

# Y-12

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## OAK RIDGE Y-12 PLANT

Project Accomplishment Summary  
for  
Project Number 93-Y12P-003-XX

LOCKHEED MARTIN



### SMALL BUSINESS INITIATIVE

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**MASTER**

October 31, 1997

*[Signature]*

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for the  
U.S. DEPARTMENT OF ENERGY  
under contract DE-AC05-84OR21400

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## **PROJECT ACCOMPLISHMENT SUMMARY**

**Title:** Small Business Initiative  
**DOE TTI Number:** 93-Y12P-003-XX  
**Partner(s):** Various State Agencies and Businesses

### **BACKGROUND**

In mid 1993, the DOE Defense Programs initiated the Small Business Initiative (SBI) which was designed to provide technical support to our Nation's small businesses. The initial participating facilities were Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the Oak Ridge Y-12 Plant, and Sandia National Laboratory. The Allied-Signal Kansas City Plant and the Savannah River Site came on board, later. The program was designed to keep the DOE-DP technical skills honed, to maintain baseline technology capabilities vital to safeguarding the nation into the 21st century, and to share technical resources with the small business community. The approach utilized to accomplish this was to establish mutually beneficial technology partnerships with small businesses that could leverage advanced technologies and improve the U.S. position in the global economy.

### **DESCRIPTION**

The SBI executes its mission through six program elements:

- 1) Technical Assistance,
- 2) Personnel Exchanges,
- 3) Collaborative Partnerships (CRADAs),
- 4) Intermediary Relationships,
- 5) Facility Utilization, and
- 6) Training.

Each participating facility uses the combination of these elements which best contributes to meeting DP goals. At Y-12, Technical Assistance, CRADAs, Intermediary Relationships, User Facilities, and Training have been the major elements used.

#### **Technical Assistance**

We have tailored our Technical Assistance Program to help small businesses with short-term technical problems. Technical Assistance can take a variety of forms: technical consultation, education and training, technical information, or access to specialized or unique equipment. Depending on the nature of the technical assistance required, we will work with the business at either their business location or in our laboratories and facilities. Technical Assistance involves the utilization of existing technology, not development and deployment of new technology. As such, no collaborative research is involved, and no intellectual property is created. Our technical assistance service is offered at reduced rates to qualified small businesses. It is available on a first-come, first-served basis, and is generally limited to one request per business per year.

#### **Personnel Exchange**

Under a personnel exchange, the technical representative of a small business may travel to the SBI site location or the SBI site's technical staff may travel to the small business's location or an actual exchange of personnel at both locations may occur in order to effect an exchange of technology. Any costs associated with laboratory technical staff involvement are paid by the SBI

-- to a limit of \$30,000.

Projects selected under this element must be technically sound, specifically focused, and of distinct benefit to both the small business and DOE-DP. Unique technical skills or equipment not reasonably available in the private sector are applied to the small business' problem.

### **Partnership Agreements**

The most common mechanism used to enter into a partnership is a Cooperative Research and Development Agreement (CRADA). CRADAs are contracts, used for developing new technologies that cover issues such as intellectual property, inventions, and product commercialization rights. We select our partners on a competitive basis. In making the selection, we look at the mutual benefits to small businesses and to the Department of Energy. These funds are used to support the participating DOE organization's direct costs. Partnership agreements may be cost-shared or may be 100% funds-in. A small business qualifying for a cost-shared partnership is required to make an in-kind contribution. The contribution may take the form of personnel, space, equipment, materials and/or money.

### **Facility Utilization**

Over the years, the Department of Energy laboratories and production facilities have developed an extensive array of state-of-the-art manufacturing, computational, and experimental instrumentation resources. Today, laboratories and production centers participating in the Small Business Initiative have unique user facilities and equipment at their locations. Businesses can use these facilities or this equipment to conduct research -- perhaps to produce a one-of-a-kind prototype or to develop or evaluate a unique technology or process. Other examples of facility utilization include fabrication, calibration, and testing.

### **Intermediaries**

Assistance may be provided through a one-on-one relationship between a laboratory or facility and a small business or through an intermediary partner. The intermediary may be a state or local government, university or community college, not-for-profit economic development center, or business incubator. The partner becomes an outreach tool for Y-12 and Y-12 becomes a technical resource for the partner. These partnering arrangements have been documented with CRADAs in the past, but the newer ones use Memoranda of Cooperation.

### **ECONOMIC IMPACT**

The reported private sector impact from the SBI Program in FY96 was \$210M. Cumulative impact for the period mid-FY93 through FY96, was \$430M. More than 2300 requests for technical assistance have been made through the Lockheed Martin Energy Systems Technical Assistance Program, and more than 2000 have been completed. Technical assistance customers are surveyed a few months after completion of the project. Over 93% of our customers have indicated satisfaction with the assistance that they received.

### **DOE BENEFIT**

The SBI provides DP benefits both directly and indirectly. Mechanisms such as CRADAs provide an excellent platform for Y-12 Defense Program Managers to ascertain and plan specific contributions of the research prior to implementation. Mechanisms such as Technical Assistance

generally provide indirect DP benefits, although specific contributions are made. For instance, the Y-12 Technical Assistance Program provides well over half of the entire private sector impact reported for the facility and most of the success stories. This, along with the rapid response available through the program, provides goodwill in the community, region, and nation that has not been generated by other means. Technical Assistance and User Facilities provide opportunities for private sector funded follow-on work that provides additional support for the DP principal investigators (PIs). The interactions provided for PIs allows them to maintain or enhance their knowledge of the state of the art in private industry. This becomes more and more important as internal funds for new technical development decrease. These interactions also provide PIs information for determining potential future suppliers, and allow experimentation with new materials or machines that may not be available on-site.

The SBI funds are leveraged with private sector funding to develop new technologies or to enhance old technologies, addressing either planned or potential DP needs and private sector needs. The SBI projects involve many of the Y-12 Weapons Baseline Technologies such as welding, dimensional metrology, ceramics machining, and surface metrology. The Technical Assistance Program allows a more varied use of principal investigators with a corresponding increase in their opportunities to learn from the private sector, develop long term private sector relationships for future reference, and to apply lessons learned to their DP work. Approximately 75% of the technical assistances involve at least one of the Y-12 Weapons Baseline Technologies and over 90% include a DP supported principal investigator.

In the past, we have issued success stories, which were focused on private sector impact. We are presently developing a success story format and a PI survey to address DP benefits. This new format will highlight both the industrial partner's benefit as well as the DOE DP benefit and will be used in future releases of the ORCMT's Success Stories booklet.

## **PROJECT STATUS**

### **I. Executive Summary**

Through the fourth quarter of FY96, \$3.819M of \$4.002M of Small Business Initiative (SBI) funds were costed. Four hundred fifty-four technical assistance requests were received during the year and 438 were completed. Total reported private sector impact resulting from technical assistance for the FY was \$184M. Six new SBI Cooperative Research and Development Agreements (CRADA) were initiated during the year. Nine new user agreements were signed during the year. The Tennessee Governor's School for Manufacturing, the first of its kind in the nation, was conducted during June and July.

### **II. Technical Accomplishments**

#### **Element Narrative**

##### ***Administrative***

Through the fourth quarter of FY96, \$3.819M of \$4.002M of SBI funds were costed.

##### ***Element 1-Technical Assistance***

##### **Accomplishments**

During FY96, the SBI funded 454 short-term technical assistances. Private sector impact for

FY96 was \$184M and the overall quality rating was 4.3 out of a possible 5. Cumulative private sector impact was \$395M. In addition, approximately \$500K of work for others was generated as a result of the technical assistance interface.

Reports for the years FY93 - FY96 map technical assistance requests to Y-12 "core competencies." Beginning in FY97, mapping of technical assistance requests will be to the Y-12 Weapons Baseline Technologies.

### **Technical Assistance Mapped To Core Competencies**

| <u>Core Competency</u>                  | <u>FY96</u> |
|---|-------------|
| 3D Simulation                           | 9           |
| Distributed Computing                   | 20          |
| Component Design                        | 9           |
| Manufacturing Technology                | 184         |
| Photonics                               | 29          |
| Sensors                                 | 12          |
| Metals                                  | 19          |
| Ceramics & Inorganics                   | 17          |
| Polymers                                | 8           |
| Composites                              | 8           |
| Predictive Aging                        | 9           |
| Environmentally Conscious Manufacturing | 27          |
| Uranium                                 | 57          |
| Salt (LiH/D)                            | 9           |
| Visualization Tools                     | 2           |
| Robotics                                | 1           |

#### ***Element 2-Personnel Exchange***

##### **Accomplishments**

No personnel exchanges were planned or initiated during FY96.

#### ***Element 3-Partnership Agreements***

##### **Accomplishments**

Since the beginning of the SBI Program 36 SBI CRADAs have been approved and executed. Thirty-two of these were with small businesses and four were with intermediary partners. During the fourth quarter of FY96 18 projects were active and nine of those were completed. Six SBI CRADAs have been signed and executed this FY. Nine CRADAs will carry over into FY97.

#### ***Element 4-Intermediary Relationships***

##### **Accomplishments**

During FY96 all of the SBI participants have emphasized populating the DOE Technology Information Database (DTIN). Y-12 made over 252 entries during the fiscal year. Our participation with the DOC in the Commercialization of Defense Technologies conferences included the San Diego and Orlando conferences. We also assisted in sponsoring a Composites Workshop in Oak Ridge. Our support of the Manufacturing Means Jobs (MMJ) initiative with

the University of Tennessee Centers for Industrial Services and the Tennessee Department of Economic and Community Development continues to broaden access to our program in the manufacturing arena in Tennessee. A supplier development program within the MMJ to help develop suppliers for original equipment manufacturers (OEMs) will also be developing these same suppliers to produce future parts for the DOE weapons programs as needs arise. Also arising from this partnership is a joint proposal with the NIST's Tennessee Manufacturing Extension Partnership to the DOD to reengineer old parts and help develop suppliers for these parts. This will provide benefits for the DOD, the small manufacturers, and the DOE. Not only will we be exercising engineering and production skills critical to Defense Programs, but we will also be developing suppliers for future DP needs.

#### ***Element 5-Facility Utilization***

##### **Accomplishments**

Nine new user agreements were signed during FY96. Twenty-six SBI users logged 1131 hours during the year. Private sector impact attributed to User Facilities was \$26M in FY96 and \$35M, cumulative. The overall quality of service rating is 4.5 on a 5.0 scale.

#### ***Element 6-Training***

##### **Accomplishments**

Manufacturing skills training has been identified consistently by our small business contacts as a very critical need, both now and into the future. This training has also become very important to us in the Y-12 Defense Programs as our older employees retire and the pool for replacement increasingly comes from the private sector or other craft groups within Y-12. The ORCMT's Manufacturing Skills Campus continues to successfully partner with the technology centers, high schools, and small businesses to generate student interest in manufacturing careers and to provide manufacturing skills training that has not been available to these students and small companies in the past. Thirty high school students were provided training in precision manufacturing and industrial maintenance technologies in partnership with the Tennessee Technology Center at Knoxville. All of these students have been placed in jobs; most of them in small businesses. The first Governor's School for Manufacturing was completed in July. The Manufacturing Skills Campus also supported the "Focus: HOPE" organization in Detroit with training in the precision alignment of machine tools.

### **III. Goals**

| <b>Description</b>                                 | <b>Goal</b> | <b>FY96</b> | <b>Difference</b> |
|--|-------------|-------------|-------------------|
| No. of technical assistances initiated             | 400         | 454         | +54               |
| No. of technical assistances with women/minorities | 27          | 27          | 0                 |
| Customer satisfaction levels of good or excellent  | 100%        | 82%         | -18%              |
| No. of technical assistances closed                | 400         | 438         | +38               |
| Equivalent Jobs created                            | ----        | 3167        | ----              |
| Total Economic Impact/Technical Assistance         | ----        | \$184M      | ----              |
| No. of SBI funded CRADAs                           | 5           | 6           | +1                |
| No. of small business CRADAs, other funding        | N/A         | N/A         | N/A               |
| No. of new intermediary agreements                 | 5           | 4           | -1                |
| No. of new User Facilities                         | 0           | 0           | 0                 |

No. of new SB user agreements

10

9

-1

## **CONTACTS**

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## **PROJECT EXAMPLES AND INFORMATION RELEASE**

A few examples of SBI projects and their DP benefit are in Attachment 1. The Technical Assistance statistics by fiscal year are in Attachment 2. Individual CRADA final reports are available upon request.



## **Attachment 1**

### **SBI DP Benefit Examples**

Laser beam cutting requests generated an effort in the Materials Joining Center to improve the level of expertise in this area. Recent DP programmatic needs triggered an interest in laser cutting which the Materials Joining Center was better able to respond to because of the previous technical assistance projects.

Technical assistance projects concerning replacement of methyl chloroform with ultrasonic cleaning resulted in gaining knowledge of several different vendors' equipment in terms of cleaning time required and operating parameters (vendor selection). It also allowed the technologists to learn what chemistries work well in ultrasonics and solubilities for particular coatings.

Reverse Engineering projects have exercised the material analysis capabilities of ORNL and the dimensional capabilities of Y-12 to produce 3D CAD models and engineering drawings. This exercise is very similar to the process of duplicating weapons parts.

# Attachment 2

## TECHNICAL ASSISTANCE REQUESTS FY'93-FY'96

| MONTH       | MTIS | NMTP | TENN | TV | FLA | GA | N    | SMT | TEC | PEN | CONN | MIS | BM | MASS | OHIO | TA    | INFO | GRAND |
|-------------|------|------|------|----|-----|----|------|-----|-----|-----|------|-----|----|------|------|-------|------|-------|
|             |      |      |      | A  |     |    | CAR. | NET | N   |     |      | S   | P  |      |      | TOTAL | TOT  |       |
| FEBRUARY    | 11   | 3    | 3    |    |     |    |      |     |     |     |      |     |    |      |      | 17    | 25   | 42    |
| MARCH       | 11   | 8    | 101  | 8  |     |    |      |     |     |     |      |     |    |      |      | 128   | 26   | 154   |
| APRIL       | 20   | 14   | 11   | 0  |     |    |      |     |     |     |      |     |    |      |      | 45    | 64   | 109   |
| MAY         | 13   | 34   | 4    | 8  |     |    |      |     |     |     |      |     |    |      |      | 59    | 74   | 133   |
| JUNE        | 5    | 19   | 10   | 5  |     |    |      |     |     |     |      |     |    |      |      | 39    | 44   | 83    |
| JULY        | 21   | 29   | 43   | 1  |     |    |      |     |     |     |      |     |    |      |      | 94    | 29   | 123   |
| AUGUST      | 21   | 24   | 12   | 2  |     |    |      |     |     |     |      |     |    |      |      | 59    | 24   | 83    |
| SEPTEMBER   | 20   | 23   | 25   | 4  | 0   |    |      |     |     |     |      |     |    |      |      | 72    | 94   | 166   |
| FY'93 TOTAL | 122  | 154  | 209  | 28 | 0   | 0  | 0    | 0   | 0   | 0   | 0    | 0   | 0  | 0    | 0    | 513   | 380  | 893   |
| OCTOBER     | 21   | 23   | 11   | 4  | 1   |    |      |     |     |     |      |     |    |      |      | 60    | 39   | 99    |
| NOVEMBER    | 19   | 20   | 14   | 1  | 1   |    |      |     |     |     |      |     |    |      |      | 55    | 37   | 92    |
| DECEMBER    | 14   | 13   | 11   | 1  | 1   |    |      |     |     |     |      |     |    |      |      | 40    | 61   | 101   |
| JANUARY     | 19   | 18   | 2    | 0  | 1   |    |      |     |     |     |      |     |    |      |      | 40    | 34   | 74    |
| FEBRUARY    | 35   | 33   | 12   | 0  | 1   | 1  |      |     |     |     |      |     |    |      |      | 82    | 80   | 162   |
| MARCH       | 28   | 36   | 16   | 0  | 1   | 2  |      | 2   |     |     |      |     |    |      |      | 85    | 36   | 121   |
| APRIL       | 31   | 20   | 16   | 0  | 1   | 0  |      | 0   |     |     |      |     |    |      |      | 68    | 19   | 87    |
| MAY         | 47   | 19   | 5    | 5  | 0   | 0  |      | 0   |     |     |      |     |    |      |      | 76    | 39   | 115   |
| JUNE        | 68   | 8    | 14   | 4  | 0   | 2  |      | 0   |     |     |      |     |    |      |      | 96    | 54   | 150   |
| JULY        | 31   | 2    | 8    | 5  | 2   | 3  | 3    | 0   |     |     |      |     |    |      |      | 54    | 27   | 81    |
| AUGUST      | 33   | 4    | 3    | 0  | 1   | 0  | 0    | 0   |     |     |      |     |    |      |      | 41    | 34   | 75    |
| SEPTEMBER   | 41   | 2    | 3    | 1  | 1   | 1  | 0    | 1   | 0   |     |      |     |    |      |      | 50    | 137  | 187   |
| FY'94 TOTAL | 387  | 198  | 115  | 21 | 11  | 9  | 3    | 1   | 2   | 0   | 0    | 0   | 0  | 0    |      | 747   | 597  | 1344  |
| OCTOBER     | 28   | 6    | 2    | 0  | 0   | 0  | 2    | 0   | 0   |     |      |     |    |      |      | 38    | 14   | 52    |
| NOVEMBER    | 32   | 9    | 6    | 0  | 0   | 1  | 3    | 2   | 0   |     |      |     |    |      |      | 53    | 13   | 66    |
| DECEMBER    | 21   | 2    | 2    | 0  | 0   | 0  | 2    | 1   | 0   |     |      |     |    |      |      | 28    | 10   | 38    |
| JANUARY     | 28   | 6    | 12   | 0  | 0   | 0  | 4    | 5   | 0   |     |      |     |    |      |      | 55    | 56   | 111   |
| FEBRUARY    | 24   | 8    | 5    | 2  | 1   | 1  | 2    | 0   | 1   |     |      |     |    |      |      | 44    | 5    | 49    |
| MARCH       | 44   | 10   | 10   |    | 0   | 5  | 0    | 6   | 0   |     |      |     |    |      |      | 75    | 11   | 86    |
| APRIL       | 36   | 10   | 3    |    | 0   | 2  | 1    | 0   | 0   |     |      |     |    |      |      | 52    | 8    | 60    |
| MAY         | 34   | 4    | 6    |    | 1   | 3  | 1    | 2   | 0   |     |      |     |    |      |      | 51    | 10   | 61    |
| JUNE        | 39   | 10   | 2    |    | 0   | 2  | 0    | 1   | 0   |     |      |     |    |      |      | 54    | 14   | 68    |
| JULY        | 24   | 7    | 4    |    | 1   | 1  | 1    | 1   | 0   |     |      |     |    |      |      | 39    | 18   | 57    |
| AUGUST      | 35   | 8    | 6    |    | 0   | 1  | 0    | 2   | 1   |     |      |     |    |      |      | 53    | 8    | 61    |
| SEPTEMBER   | 45   | 6    | 2    |    | 0   | 1  | 0    | 4   | 0   |     |      |     |    |      |      | 58    | 189  | 247   |
| FY'95 TOTAL | 390  | 86   | 60   | 2  | 3   | 17 | 16   | 24  | 2   | 0   | 0    | 0   | 0  | 0    |      | 600   | 356  | 956   |
| OCTOBER     | 41   |      | 6    |    | 1   | 0  | 3    | 2   | 0   | 0   | 0    | 0   | 0  |      |      | 53    | 0    | 53    |
| NOVEMBER    | 47   |      | 1    |    | 0   | 1  | 0    | 2   | 1   | 0   | 0    | 0   | 0  |      |      | 52    | 0    | 52    |
| DECEMBER    | 14   |      | 1    |    | 1   | 2  | 1    | 0   | 0   | 1   | 0    | 0   | 0  |      |      | 20    | 23   | 43    |
| JANUARY     | 36   |      | 1    |    | 0   | 2  | 0    | 1   | 1   | 1   | 0    | 0   | 0  |      |      | 42    | 0    | 42    |
| FEBRUARY    | 32   |      | 6    |    | 1   | 0  | 1    | 1   | 0   | 0   | 0    | 0   | 0  |      |      | 41    | 1    | 42    |
| MARCH       | 27   |      | 8    |    | 0   | 0  | 0    | 0   | 0   | 2   | 0    | 0   | 0  |      |      | 37    | 0    | 37    |
| APRIL       | 34   |      | 3    |    | 0   | 0  | 0    | 1   | 0   | 0   | 0    | 0   | 0  |      | 0    | 38    | 8    | 46    |

|                |      |     |     |    |    |    |    |    |   |   |   |   |   |    |    |      |      |      |
|----------------|------|-----|-----|----|----|----|----|----|---|---|---|---|---|----|----|------|------|------|
| MAY            | 24   | 4   | 1   | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0  | 29 | 15   | 44   |      |
| JUNE           | 10   | 5   | 0   | 0  | 1  | 0  | 0  | 1  | 0 | 0 | 0 | 0 | 0 | 17 | 0  | 17   |      |      |
| JULY           | 22   | 4   | 1   | 0  | 0  | 1  | 0  | 0  | 0 | 0 | 0 | 1 | 0 | 29 | 0  | 29   |      |      |
| AUGUST         | 37   | 12  | 0   | 0  | 0  | 4  | 0  | 0  | 0 | 0 | 0 | 0 | 1 | 54 | 11 | 65   |      |      |
| SEPTEMBER      | 36   | 4   | 0   | 0  | 0  | 2  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 42 | 50 | 92   |      |      |
| FY'96<br>TOTAL | 360  | 0   | 55  | 0  | 5  | 5  | 6  | 14 | 2 | 5 | 0 | 0 | 0 | 1  | 1  | 454  | 108  | 562  |
| CUM.<br>TOTAL  | 1259 | 438 | 439 | 51 | 19 | 31 | 25 | 39 | 6 | 5 | 0 | 0 | 0 | 1  | 1  | 2314 | 1441 | 3755 |

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M98052945



Report Number (14) Y/AMT--492  
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Publ. Date (11) 19971031  
Sponsor Code (18) DOE/DP, XF  
UC Category (19) UC-700, DOE/ER

19980707 085

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