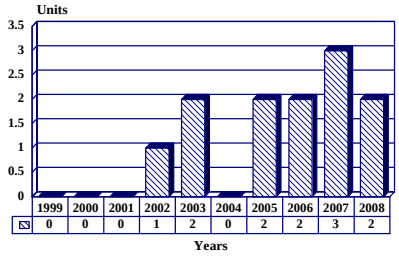
# Volume Surveillance Radar (VSR) - Archived 5/99

## Outlook

- Replacement for SPS-48(V) and SPS-49(V) surveillance radars
- Requirement announced to industry; VSR briefing held, concept papers requested
- EDM planned for 2003; production target date 2005
- COTS emphasized

10 Year Unit Production Forecast
1999 - 2008




## Orientation

Description. A new Fleet Volume Surveillance Radar (VSR). Planned for non-AEGIS ships to replace the SPS-48(V) and SPS-49(V).

Sponsor
US Navy
Naval Sea Systems Command (NAVSEA)
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Contractors
To be determined.

Status. Concept papers requested, industry briefing held.

Total Produced. None to date.

Application. Non-AEGIS surface ships.

Price Range. The Navy cost goal has been set at US$10 million per system (FY97 dollars).

## Technical Data

| | Metric | US |
|---|---|---|
| **Dimensions** | | |
| To be determined | | |
| **Characteristics (planned)** | | |
| Coverage: | 360° in azimuth<br>70° in elevation | |
| Range: | 463 km | 250 nm |
| MTBF: | 5,000 hr | |

Design Features. The VSR would have to be capable of operating in a littoral environment contaminated by a large amount of clutter, as well as by hostile signals. The tentative radar coverage requirement is 360° in azimuth, 70° in elevation, to 120,000 feet in height, and with an instrumented range of 250 nm.

Guidelines for radar supportability were an MTBF goal of 5,000 hours, with full built-in-test down to the LRU level with local maintenance and radar-set control panel. It would have to be Battle Force Tactical Training (BFTT) System-compatible and supported by minimal manning. Ruggedized Commercial Off-the-Shelf (COTS) equipment should be used where possible, and documentation and logistics would have to meet a tailored MIL-STD. Flexibility is a key issue, and the largest anticipated antenna size and weight was requested from respondents so the effect on ship construction could be determined. Planners will consider modular construction to accommodate a changing COTS environment.

The Navy said it was interested in having an Engineering Development Model of the VSR ready for installation by 2003, with production beginning in 2005. The cost goal was set at US$10 million per system (in FY97 dollars).

**Operational Characteristics.** The VSR is to replace the SPS-48(V) and SPS-49(V) series radars, and would typically be installed on non-AEGIS ships. One of the new radar's missions will be to provide tracking of threats such as aircraft, missiles, ultra-light air vehicles (UAVs), and helicopters with rapid hand-off to engagement systems. Other missions would include situational awareness, air traffic control, IFF and fire finding. These goal missions were considered desirable, if not a cost driver.

## Variants/Upgrades

None to date.

## Program Review

Background. The SPS-48(V) and SPS-49(V) surveillance radars have been in service with the Fleet since the 1970s. They are capable sensors and have seen ongoing upgrades and enhancements. But they are aging, and the Navy mission is changing from blue-water, deep- sea operations to missions in the littoral. These aging radars do not have the up-to-date technology needed to adapt effectively to the new needs of the surface fleet. Instead of trying to continue upgrading the old workhorses, the Navy will develop a new radar to meet the new need.

The US Navy released a May 1997, *Commerce Business Daily* Research and Development Sources Sought announcement, seeking concept papers for a new fleet Volume Surveillance Radar (VSR), that was under consideration by the Navy. A concept paper was requested from companies that believed they were qualified to design, construct and test the VSR. The concept papers were to be submitted within 80 days to the Naval Sea Systems Command. This release followed an April 1997 industry briefing at the Naval Research Laboratory (NRL).

On February 4, 1999, the USS *Arthur W. Radford* collided with a Saudi Arabian container ship off the Virginia coast. There was significant damage. Although the *Radford* is not directly involved in the VSR program, some of its findings on composite mast/ship radar cross-section technology would be used by Navy planners to develop and evaluate concepts and requirements for the volume surveillance radar program. A significant delay in resuming the tests could impact the VSR schedule.

A claim for damages was filed on behalf of the US Navy in the US District Court in late February, stating that the "fault and negligence" of the cargo ship caused the accident. The collision left the 563-foot destroyer with a hole extending from the deck to the waterline, toppled its five-inch gun and damaged the Tomahawk cruise missiles onboard. The three-times-heavier Saudi *Riyadh* suffered a 30-40-foot-long and four-foot-high gash on both sides of its bow.

The destroyer had been calibrating its electronic instruments by operating in circles around an electronic buoy at a slow speed. The cargo ship, on the other hand, was preparing to line up in the shipping lanes before taking on a pilot for the last part of its trip to Baltimore. The accident took place about 25 miles northeast of entrance to the Chesapeake Bay, at 11:40 p.m. The *Radford* was scheduled to move to a dry dock on Feb. 24 or 25, provided the ship's underwater portion was ready for the transfer by then. It was estimated that it would take more than a month from the beginning of the dry docking to specifically determine the amount of damage and evaluate their eventual

repair. The Saudi ship underwent temporary hull repairs locally, with permanent repairs to be made in the UAE.

## Funding

Specific funding has not yet been identified.

## Recent Contracts

No contracts have been awarded.

## Timetable

| Month | Year | Major Development |
|---|---|---|
| Apr | 1997 | VSR briefing to industry |
| May | 1997 | Sources Sought announcement |
| | 2003 | Engineering Development Model of the VST ready for installation |
| | 2005 | Production start (tentative) |

## Worldwide Distribution

This is a **US** only program in the earliest stages of concept development.

## Forecast Rationale

Although the SPS-48(V) and SPS-49(V) radars perform well for their age and design, naval operations and the state-of-the-art are changing. Sea battles will no longer be fought in the open ocean. Rather, conflict is moving to the coastal regions, the littoral environment, and this is making new demands on sensors and systems.

As was pointed out in Forecast International's *Littoral Warfare: An Emerging Market for Ships & Systems*, "Warfare in the littoral regions would be much easier if medieval cartographers had been correct in assuming that the world was flat. This would remove many of the limits faced by maritime radars today, and made it possible to continue to use older systems which rely on brute radar power to achieve superior performance in historically typical conditions."

Clutter, crowding, low-flying hyper-fast missiles, and an increasingly demanding data processing and situational awareness system make it necessary to reexamine a ship's sensor suite. Instead of modifying existing radars for the task, planners are telling designers to start from scratch and create a new sensor which will meet the needs of the turn-of-the-century Navy. Front-line combatants will rely on AEGIS for combat operations. Non-AEGIS ships have been thought to be able to get along with something different, something less expensive and less complex than the SPY-1(V) radars.

By developing a new system, the Navy can capitalize on a variety of developments. Antenna systems are changing as radar designers move away from large rotating scanners to phased and active array systems. New components are vastly more stable and sensitive than those of a decade ago, significantly increasing the ability of new radars to perform detection and discrimination tasks not even thought of when the SPS-48(V) and SPS-49(V) were designed. By incorporating data processing throughout the system's design, the outputs are better adapted to today's advanced data processing, something which will provide major benefits as the planners implement Cooperative Engagement Capability networking.

The overall procurement climate is changing as well. Instead of telling industry in detail what they want, planners are putting forth performance requirements and letting designers find ways of meeting them within a cost target. The desire for Commercial Off-the-Shelf equipment is another step toward ensuring affordability and performance. With some ruggedization, many

highly capable commercial components will perform quite well for military applications.

This program is too early in its development to have developed a production plan or concept. The goal is to have an initial set of developmental systems available for installation and testing in 2003. Production would possibly start in 2005. Because this radar will equip non-AEGIS ships, the number produced for new construction ships will be small unless a significant retrofit effort develops. Budget constraints will be a major limiting factor.

Lockheed Martin has proposed installing a down-sized AEGIS radar similar to the SPY-1F on the LPD-17 instead of a standard radar suite. The company is making significant cost-driver points relative to the proposed change. The Navy is seriously evaluating the idea. Should this happen, it may impact the VSR program significantly.

The following forecast is still very tentative at this time and will be adjusted to Navy procurement plans when, and if, they develop.

# Ten-Year Outlook

| | | ESTIMATED CALENDAR YEAR PRODUCTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | High Confidence Level | | | Good Confidence Level | | | | | Speculative | | |
| Designation | Application | thru 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | Total 99-08 |
| Volume Surveillance Radar (VSR) | non-AEGIS surface ships | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 2 | 3 | 2 | 12 |

Note: Includes engineering development models and prototype systems.