27.18	71	Clay Center	NE	U.S. Meat Animal Research Center
34.55	58	Corvallis	OR	National Clonal Germplasm Repository
35.36	32	Ames	IA	National Laboratory for Agriculture and the Environment
37.00	12	Beltsville	MD	Plant Science Inst - Bee Research (B-476)
43.55	11	Beltsville	MD	Human Nutrition Ctr - Nutrition Data and Food Surveys (B-005)
43.55	17	Beltsville	MD	Plant Science Inst - National Germplasm Resources (B-003)
43.55	20	Beltsville	MD	Plant Science Inst - Systematic Entomology (B-005)
45.18	53	Aberdeen	ID	Small Grains & Potato Germplasm Research
47.64	5	Beltsville	MD	Animal & Nat Res. - Hydrol, Rem Sens & Env Mgt (B-007)
49.27	37	St. Paul	MN	Cereal Disease Research

Similarly, Table 4 lists and identifies band 2 priority programs housed in facilities that have the lowest scaled condition indices (scaled 1 up to the median of 50.50).

Table 4: Low Condition ARS-Owned Research Facilities Housing High Priority (Band 2) Research Programs

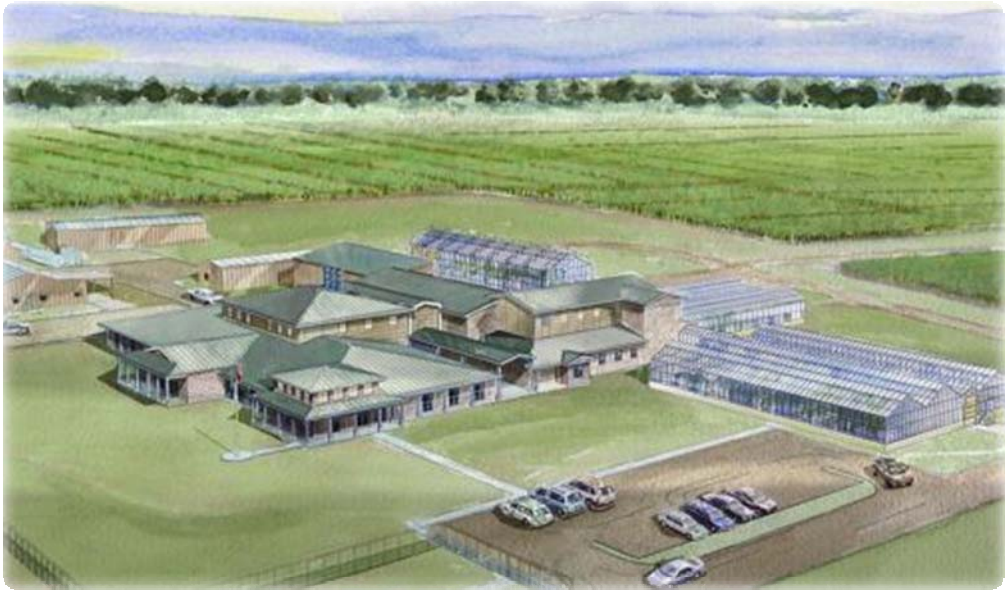
Scaled Condition Index	Site ID	City	State	ARS Laboratory Name
1.00	51	Salinas	CA	Crop Improvement and Protection Research
6.73	55	Kimberly	ID	Northwest Irrigation & Soils Research
7.55	59	Pendleton	OR	Soil & Water Conservation Research
19.82	70	Mandan	ND	Natural Resource Management Research
23.91	107	Canal Point	FL	Sugarcane Production Research
28.82	90	Kerrville	TX	U.S. Livestock Insects Research Laboratory
29.64	13	Beltsville	MD	Plant Science Inst - Food Quality Laboratory (B-002)
31.27	98	Baton Rouge	LA	Honey Bee Breeding, Genetics, & Physiology Research
32.91	18	Beltsville	MD	Plant Science Inst - Soybean Genomics (B-006)
36.18	16	Beltsville	MD	Plant Science Inst - Molecular Plant Pathology (B-004)
38.64	68	Fargo	ND	Red River Valley Agric Res Ctr - Plant Bioscience
39.45	56	Corvallis	OR	Forage Seed & Cereal Research
40.27	102	Oxford	MS	National Sedimentation Laboratory
41.09	61	Akron	CO	Central Plains Resources Management Research
47.64	15	Beltsville	MD	Plant Science Inst - Invasive Insect Biocontrol (B-007)
49.27	28	Wyndmoor	PA	Eastern Regional Research Center
50.09	49	Riverside	CA	Citrus Repository

ARS Research Laboratories Housed in Cooperator Facilities

As noted earlier in this report, about 30 percent of ARS research (as measured by numbers of personnel and annual base funding) is housed in facilities owned by cooperators. These programs and facilities are listed in Appendix G.

Most of these cooperator facilities are those of university partners with which ARS is co-located. Other cooperators that house ARS programs under long term lease or other agreements are Federal agencies (i.e., DHS, U.S. Army, GSA, Smithsonian Institution), commodity organizations, and private entities.

ARS does not maintain a comprehensive engineering and facility condition database for cooperator facilities comparable to the data in CPAIS for ARS-owned facilities (see Appendix B). ARS also does not have responsibility or authority for capital improvements and investments in cooperator facilities, but does have varying degrees of responsibility for routine and/or major repair and maintenance depending on the terms of occupancy agreements. As such this CIS report does not address the capital investment needs and priorities of cooperator facilities in a systematic manner as has been done for ARS-owned facilities.



Sugarcane Research Laboratory
Houma, LA

Special note, however, is made that for some of these cooperator facilities USDA must consider acquisition of alternative facilities or investment in replacement facilities that will be Federally-owned. This is because some cooperator facilities are not fully suitable for ARS research programs and/or may not even be available to ARS in the long term. Reasons include limited capacity, inadequate condition due to facility age and high deferred maintenance, and/or alternative use plans for the facilities by the cooperator owners.

Cooperators that have expressed desire and support for relocation of their currently housed ARS laboratories to Federally-owned replacement facilities include:

- University of Missouri (Columbia); ARS plant genetics research
- Washington State University (Pullman); ARS crop and land management research
- University of California (Davis); ARS grape genetics research
- University of Kentucky (Lexington); ARS forage/animal research
- Bowling Green University (Kentucky); ARS waste management research
- University of Nebraska (Lincoln); ARS crop, agroecosystem, and bioenergy research
- University of Toledo (Ohio); ARS horticultural greenhouse research
- U.S. Army (Frederick, Maryland); ARS plant disease biocontainment research
- American Sugar Cane League (Houma, Louisiana); ARS sugarcane research
- University of Idaho (Hagerman worksite); ARS aquaculture research
- Cornell University (Geneva, New York); ARS grape genetics/genomics research

The need and desire to relocate the ARS research programs now housed by cooperators have been the basis for cooperator and other stakeholder advocacy to secure Congressional appropriations for the ARS B&F account for new construction.

Rescission of Building and Facility Funding for New ARS Facilities

Appendix C provides a 27-year history of annual appropriations to the ARS Buildings and Facilities (B&F) account for capital investments in ARS-owned facilities. As footnoted there, $229.6 million in unobligated funding was rescinded in the FY2011 Continuing Resolution budget. These funds had been appropriated in prior years for specific projects and were being held in escrow pending completion of architectural and engineering planning requirements, contractual procedures, and/or receipt of full funding to allow construction to begin.

Appendix H itemizes the 31 active and pending B&F projects that were affected by the rescinded funding. In four instances the relatively small amounts rescinded (about $150,000 or less) associated with "left-over" funding from completed projects had minimal impact on those ARS programs and facilities.

In four other cases (Storrs, CT; Hagerman, ID; Lorman, MS; and Bozeman, MT) the funding losses were for new ARS facility construction for research programs not yet or only minimally established. Relative to ongoing priority research programs and existing facilities, the loss of these facility investments for new programs are not of high consequence to ARS at this time.

All other rescissions listed in Appendix H were targeted investments for modernization, expansion, or replacement of existing ARS-owned facilities, or for new ARS facilities to house an existing research program now located within a cooperator facility. The loss of B&F funding for these pending projects have varying degrees of impact on ARS research programs and infrastructure capacity. Replacement facilities in greatest need at this time will be reflected in the recommendations for near term and out year recapitalization investment priorities.

Pacific Basin Agricultural Research Center
Hilo, Hawaii

Capital Improvement Recommendations and Discussion

The 39 low condition ARS facilities housing priority research listed in tables 3 and 4 are primary potential candidates for near term capital improvement investments. Additional candidates are some of those cooperator facilities housing priority ARS research and in major need of repair, particularly those that may not be available or suitable to ARS over the long term and for which there has been active and strong stakeholder advocacy for replacement with new ARS facilities (see pp 32-33 and Appendix H).

All of these candidate facilities were systematically reviewed by the ARS Asset Management Review Boards, ARS Office of National Programs leadership, and the Office of the Administrator, to judge and recommend priority and sequence for capital investment based on relative condition metrics, other physical factors, urgency for attention, priority of housed research, and other known factors.

Table 5 lists 24 facility and infrastructure projects, assembled into nine priority groups and order, which are recommended for near term and out year investments. The estimated modernization or replacement costs in current year dollars are also provided. Not all candidate facilities are included in Table 5 at this time for various reasons. For example, at Cheyenne, Wyoming R&M funds are currently being invested in onsite facilities; also, much of the Cheyenne staff and program are housed in good condition "worksite" facilities at nearby Fort Collins, Colorado. In some cases, ARRA funds are now being invested for the most critical facility improvements needed. In yet other cases, cooperators or stakeholders may address the most urgent needs in the near term.

Each facility priority group in Table 5 (indicated by the alternating shaded/non-shaded sections) has a cumulative total cost in the approximate $100 to $150 million range in current year dollars. As previously discussed on pages 15-16, this value range corresponds to the average annual facility improvement investments needed going forward on a regular and periodic basis.

Table 5 investment recommendations are made while being fully cognizant of the current fiscal environment of limited Federal spending. But even within a reduced level of public funding available for agricultural research, an appropriate portion is warranted to be regularly allocated to recapitalize and sustain USDA's infrastructure capacity to carry out the research.

Table 5: Recommended Out-Year Capital Investments for Modernizing or Replacing ARS Research Facilities

Priority Group	Location	Name	Estimated Cost ($m)	Group Total ($m)
1	Athens, GA	Southeast Poultry Research Laboratory	145	145
2	Frederick, MD*	Ft. Detrick Foreign Disease-Weed Science Res	70	
	Beltsville, MD	B-307A (Anim Sci, Hum Nutr, and Bee Research	33	103
3	Tucson, AZ	Southwest Watershed Research Laboratory	10.5	
	Houston, TX	Children's Nutrition Research Center	25	
	Clay Center, NE	U.S. Meat Animal Research Center	55	
	Ames, IA	Nat'l Lab for Agriculture and the Environment	12	102.5
4	Salinas, CA	U.S. Agricultural Research Station	82	
	Kerrville, TX	U.S. Livestock Insect Research Laboratory	45	127
5	Temple, TX	Grassland, Soil & Water Research Laboratory	15	
	Madison, WI	U.S. Dairy Forage Research Ctr (Prairie du Sac)	46.2	
	Tifton, GA	Southeast Watershed Research Laboratory	27.5	
	University Park, PA	U.S. Pasture Laboratory	15.5	104.2
6	Gainesville, FL	Center for Med, Agricultural & Vet Entomology	45	
	Geneva, NY*	Grape Genetics/Genomics Laboratory	37.8	
	Corvallis, OR	National Clonal Germplasm Repository	8.5	91.3
7	Beltsville, MD	Utility infrastructure upgrade and B-007, B-006, and B-002 modernization (crop, food, and natural resources research)	77	
	Oxford, MS	U.S. Sedimentation Laboratory	20.5	97.5
8	Pullman, WA*	Crop and Land Management Research	62	
	Beltsville, MD	National Agricultural Library	32.5	94.5
9	Athens, GA	Richard B. Russell Research Center	140	140

** ARS-owned replacement of cooperator facility*

Included in Table 5 investment recommendations are utility infrastructure upgrades and four buildings (i.e., B-307A, B-007, B-006, and B-002) at the Beltsville Agricultural Research Center (BARC) in Maryland. BARC is the largest of all ARS research locations in terms of number of scientists and other employees, breadth and diversity of research programs, number of separate facilities, etc. More so than any other ARS location the major research buildings at BARC provide a generic capacity and flexibility to house multiple kinds of research and future changes in research priority. Thus, the capital investments recommended in Table 5 for BARC are largely based on sustaining the capacity of the entire Center as well as particular facilities there to house priority research in the future, rather than on the priority of the research they may now house. For example, the BARC facility of highest priority for major new capital investment at this time is B-307A, a large building now vacant but having the potential to accommodate the consolidation and housing of priority animal science, human nutrition, and honey bee research now located in generally low condition BARC facilities (i.e., B-200, B-005, and B-476, respectively). This in turn would allow some of these latter buildings to be retrofitted later to accommodate new priority research, or demolished.

Roman L. Hruska U.S. Meat Animal Research Center
Clay Center, Nebraska

Table 5 includes a recommendation for out year capital investments in the Richard B. Russell Research Center (RRC) in Athens, GA. Although not listed in Tables 3 or 4 as a low condition facility at the present time, it currently has a scaled CI value of 51.73 on the scale of 1 to 100, slightly above the median condition of all major ARS owned research facilities. Within the next 10 years and as this facility ages, its condition will eventually warrant investment attention. The RRC facility importantly houses priority poultry food safety programs, including partial occupancy by a tenant USDA agency, the Food Safety and Inspection Service.

National Agricultural Library
Beltsville, Maryland

Special note is made that the National Agricultural Library (NAL) is also included in Table 5. Although the NAL facility is not a research laboratory per se, and as such is not listed in Tables 1 and 2, it nevertheless is an important component of ARS' program and infrastructure portfolio, and a USDA responsibility to maintain. Recent investments in NAL have been made as shown in Appendix D and F. The NAL facility with a Condition Index of 91.10 (equivalent to 24.23 on a scaled basis) is still among the primary candidates for future capital investment.

Also to be noted in Table 5, ARS-owned replacement facilities are included for three research programs now housed in cooperator facilities, i.e., Frederick, MD, Geneva, NY, and Pullman, WA. These are deemed most critical and urgent for ARS replacement given the priority of the research, the relative low-condition of current facilities, and their potential non-availability to ARS in the future.

Plant Sciences Institute
Beltsville, Maryland

The cost estimates presented in Table 5 for some of the facilities are based on previous detailed planning and design studies. For the other facilities the estimates were derived by ARS facility engineers using applicable square footage unit costs for modernization or new construction of scientific research laboratories. These cost estimates will have to be validated in the future based upon actual or updated planning and design studies for each facility. Also, the estimates will have to be modified as appropriate to reflect inflation and projected market conditions in the anticipated years of design and construction.

Major capital improvement projects typically require five or more years to complete, including time required for planning, contracting, design, and actual construction. Funding required to initiate the architectural and engineering design phase is generally 10 percent of total project cost. The balance of full funding for project construction or a standalone phase thereof is needed before actual construction can begin. Thus, a given capital improvement project can be budgeted and phased over several fiscal years.

Facility investment priorities presented in Table 5 provide a basis for the formulation of annual Administration budget requests as opportunities and allowances permit in the current Federal budget climate. As Congressional appropriations are received via the ARS Buildings and Facilities line item budget account for addressing highest priority facilities, the remaining facilities in the "queue list" move up for consideration, subject to validation and updating cost estimates and relative priority. Also, as other research facilities within the total ARS infrastructure continue to age and their physical conditions might diminish, they need to be evaluated for possible addition to the queue based upon an assessment of their relative physical condition and research priority.

Routine repair and maintenance (R&M) expenditures constitute a still important component of ARS' overall facility investment strategy, especially when capital expenditures from the B&F account are slowed during periods of limited Federal spending. ARS will continue, and seek to enhance as opportunities permit, its annual R&M line item of $18 million and the additional 4 percent R&M expenditures from its annual program operating budget (Salaries and Expenses account).

USDA Children's Nutrition Research Center
Houston, Texas

National Laboratory for Agriculture and the Environment
Ames, Iowa

Although a primary focus of this CIS Report is the establishment of criteria and processes for determining and recommending the appropriate level of new investments needed for USDA research facilities, the same processes can be used to identify inadequate facilities and/or lesser priority programs housed in them for potential consolidation or closure, thus avoiding out-year recapitalization and other costs.

In this regard and based in part on such criteria and processes, along with recent Administration initiatives to reduce overall Federal spending, ARS in FY2012 initiated the closure of six ARS-owned facilities and their housed programs, and three other programs in cooperator-owned facilities. These actions were recommended in the President's FY2012 budget and approved by Congress and the President in the FY2012 appropriation bill. ARS locations being closed are Coshocton, Ohio; Beaver, West Virginia; Clemson, South Carolina; Watkinsville, Georgia; Brooksville, Florida; Lane, Oklahoma; Weslaco, Texas; Shafter, California; and Fairbanks, Alaska. As such, these locations do not appear in any of the facility listings and databases in this Report.

Complementing these actions, earlier in FY2011 ARS implemented an off-budget, Congressionally-approved reprogramming and consolidation of citrus research from a poor condition ARS-owned facility in Winter Haven, Florida, with other citrus research at a relatively new and good condition ARS facility in Fort Pierce, Florida. Also in FY 2011, ARS initiated the reprogramming and consolidation of its

rice research in Beaumont, Texas, with its critical mass program and quality Rice Research Center facility in Stuttgart, Arkansas.

Yakima Agricultural Research Laboratory
Wapato, Washington

The FY 2013 budget for ARS now pending before Congress proposes the closure of six laboratory units and the redirection of their $17 million in annual program resources to other research of higher priority. These actions, if enacted, would result in the physical closure and vacating of ARS-owned facilities at three locations: East Lansing, MI; Columbia, MO; and Booneville, AR (in Tables 1 and 2, they are indicated with site IDs 35, 38, and 75, respectively). At the East Lansing location, the poultry disease research unit is proposed to be consolidated with similar research at Athens, GA. Three other ARS facilities, at Beltsville, MD; Orono, ME; and Wyndmoor, PA (site IDs 13, 24, and 28, respectively), will be retained by ARS and used to house the higher priority research to which the program resources will be redirected. These proposed FY 2013 budget actions are based largely on program priority considerations, but improved facility utilization or avoidance of future recapitalization costs were additional decision factors.

Summary

The foregoing report establishes criteria and an enduring process for assessing and determining recurring capital investment needs, priorities, and recommendations for USDA Agricultural Research Service (ARS) scientific research laboratories, based upon relative facility physical conditions and research program priorities. The existing portfolio of ARS facilities and associated real property resources is large, extensive, and highly valuable. The latter includes both the current capitalization value – nearly $3.7 billion – and the public benefit derived on an ongoing basis from USDA research carried out in the facilities that serves to help technologically advance the U.S. food and agricultural system. While the ARS research facility portfolio consists of many new and outstanding laboratories, there are numerous other facilities that have exceeded or are approaching their practical functional life span. Also, the entire portfolio is constantly aging. In addition to stressing the continued need for regular and routine repair and maintenance investments for all facilities, this report identifies 24 ARS facility and infrastructure projects in special priority need of major recapitalization in the coming decade, as budget conditions allow. These recommendations are on the order of about $100 million per year, and can help shape the development of future Administration budget proposals for capital improvements in USDA facilities to sustain their capacity to conduct relevant and quality scientific research.

U.S. Vegetable Laboratory
Charleston, South Carolina

Appendix A: Benchmarking Federal Agencies for Capital Investment Planning Best Practices

In order to assure that ARS capital investment planning is based upon best practices, the processes used by NASA, Department of Veterans Affairs, Department of Defense and NIH were reviewed. Practices learned from these agencies, which were judged best suited for ARS were adopted for the planning process. All of these organizations use processes based on the OMB guidance (OMB Circular A-11, Part 7). Factors and criteria consistently considered in the strategic planning include the following:

- Does the investment in a major capital asset support core/priority mission functions that need to be performed by the Federal Government? (How does the project support the Secretary's priorities, Congressional mandates, and the Department's and agency's strategic goals and objectives);

- Is the investment supported by a Life Cycle analysis?

- Does the investment improve Real Property Performance Measures such as, 1) Utilization; 2) Condition Index; 3) Mission Dependency; and 4) Annual Operation & Maintenance (O&M) costs?

The complexity of the decision models used by organizations varies with the size and complexity of the real property portfolio and the diversity of the mission elements competing for the resources. For example, while the Department of Veterans Affairs real property portfolio is approximately ten times greater in size than the ARS portfolio, the VA mission is more narrowly focused, which allows for a less complex decision model.

The challenge for ARS, and all asset managers, is in identifying and allocating resources to real property assets that warrant priority attention and investment to ensure core and priority mission needs are met. There always are a number of facilities that require immediate attention due to failing building systems and life safety issues; these assets also need to be addressed on a priority basis. Obtaining and maintaining accurate data regarding asset condition, utilization, and funding needs is paramount to an effective decision model. The cost to obtain and maintain these data is dependent on the level of detail desired and the

available resources to invest in obtaining them. With a large and geographically dispersed portfolio there are concerns with the potential for lack of comparability in assessing asset condition and utilization and reporting that information to decision makers in a consistent manner.

There are a number of assessment methods and decision modeling tools available to obtain and analyze the information required for a CIS process and organizations select the most appropriate method after consideration of size and complexity of the portfolio, mission requirements, cost of data versus benefit of the level of detail, resource availability, and similar considerations. Generally information on condition and project needs is obtained either through on site condition assessment surveys (i.e., visual, physical inspections) or through life cycle costing methods (i.e., modeling) or a combination of the two.

Each method has advantages and disadvantages. Condition assessment surveys provide more accurate deferred maintenance and repair estimates, more timely identification of specific health and safety issues, and provide more detailed information to identify and prioritize work items / specific repairs. The disadvantage of these surveys is that they are expensive to perform, provide a discrete snapshot in time of facility condition that may change in relatively short time frames, work items / specific repair needs may not be identified by the on-site team, and there is potential for lack of consistent information based upon the inspection team's experience, background and bias.

Life cycle cost models are generally less costly to perform, provide an economical tool for evaluation of large portfolios. These models can provide an estimating tool for predicting the cumulative costs of deferred maintenance at a portfolio level. The limitations of these models include not having on-site inspections to identify or prioritize work items / specific repairs, they are not always appropriate for smaller portfolios, updating of initial model information can be costly, and the models introduce some accuracy and credibility issues when validated against actual on site conditions.

ARS uses a combination of these two methods to estimate deferred maintenance costs and facility condition index. ARS employs a third party contractor to conduct onsite surveys of about 10 percent of our facilities each year. The contractor uses this information to develop and update a parametric model to extrapolate the information across the entire ARS portfolio. ARS relies on its field

officials and personnel to update information regarding significant changes in condition between the inspections. This process reflects the advantages and disadvantages of each individual method previously discussed.

The process described above results in defensible information regarding the portfolio level condition and deferred maintenance needs of the Agency for annual federal real property reporting requirements. This process provides a relative indicator of buildings in need of attention so that subsequent analysis can be performed to obtain sufficiently detailed information to identify and prioritize the repair and maintenance investments needed to sustain and modernize ARS facilities.

Appendix B: Data Fields for Each ARS-Owned Facility in the Corporate Property Automated Information System (CPAIS)

AGENCY
ORG_CODE
ORG_CODE_NAME
GSA_REGION
GSA_REGION_NAME
INSTALLATION_ID
INSTALLATION_NAME
SITE_NUMBER
SITE_NAME
UNIQUE_SYSTEM_RECORD_ID
ASSET_ID
ASSET_NAME
YEAR_CONSTRUCTED
GROSS_SQFT
QUANTITY_STRUCTURE
STRUCTURE_UOM
ACQUISITION_DATE
INITIAL_ACQUISITION_COST
ACQUISITION_METHOD
ACQUISITION_AUTHORITY
OWNED_LEASED_OTHER
ASSET_TYPE
STATUS
EFFECTIVE_DATE
PREDOMINANT_USE_CATEGORY
PREDOMINANT_USE_SUBCATEGORY
GSA_USAGE_CODE
MISSION_DEPENDENCY
DESIGN_CAPACITY_SQFT_SYS
OCCUPIED_UNITS_SQFT_SYS
UTILIZATION_RATE
SUSTAINABILITY
FACILITY_CONDITION_YEAR
AVERAGE_COST_PER_SQFT
PLANT_REPLACEMENT_VALUE
DEFERRED_MAINTENANCE
MAILING_GEO_LOC_CODE
SPACE_OCCUPIED_SQFT
CONDITION_INDEX
ANNUAL_OPERATING_COST_YEAR
ANNUAL_OPERATING_COST
ANNUAL_OPER_COST_OVERRIDE
EXCLUDE_FROM_FRPP
OUTGRANT_INDICATOR
ORGANIZATION_USING_PROPERTY
HISTORICAL_STATUS
ASSET_IN_A_HISTORIC_DISTRICT
ASSET_IN_A_BUSINESS_DISTRICT
ASSET_REMARKS
TYPE_OF_RESTRICTIONS
TYPE_OF_RESTRICTIONS_REMARKS
HAZARDOUS_MATERIAL
HAZARDOUS_MATERIAL_REMARKS
ANTENNA_ON_THE_BUILDING
CHILDCARE_CTR_IN_THE_BUILDING
FRPP_QUALIFIED
CONGRESSIONAL_DISTRICT_ID
CONGRESSIONAL_DISTRICT_NAME
PHYSICAL_STREET_ADDR_1
PHYSICAL_STREET_ADDR_2
PHYSICAL_LOCATION_STATE_NAME PHY
SICAL_COUNTY_COUNTRY
PHYSICAL_CITY_NAME
PHYSICAL_ZIP_CODE
PHYSICAL_GEO_LOC_CODE
LONGITUDE
LATITUDE
MAILING_STREET_ADDR_1
MAILING_STREET_ADDR_2
MAILING_STATE
MAILING_COUNTY_COUNTRY
MAILING_CITY_NAME
MAILING_ZIP_CODE

Appendix C: Annual ARS Building & Facility Appropriations, 1985-2011

Fiscal Year	Budget request		Actual Appropriation	
1985	-		$22,350,000	
1986	-		$6,312,000	
1987	-		$1,000,000	
1988	$1,000,000		$15,300,000	
1989	$11,000,000		$17,044,000	
1990	$18,500,000		$12,658,000	
1991	$32,600,000		$41,015,000	
1992	$46,100,000		$50,564,000	
1993	$27,300,000		$34,514,000	
1994	$24,587,000		$32,743,000	
1995	$25,700,000		$43,718,000	
1996	$30,200,000		$30,200,000	
1997	$80,100,000		$69,100,000	
1998	$59,300,000		$80,630,000	
1999	$35,900,000		$56,437,000	
2000	$44,500,000		$52,500,000	
2001	$39,300,000		$74,200,000	
2002	$30,462,000		$118,987,000	
2003	$16,580,000		$119,480,000	
2004	$24,000,000		$63,810,000	
2005	$178,000,000		$187,838,000	
2006	$64,800,000		$131,195,000	
2007	$8,415,000		-	
2008	$16,000,000		$47,082,000	
2009	($53,959,600)	1/	$46,752,000	
2010	-		$70,873,000	
Subtotal	$760,384,400		$1,426,302,000	
2011	($75,500,000)	2/	($229,582,000)	3/
2012	($224,000,000)	4/	-	
Net Total	$460,884,400		$1,196,720,000	

1/ Includes proposed rescission of $67,179,600 from prior year unobligated appropriations that were being held in escrow for pending building and facility projects.

2/ Proposed rescission of $75,500,000 from prior year unobligated appropriations that were being held in escrow for pending building and facility projects.

3/ Rescission of prior year unobligated appropriations that were being held in escrow for pending building and facility projects. See Appendix H for projects and funding rescinded.

4/ Proposed rescission of $224,000,000 from prior year unobligated appropriations that were being held in escrow for pending building and facility projects. This proposal preceded Congressional action on FY 2011 budget which rescinded these funds. See footnote 3.

Appendix D: Major Capital Projects Completed with B&F Funds, 1987-2011

Facility	Location	Year completed	Cost
The National Soil Tilth Laboratory	Ames, IA	1987	$11,500,000
National Small Grains Germplasm Research Laboratory	Aberdeen, ID	1988	$2,500,000
Northern Crop Science Laboratory	Fargo, ND	1988	$8,600,000
Children's Nutrition Research Center	Houston, TX	1988	$39,000,000
Subtropical Horticulture Research Station	Miami, FL	1988	$800,000
National Center for Genetic Resources Preservation	Fort Collins, CO	1992	$12,500,000
South Central Agricultural Research Laboratory	Lane, OK	1993	$3,250,000
Honey Bee Research Lab	Weslaco, TX	1994	$2,900,000
BARC Modernization Various Facilities	Beltsville, MD	1994	$178,000,000
Plant Sciences Institute	Beltsville, MD	1995	$11,800,000
George E. Brown, Jr. Salinity Laboratory	Riverside, CA	1995	$11,500,000
Yakima Agricultural Research Laboratory	Wapato, WA	1995	$13,000,000
NADC Large Animal Necropsy	Ames, IA	1996	$5,000,000
Swine Research and Information Center	Ames, IA	1997	$14,100,000
Dale Bumpers National Rice Research Center	Stuttgart, AR	1998	$9,900,000
U.S. Horticultural Research Laboratory	Fort Pierce, FL	1999	$31,400,000
Cropping Systems Research Laboratory	Lubbock, TX	1999	$12,100,000
European Biological Control Laboratory	Montpellier, FR	1999	$4,000,000
Crop Quality and Fruit Insects Laboratory	Weslaco, TX	2000	$5,500,000
National Center for Cool and Coldwater Aquaculture	Leetown, WV	2001	$15,900,000
San Joaquin Valley Agricultural Research Center	Parlier, CA	2001	$29,000,000
U.S. Vegetable Laboratory	Charleston, SC	2002	$24,000,000
Jornada Experimental Range	Las Cruces, NM	2002	$7,400,000
Beltsville Human Nutrition Research Center (B-307B/C)	Beltsville, MD	2003	$25,600,000
NCAH Phase 1 Laboratory Facility	Ames, IA	2004	$24,800,000
Poisonous Plant Research	Logan, Utah	2004	$11,500,000
National Biological Control Laboratory	Stoneville, MS	2004	$16,500,000
U.S. Arid Land Agricultural Research Center	Maricopa, AZ	2005	$27,900,000
Horticultural Laboratory for the Gulf Coast	Poplarville, MS	2005	$9,900,000
Advanced Genetics Laboratory	Aberdeen, ID	2006	$5,100,000
Northern Grains Insect Research Laboratory	Brookings, SD	2006	$9,500,000
Western Human Nutrition Research Center	Davis, CA	2006	$25,400,000
Cereal Crops Research Laboratory	Madison, WI	2006	$11,400,000
Cereal Disease Laboratory	St. Paul, MN	2006	$3,500,000
Southern Plains Range Research Station	Woodward, OK	2006	$15,200,000
National Cold Water Marine Aquaculture Center	Franklin, ME	2006	$22,700,000
NCAH 3Ag Large Animal Facility	Ames, IA	2007	$78,000,000
NCAH Central Utility Plant Infrastructure	Ames, IA	2007	$56,000,000
Subtropical Horticulture Research Station	Miami, FL	2008	$9,900,000
Appalachian Fruit Laboratory	Kearneysville, WV	2008	$7,900,000
NCAH Consolidated Laboratory	Ames, IA	2009	$221,000,000
U.S. Pacific Basin Ag Research Center	Hilo, HI	2009	$32,000,000
Northern Plains Ag Research Laboratory	Sidney, MT	2009	$10,400,000
NCAH Low Containment Large Animal Facility	Ames, IA	2009	$34,500,000
Dairy Research Facility	Marshfield, WI	2009	$10,000,000
Richard Russell Research Center	Athens, GA	2010	$14,700,000
Southern Regional Research Ctr Hurricane Recovery	New Orleans, LA	2010	$55,600,000

National Agricultural Library	Beltsville, MD	2010	$16,000,000*
Western Regional Research Center	Albany, CA	2011	$28,800,000*
U.S. National Arboretum	Washington, DC	2011	$9,900,000*
Eastern Regional Research Center	Wyndmoor, PA	2011	$46,000,000*
National Center for Agricultural Utilization Research	Peoria, IL	2011	$38,200,000*
Ft. Keogh Livestock & Range Laboratory	Miles City, MT	2011	$10,200,000*
ERRC Grain and Animal Health Research Center	Manhattan, KS	2011	$14,700,000
Sugar Cane Research Laboratory	Houma, LA	2011	$15,900,000
Jamie Whitten Delta States Research Center	Stoneville, MS	**	$54,400,000*

** Partial funding from American Recovery and Reinvestment Act (ARRA). See Appendix F for complete listing.*

*** Ongoing project; expect completion in 2015.*

Appendix E: Selected Images of ARS Facilities Built or Modernized with B&F Appropriations (other images are displayed in text)

Eastern Regional Research Center
Wyndmoor, Pennsylvania

Southern Regional Research Center
New Orleans, Louisiana

National Center for Agricultural Utilization Research
Peoria, Illinois

Western Regional Research Center
Albany, California

Western Human Nutrition Research Center
Davis, California

U.S. Horticultural Research Laboratory
Fort Pierce, Florida

Jean Mayer USDA Human Nutrition Center
Boston, Massachusetts

National Centers for Animal Health Consolidated Laboratory Facility
Ames, Iowa

National Centers for Animal Health - 3Ag Large Animal Facility
Ames, Iowa

Modernization Phase 1L
Ames, Iowa

Subtropical Horticulture Research Station
Miami, Florida

Cereal Disease Laboratory (Addition)
St. Paul, Minnesota

North Central Agricultural Research Laboratory
Brookings, South Dakota

Cereal Crops Research Laboratory
Madison, Wisconsin

Southern Plains Range Research Station
Woodward, Oklahoma

Poisonous Plant Research Laboratory
Logan, Utah

Beltsville Human Nutrition Research Center
Beltsville, Maryland

European Biological Control Laboratory
Montpellier, France

Plant Stress and Water Conservation Laboratory
Lubbock, Texas

George E. Brown Jr. Salinity Laboratory
Riverside, California

National Center for Genetic Resources Preservation
Fort Collins, Colorado

National Small Grains Germplasm Research Laboratory
Aberdeen, Idaho

Northern Crop Science Laboratory
Fargo, North Dakota

Crops Research Laboratory
Fort Collins, Colorado

Invasive Plant Research Laboratory (Melaleuca Laboratory)
Ft. Lauderdale, Florida

Advanced Genetics Laboratory
Aberdeen, Idaho

Range 1 Greenhouses
Beltsville, Maryland

Oilseed and Grain Processing Plant, Chemical Wing Modernization
New Orleans, Louisiana

Research Center Poultry Facility
Beltsville, Maryland

Dairy Research Facility
Beltsville, Maryland

Greenhouse Natural Products Utilization Research Unit
Oxford, Mississippi

Northern Plains Agricultural Research Laboratory
Sidney, Montana

Jamie Whitten Delta States Research Center
Stoneville, Mississippi

Ft. Keogh Livestock Range Research Laboratory
Miles City, Montana

National Forage Seed Production Research Laboratory
Corvallis, Oregon

Nutrient Management Research Laboratory
Marshfield, Wisconsin

Animal Holding Facility
Marshfield, Wisconsin

National Cold Water Marine Aquaculture Center
Franklin, Maine

U.S. National Arboretum
Washington, D.C.

Robert Holley Center of Agriculture and Health
Ithaca, New York

Center for Grain and Animal Health Research
Manhattan, Kansas

Greenhouse
Bowling Green, Kentucky

Horticultural Crops Research Laboratory
Corvallis, Oregon

Tropical Agriculture Research Station
Mayaguez, PR

Appendix F: ARS American Recovery and Reinvestment Act (ARRA) Projects

Project Description	**Location**	**Total Project Cost**
Major renovation to Western Regional Research Center to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs. (Phases 3b thru 6)	Albany, CA	$16,500,000
Repairs and renovations to building life safety and fire detection and suppression systems. Replacement of steam distribution system, replacement of safety hood exhaust systems, and replacement of roofing systems. Recoating of exterior building enclosures to prevent deterioration of structural elements and weather integrity. Repairs to service building exterior finish.	Albany, CA	$1,700,000
Major renovation to U. S. National Arboretum laboratory and administration building to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs.	Washington, DC	$8,300,000
Southeast Poultry Research Laboratory- Replacement of critical mechanical, electrical, and plumbing systems serving laboratory and animal housing spaces.	Athens, GA	$6,700,000
Replacement of mechanical and electrical systems, envelope, and finishes in low containment animal facilities Buildings 3 and 4 and miscellaneous critical infrastructure needs.	Ames, IA	$16,250,000
Major renovation to the National Agricultural Utilization Research Center to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs. (Phases 3 and 4)	Peoria, IL	$16,250,000
Repair and replacement of various critical building systems to include underground oil storage tank, back-up power supply, HVAC chillers and related components, roofing system, and domestic hot water generators and distribution elements.	Boston, MA	$3,694,000
National Agricultural Library- Replacement of deteriorated building envelope, repair of brick façade, and replacement of plumbing systems and incidental work.	Beltsville, MD	$6,650,000
Replacement of boilers, electrical and steam distribution system serving campus research facilities.	Beltsville, MD	$8,650,000
Major renovation to Jamie Whitten Delta States Research Center to address deferred maintenance of critical mechanical, electrical and plumbing systems, repair of deteriorated building envelope, and incidental repairs. (Phases 1-3)	Stoneville, MS	$36,350,000
Major renovation to Eastern Regional Research Center to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs.	Wyndmoor, PA	$15,100,000
Replacement of system components on HVAC for HVAC Materials Storage Building. Replacement of air handling units, controls, and compressor and replacement of electrical components for Building 107.	Tucson, AZ	$335,000
Replacement of research greenhouse mechanical systems and replacement of chiller.	Riverside, CA	$745,000

Replace system components in facility HVAC and fire alarm systems. Replace window systems to eliminate infiltration of water causing deterioration of structure and contents.	Akron, CO	$785,000
Replacement of cooling towers, heat exchangers, and lighting systems serving research facility.	Ft. Collins, CO	$300,000
Replacement of Annex Building HVAC system and components and provision of reliable back-up power source.	Newark, DE	$520,000
Replace deteriorated roofing systems on Buildings 102 and 103.	Aberdeen, ID	$35,000
Replacement of critical HVAC controls and chillers.	Kimberly, ID	$45,000
Refurbish boiler and distribution pumps, replace roofing system, repair security system. Replace HVAC cooling unit and provide reliable back-up power source. Replace windows that are allowing infiltration of water.	West Lafayette, IN	$1,400,000
Replacement of HVAC system and components in Buildings 3 and 5. Roof replacement and exterior painting of Building 3 to prevent deterioration of structure and contents.	Manhattan, KS	$455,000
Laboratory facility- Correct building automation system, replace electrical distribution panels, and replace HVAC system. Research Greenhouses- Replace glazing and control systems.	St. Paul, MN	$1,250,000
Replace roofing systems on 4 location buildings.	MS State, MS	$410,000
Replacement of electrical switchgear, distribution system, and back-up power source. Replacement of HVAC chiller and components. Replacement of roofing system on Building 12.	MS State, MS	$800,000
Major renovation to the Research Center to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs.	Miles City, MT	$3,650,000
Replacement of laboratory facilities' HVAC systems and components.	Fargo, ND	$1,525,000
Replacement of components and distribution elements for research facilities' HVAC systems. Replacement of roofs on Buildings 1 and 2 to prevent further deterioration of structure and contents. Replace plumbing system components in facility.	Clay Center, NE	$1,675,000
Repair and replacement of various critical building systems to include HVAC systems and electrical systems.	Geneva, NY	$750,000
Replacement of windows to prevent water infiltration damaging structure and contents.	Ithaca, NY	$325,000
Replacement of HVAC system and components in the west campus laboratory facility.	El Reno, OK	$175,000
Replacement of roof on 2 lab/office buildings. Replacement of fire alarm system. Replacement of leaking windows.	Corvallis, OR	$285,000
Replacement of electrical distribution components. Replacement of roofing system on main lab/office facility.	Pendleton, OR	$265,000
Replacement of HVAC and plumbing system components in various buildings at the location.	Florence, SC	$285,000
Repairs to building foundations various buildings. Replacement of roofing systems various buildings. Repairs to critical mechanical and plumbing systems. Repairs to back-up power supply systems.	College Station, TX	$2,750,000
Replacement of HVAC systems and components in Research Greenhouses 002, 003, and 004.	Logan, UT	$140,000

Dairy Forge Research Center (DFRC) - Repair exterior masonry and seal windows to prevent water infiltration. Replace heating system coils and heat exchangers at DFRC. Replace research greenhouse control systems at Cereal Crops Lab and Dairy Forage.	Madison, WI	$4,100,000
Replacement of Air Distribution System and recoating of location water tower to prevent structural deterioration and negative impact on location water supply.	Kearneysville, WV	$1,130,000
Replacement of critical systems and finishes in insectary area; roofing repairs, and replacement of systems and finishes in laboratory space.	Ft. Lauderdale, FL	$449,000
Avian Disease and Oncology Laboratory (ADOL) - Replace HVAC system in Building 22 (including boiler) and replace boiler in Building 19. Replace electrical distribution system in Building 1. Replace HVAC system components in Building 1A. Replace mechanical and electrical systems and finishes in Building 17.	East Lansing, MI	$702,000
Major renovation Building 306 to address deferred maintenance of critical mechanical, electrical and plumbing systems, and incidental repairs.	Beltsville, MD	$13,500,000
Repair of critical HVAC components and retro-commissioning in Buildings 010A	Beltsville, MD	$300,000
Repair of critical HVAC components and retro-commissioning in main laboratory	Poplarville, MS	$770,000

Appendix G: ARS Laboratories/Research Units Housed in Cooperator Facilities

City	State	ARS Laboratory Name	Cooperator
Fayetteville	AR	Poultry Production & Products Safety Research	U Arkansas
Little Rock	AR	Arkansas Children's Nutrition Center	U Arkansas
Little Rock	AR	Delta Obesity Prevention Research Unit	Lease
Davis	CA	Crops Pathology And Genetics Research	U California Davis
Fort Collins	CO	Soil, Plant, Nutrient, & Water Systems Mgmt	GSA
Washington	DC	Systematic Entomology Laboratory	Smithsonian Institution
Griffin	GA	Plant Genetic Resources Conservation Research	U Georgia
Tifton	GA	Crop Genetics & Breeding Research	U Georgia
Ames	IA	Corn Insects & Crop Genetics Research	Iowa St U
Ames	IA	Plant Introduction Research	Iowa St U
Boise	ID	Watershed Management Research	GSA
Hagerman	ID	Aquaculture Research	U Idaho
Urbana	IL	Global Change & Photosynthesis Research	U Illinois
Urbana	IL	Soy/Maize Germplasm, Path, & Genetics Res	U Illinois
West Lafayette	IN	Crop Production & Pest Control Research	Purdue U
West Lafayette	IN	Livestock Behavior Research	Purdue U
Lexington	KY	Forage-Animal Production Research	U Kentucky
Houma	LA	Sugarcane Research	Amer Sugar Cane League
Frederick	MD	Foreign Disease-Weed Science Research	US Army
East Lansing	MI	Sugarbeet & Bean Research	Michigan St U
St. Paul	MN	Plant Science Research	U Minnesota
St. Paul	MN	Soil & Water Management Research	U Minnesota
Columbia	MO	Cropping Systems & Water Quality Research	U Missouri
Columbia	MO	Plant Genetics Research	U Missouri
Mississippi State	MS	Corn Host Plant Resistance Research	Mississippi St U
Oxford	MS	Natural Products Utilization Research	U Mississippi
Stoneville	MS	Catfish Genetics Research	Mississippi St U
Raleigh	NC	Food Science & Market Quality Research	North Carolina St U
Lincoln	NE	Agroecosyst, Grain, Forage & Bioenergy Mgmt	U Nebraska
Reno	NV	Great Basin Rangelands Research	U Nevada Reno
Geneva	NY	Grape Genetics Research	Cornell U
Ithaca	NY	Plant Protection, Boyce Thompson Inst	Cornell U
Plum Island	NY	Plum Island Animal Disease Center	Dept Homeland Security
Columbus	OH	Soil Drainage Research	Ohio St U
Wooster	OH	Application Technology Research	Ohio St U
Wooster	OH	Corn & Soybean Research	Ohio St U
Wooster	OH	Soft Wheat Quality Research	Ohio St U
Burns	OR	Range & Meadow Forage Management Research	Oregon St U
Corvallis	OR	Shellfish Aquaculture	Oregon St U
Logan	UT	Pollinating Insect-Biology, Management, Syst Res	Utah St U
Prosser	WA	Vegetable & Forage Crops Production Research	Washington St U
Pullman	WA	Animal Disease Research	Washington St U
Pullman	WA	Crop and Land Mgmt Research Units	Washington St U
Wenatchee	WA	Physiology & Pathology of Tree Fruits Research	GSA
Madison	WI	Aquaculture Research	U Wisconsin Milwaukee
Madison	WI	Vegetable Crops Research	U Wisconsin

Appendix H: Rescission of FY 2011 Funding of ARS Building and Facilities Projects

Project and Location	Estimated Cost	Amount Appropriated	Unfunded Amount	FY 2011 Unobligated Balance Rescinded
ARS Research & Development Center - Auburn, AL	57,700,000	3,500,000	54,200,000	(3,500,000)
US Water Conservation Res & Western Cotton Res Lab - Maricopa, AZ	27,824,098	27,824,098	0	(254,880)
Ctr for Advanced Viticulture & Tree Crop Res - Davis, CA	49,000,000	16,310,639	32,689,361	(16,062,114)
Western Human Nutrition Research Center - Davis, CA	25,350,000	25,350,000	0	(1,730,261)
San Joaquin Valley Ag Res Center - Parlier, CA	27,660,000	27,660,000	0	(788,193)
US Salinity Lab - Riverside, CA	1,752,445	1,752,445	0	(14,370)
U.S. Agricultural Research Station - Salinas, CA	81,600,000	18,754,019	62,845,981	(14,937,644)
Center of Excellence for Vaccine Research - Storrs, CT	30,600,000	7,715,819	22,884,181	(7,221,296)
USNA Modernization - Washington, DC	40,300,000	10,806,724	29,493,276	(2,066,637)
U.S. Agricultural Research Laboratory - Canal Point, FL	34,200,000	5,039,325	$29,160,675	(4,106,211)
Subtropical Horticultural Research Center - Ft. Pierce, FL	31,400,000	31,400,000	0	(121)
Southeast Poultry Research Lab - Athens, GA	246,500,000	6,284,400	240,215,600	(5,832,898)
Pacific Basin Agricultural Research Center - Hilo, HI	49,700,000	39,668,326	10,031,674	(7,730,452)
Physical Security Upgrades	10,467,873	10,467,873	0	(1,330,273)
Advanced Genetics Lab - Aberdeen, ID	5,070,100	5,070,100	0	(223)

Aquaculture Facility - Hagerman, ID	16,300,000	3,221,100	13,078,900	(2,907,600)
Animal Waste Management Research Laboratory - Bowling Green, KY	39,200,000	9,729,800	29,470,200	(5,880,338)
Forage Animal Production Research Laboratory - Lexington, KY	51,600,000	12,653,300	38,946,700	(9,678,689)
BARC Modernization - Beltsville, MD	72,600,000	70,944,390	1,655,610	(9,831,954)
National Ag Library - Beltsville, MD	7,151,046	7,151,046	0	(115,175)
Aquaculture Research Facilities - Orono/Franklin, ME	29,625,386	22,720,095	6,905,291	(2,012,504)
Avian Disease & Oncology Lab - East Lansing, MI	1,942,000	1,942,000	0	(63,193)
Soil & Water Lab - Morris, MN	825,000	825,000	0	(2,604)
Cereal Disease Lab - St Paul, MN	3,679,807	3,679,807	0	(71,508)
National Plant and Genetics Security Center - Columbia, MO	51,200,000	18,281,713	32,918,287	(15,590,075)
Biotechnology Laboratory - Lorman, MS	27,500,000	6,046,200	21,453,800	(5,798,055)
Plant Propagation Facility - Oxford, MS	1,987,000	1,987,000	0	(92,427)
Southern Horticulture Lab - Poplarville, MS	9,940,200	9,940,200	0	(9,178)
South Central Poultry Research Laboratory - Starkville, MS	12,493,000	12,493,200	0	(10,345,645)
Jamie Whitten Delta States Research Center - Stoneville, MS	43,998,000	43,998,000	0	(6,047,327)
National Bio Control Lab - Stoneville, MS	15,589,000	15,589,000	0	(38,409)
Animal Bioscience Facility - Bozeman, MT	30,000,000	13,659,819	16,340,181	(12,720,879)

Ft Keogh Livestock& Range Research Lab - Miles City, MT	5,818,340	5,818,340	0	(57,996)
Northern Plains Ag Research Lab - Sidney, MT	10,411,132	10,411,132	0	(29,505)
Human Nutrition Research Center - Grand Forks, ND	4,146,697	4,146,697	0	(263,041)
Systems Biology Research Facility - Lincoln, NE	66,800,000	6,238,200	60,561,800	(5,782,528)
Jornada Exp Range Mgt Research Lab - Las Cruces, NM	7,875,000	7,875,000	0	(28,256)
Center for Grape Genomics - Geneva, NY	37,800,000	16,696,232	21,103,768	(14,806,870)
Plum Island Animal Disease Center - Greeneport, NY	18,372,596	18,372,596	0	(3,086)
Center for Crop-Based Health Genomics - Ithaca, NY	66,850,000	10,411,917	56,438,083	(7,314,491)
University of Toledo - Toledo, OH	30,250,000	11,283,819	18,966,181	(9,356,845)
US Grazinglands Research Lab - El Reno, OK	2,147,256	2,147,256	0	(4,038)
Southern Plains Range Research Station - Woodward, OK	17,940,000	12,424,000	5,516,000	(152,556)
U. S. Vegetable Laboratory - Charleston, SC	42,340,000	33,140,315	9,199,685	(517)
Northern Grain Insect Research Lab, - Brookings, SD	9,394,100	9,394,100	0	(174)
U.S. Livestock Insects Res Lab - Kerrville, TX	42,800,000	3,347,200	39,452,800	(2,768,214)
Plant Stress Lab - Lubbock, TX	13,551,320	13,551,320	0	(882)
Subtropical Ag Research Lab - Weslaco, TX	9,868,703	9,868,703	0	(18,503)
ARS Agricultural Research Center - Logan, UT	64,500,000	27,413,083	37,086,917	(13,839,929)

ARS Research Laboratory - Pullman, WA	62,000,000	18,303,205	43,696,795	(17,240,830)
Cereal Crops Research Center - Madison, WI	11,345,000	11,345,000	0	(3,554)
Nutrient Management Research Lab - Marshfield, WI	19,429,529	19,429,529	0	(18,229)
Dairy Forage Agricultural Res Ctr - Prairie du Sac, WI	54,700,000	8,504,360	46,195,640	(7,675,381)
Appalachian Fruit Research Facility - Kearneysville, WV	37,235,000	10,206,959	27,028,041	(3,430,725)
National Center for Cool & Coldwater Aquaculture - Leetown, WV	15,921,000	15,921,000	0	(4,717)
TOTAL	**1,775,782,755**	**768,247,528**	**1,007,535,427**	**(229,582,000)**

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