

Secure Video Surveillance System (SVSS)

Installation Presentation ABACC

**Mark Pinkalla
Pete Humphreys
Sandia National Laboratories**

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,
for the United States Department of Energy's National Nuclear Security Administration
under contract DE-AC04-94AL85000.



Objectives

- **Describe the SVSS User Interface**
- **In-depth Software Architecture**
- **Discovered Issues**

Secure Video Surveillance System (SVSS)

User Interface – Home Screen



This is the home page where the Inspector will start. From the buttons on the top of the page, all system functions are accessible.

Toward the bottom of the page, links are available to access live feeds from the cameras.

Video Capture Active

Secure Video Surveillance System (SVSS)

User Interface

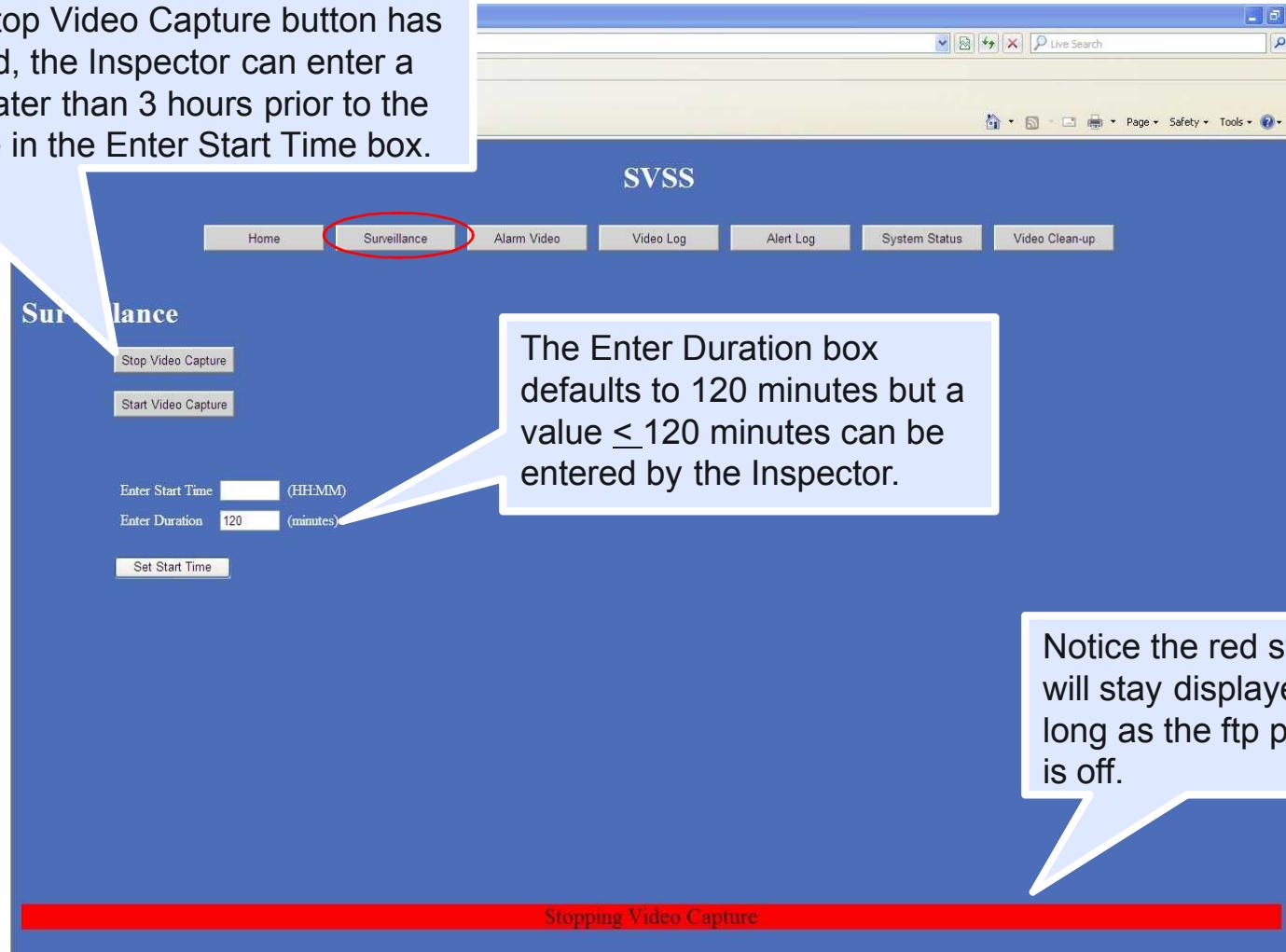
To begin an inspection, the Surveillance button is clicked from the Home Page. The Surveillance page is then displayed.

The screenshot shows the SVSS User Interface. At the top, there is a navigation bar with buttons for Home, Surveillance, Alarm Video, Video Log, Alert Log, System Status, and Video Clean-up. The 'Surveillance' button is highlighted with a red oval. Below the navigation bar, the main content area is titled 'Surveillance'. It contains two buttons: 'Stop Video Capture' (which is highlighted with a red oval) and 'Start Video Capture'. A message below the buttons says, 'Please stop video capture to enable creation of surveillance video.' At the bottom of the main content area, it says 'Video Capture Active'. A callout box points to the 'Stop Video Capture' button with the text: 'The inspector will click the Stop Video Capture button to halt the collection of images from the camera ftp process.'

Secure Video Surveillance System (SVSS)

User Interface – Begin inspection

Once the Stop Video Capture button has been clicked, the Inspector can enter a time no greater than 3 hours prior to the current time in the Enter Start Time box.



The screenshot shows the SVSS User Interface with the 'Surveillance' tab selected. The interface includes a toolbar with buttons for Home, Surveillance, Alarm Video, Video Log, Alert Log, System Status, and Video Clean-up. Below the toolbar, there are two main buttons: 'Stop Video Capture' and 'Start Video Capture'. Under these buttons are two input fields: 'Enter Start Time' with a text input box and '(HH:MM)' placeholder, and 'Enter Duration' with a text input box and '120 (minutes)' placeholder. A 'Set Start Time' button is located below these fields. A red arrow points from the text box in the first callout to the 'Enter Start Time' field. A callout box with a red border and white background contains the text: 'The Enter Duration box defaults to 120 minutes but a value < 120 minutes can be entered by the Inspector.' A red stripe is visible at the bottom of the interface, and a callout box with a blue border and white background points to it with the text: 'Notice the red stripe, it will stay displayed as long as the ftp process is off.'

SVSS

Home Surveillance Alarm Video Video Log Alert Log System Status Video Clean-up

Surveillance

Stop Video Capture

Start Video Capture

Enter Start Time (HH:MM)

Enter Duration 120 (minutes)

Set Start Time

Stopping Video Capture

Secure Video Surveillance System (SVSS)

User Interface – Inspection Time

Once the Set Start time button has been clicked, the program verifies the entered time does not exceed the 120 minute max video length in the 3 hour viewable window rule.

When the rule is satisfied, the Create Video file button will appear. By clicking the Create Video file button, the video creation process begins.

SVSS

Surveillance

Stop Video Capture

Start Video Capture

Inspection video duration: 120 minutes

Enter Start Time 20:00 (HH:MM)

Enter Duration 120 (minutes)

Set Start Time

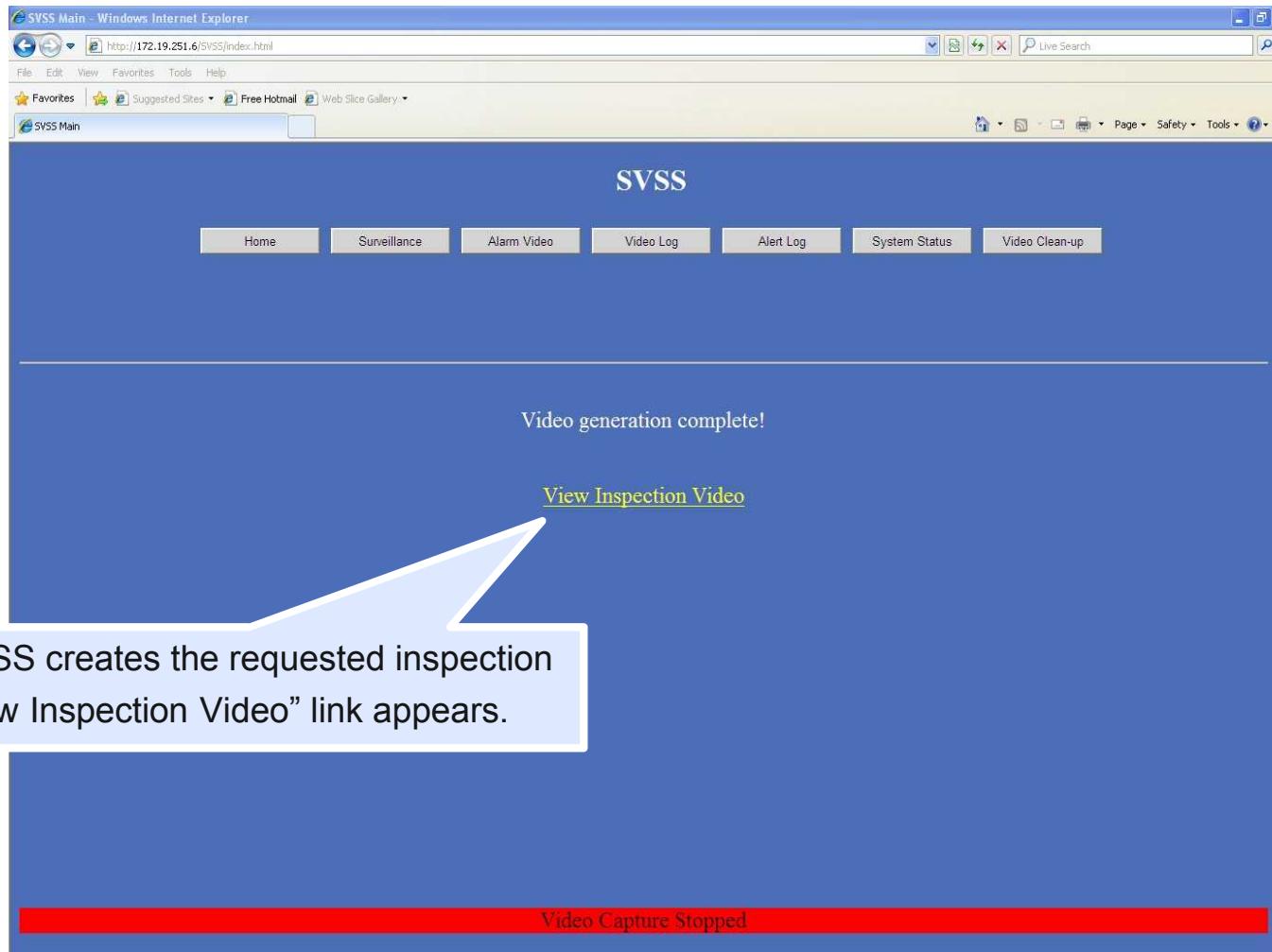
Create Video file

When the Start Time is correct, select the "Create Video file" button.

Video Capture Stopped

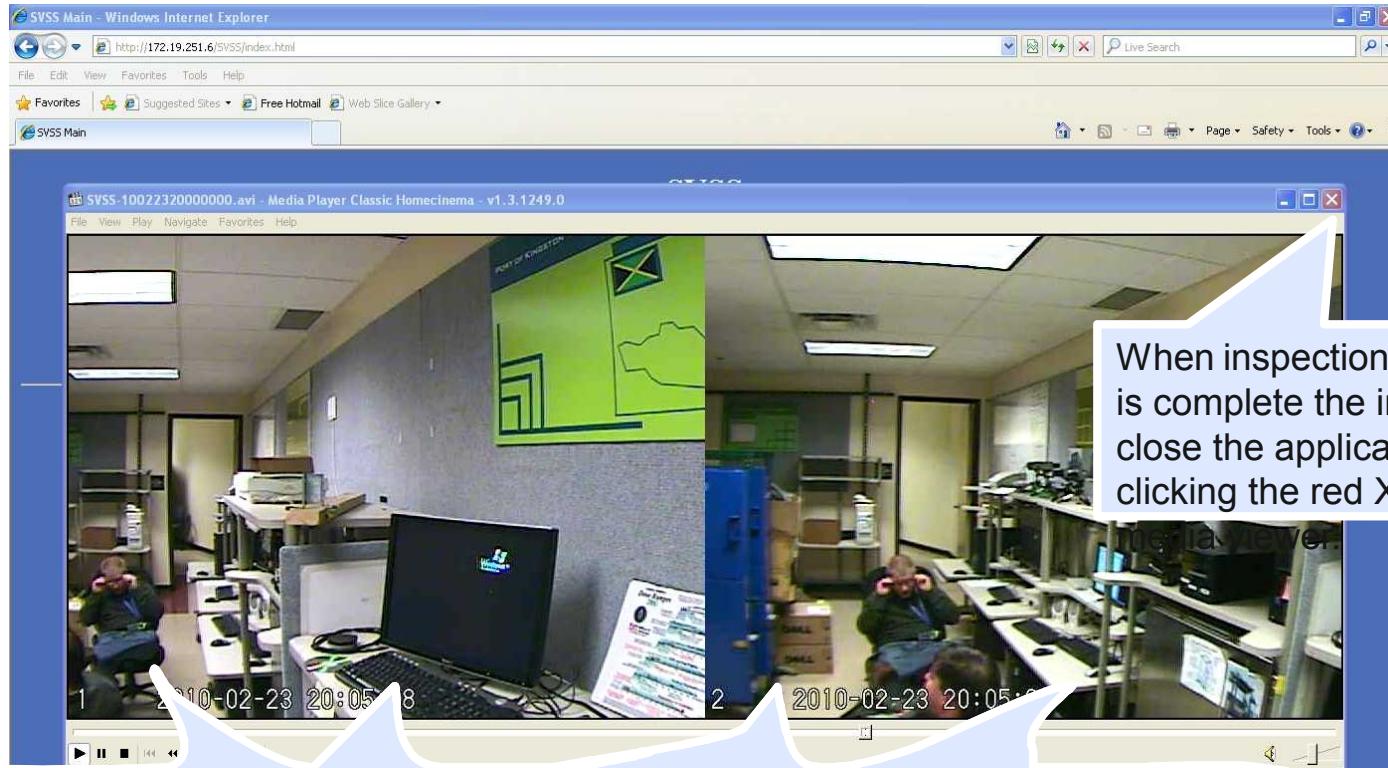
Secure Video Surveillance System (SVSS)

User Interface – Video Creation



Secure Video Surveillance System (SVSS)

User Interface – Video Display



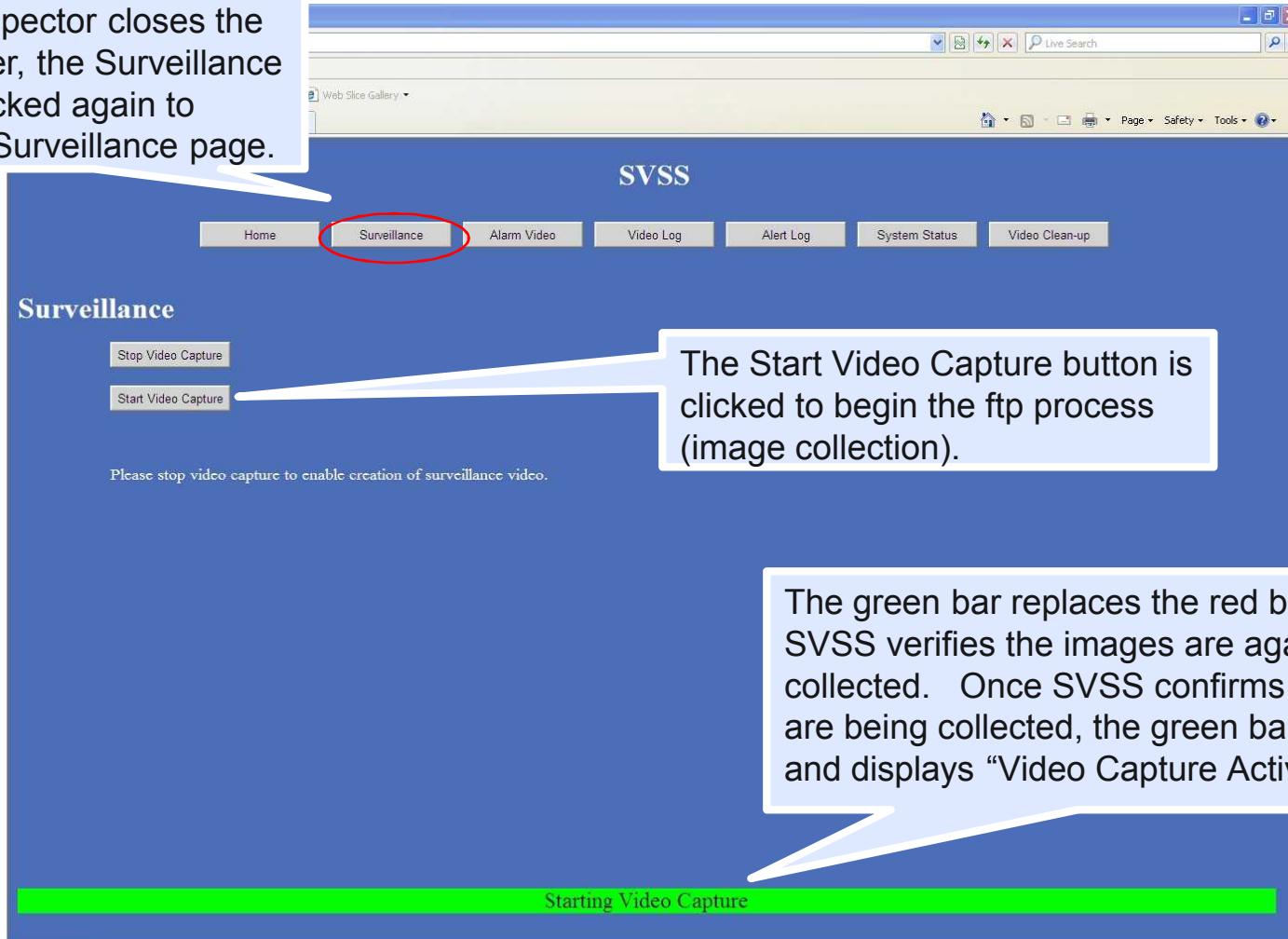
When inspection video review is complete the inspector will close the application by clicking the red X on the

Once the video link is double clicked, the media viewer application automatically launches and displays the Inspector video. The media viewer allows the Inspector to step through each frame or fast forward to the time of interest. SVSS combines the images from both cameras for simultaneous viewing of video time synced together. Each image will have a time stamp from the camera as well as number identifying the camera.

Secure Video Surveillance System (SVSS)

User Interface – Inspection Completed

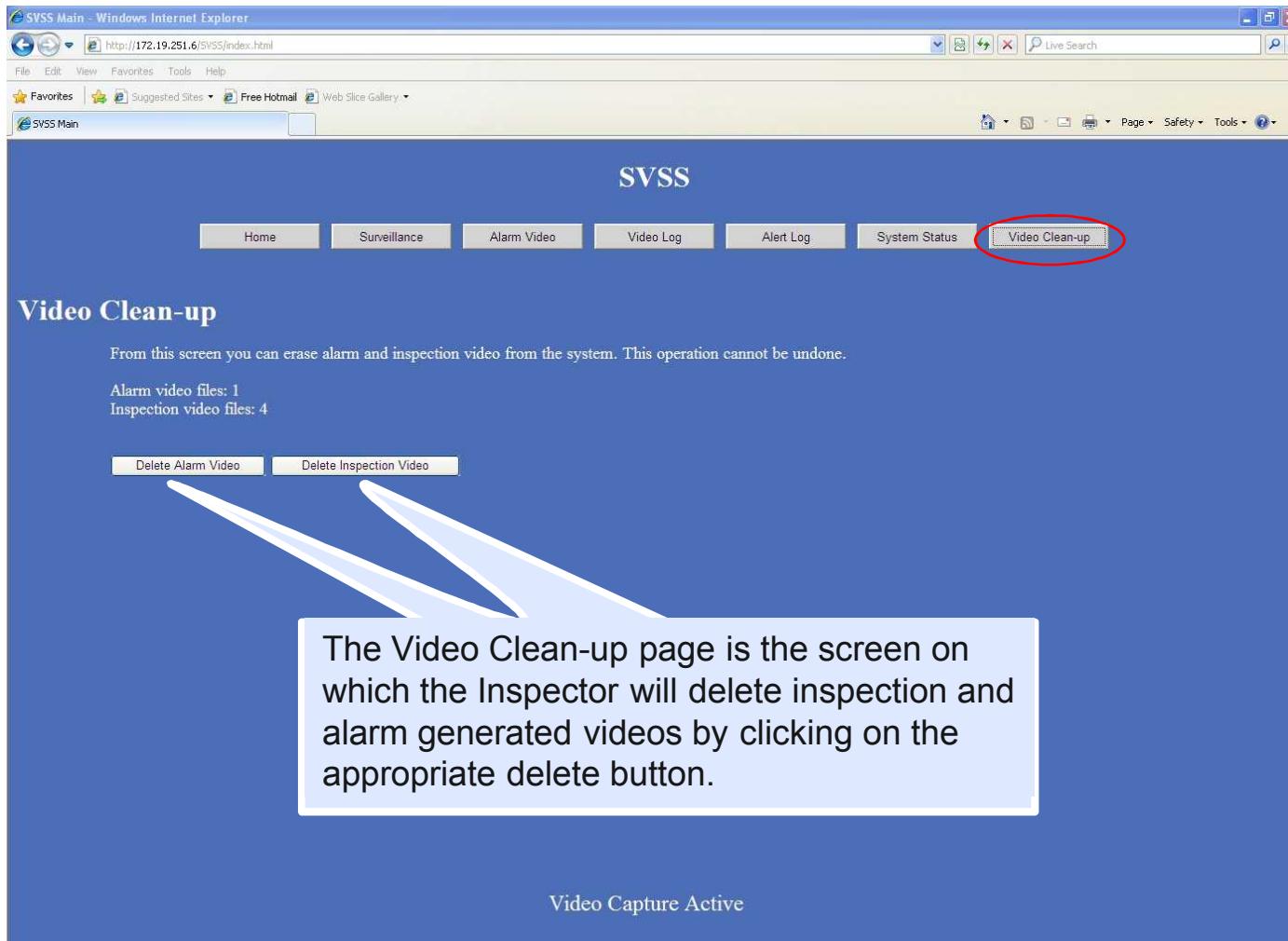
After the Inspector closes the media viewer, the Surveillance button is clicked again to display the Surveillance page.



The screenshot shows the SVSS Surveillance page. At the top, there is a navigation bar with buttons for Home, Surveillance (which is highlighted with a red oval), Alarm Video, Video Log, Alert Log, System Status, and Video Clean-up. Below the navigation bar, the page title is "Surveillance". Under the title, there are two buttons: "Stop Video Capture" and "Start Video Capture". A callout box points to the "Start Video Capture" button with the text: "The Start Video Capture button is clicked to begin the ftp process (image collection)". At the bottom of the page, there is a green progress bar with the text "Starting Video Capture" in white. A callout box points to this bar with the text: "The green bar replaces the red bar until SVSS verifies the images are again being collected. Once SVSS confirms new images are being collected, the green bar goes away and displays "Video Capture Active".

Secure Video Surveillance System (SVSS)

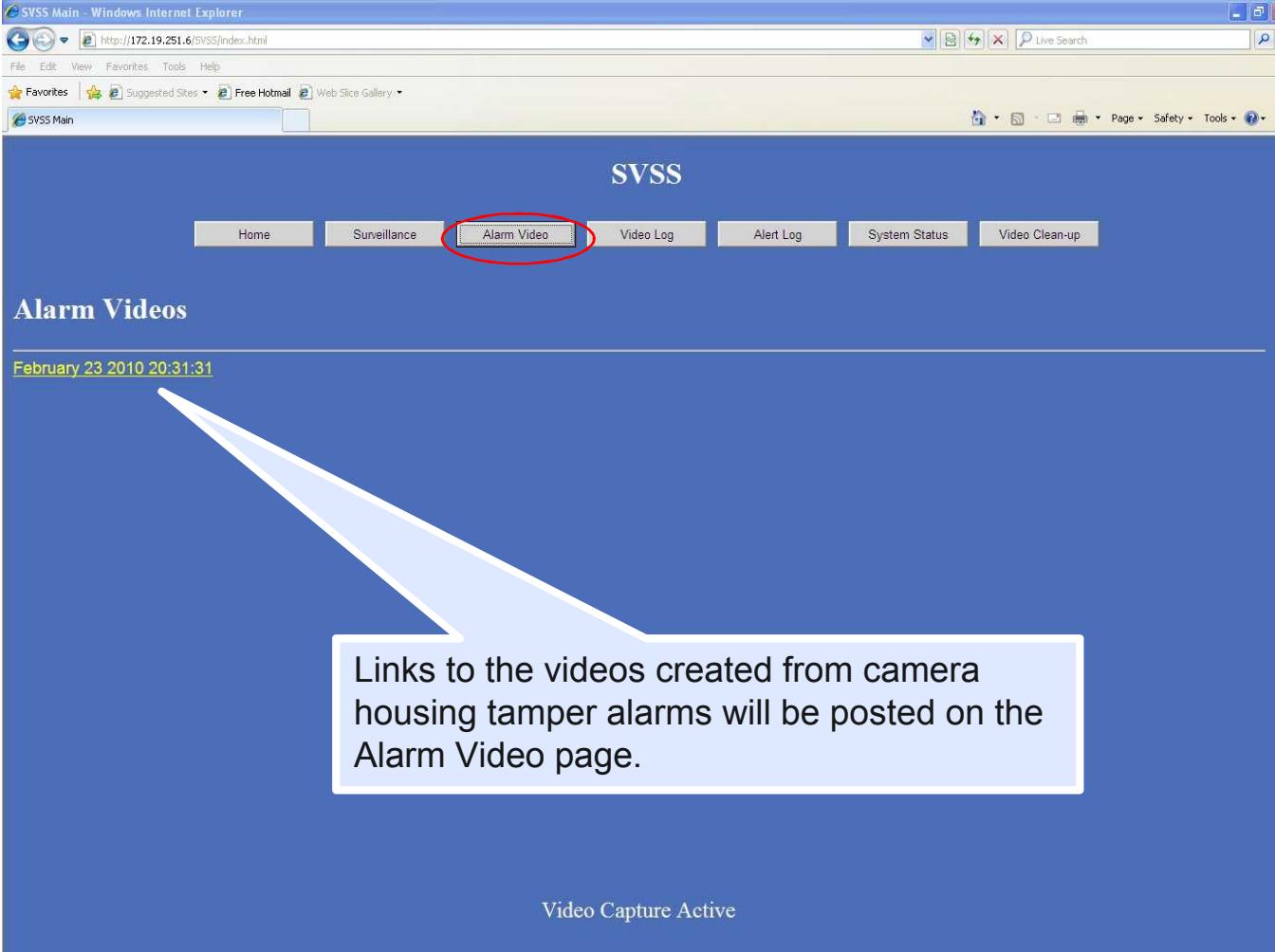
User Interface – Video Deletion



The screenshot shows a Microsoft Internet Explorer window with the title "SVSS Main - Windows Internet Explorer". The address bar shows the URL "http://172.19.251.6/SVSS/index.html". The menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar includes "Live Search" and other standard browser icons. The main content area has a blue header with the text "SVSS". Below the header is a navigation menu with tabs: "Home", "Surveillance", "Alarm Video", "Video Log", "Alert Log", "System Status", and "Video Clean-up". The "Video Clean-up" tab is highlighted with a red oval. The main content area is titled "Video Clean-up" and contains the following text: "From this screen you can erase alarm and inspection video from the system. This operation cannot be undone." Below this, it shows "Alarm video files: 1" and "Inspection video files: 4". At the bottom of this section are two buttons: "Delete Alarm Video" and "Delete Inspection Video". A large, stylized white arrow points from the bottom left towards the "Delete Inspection Video" button. A callout box with a black border and white text is positioned in the lower right area of the content, containing the following text: "The Video Clean-up page is the screen on which the Inspector will delete inspection and alarm generated videos by clicking on the appropriate delete button." At the bottom center of the page, the text "Video Capture Active" is displayed.

Secure Video Surveillance System (SVSS)

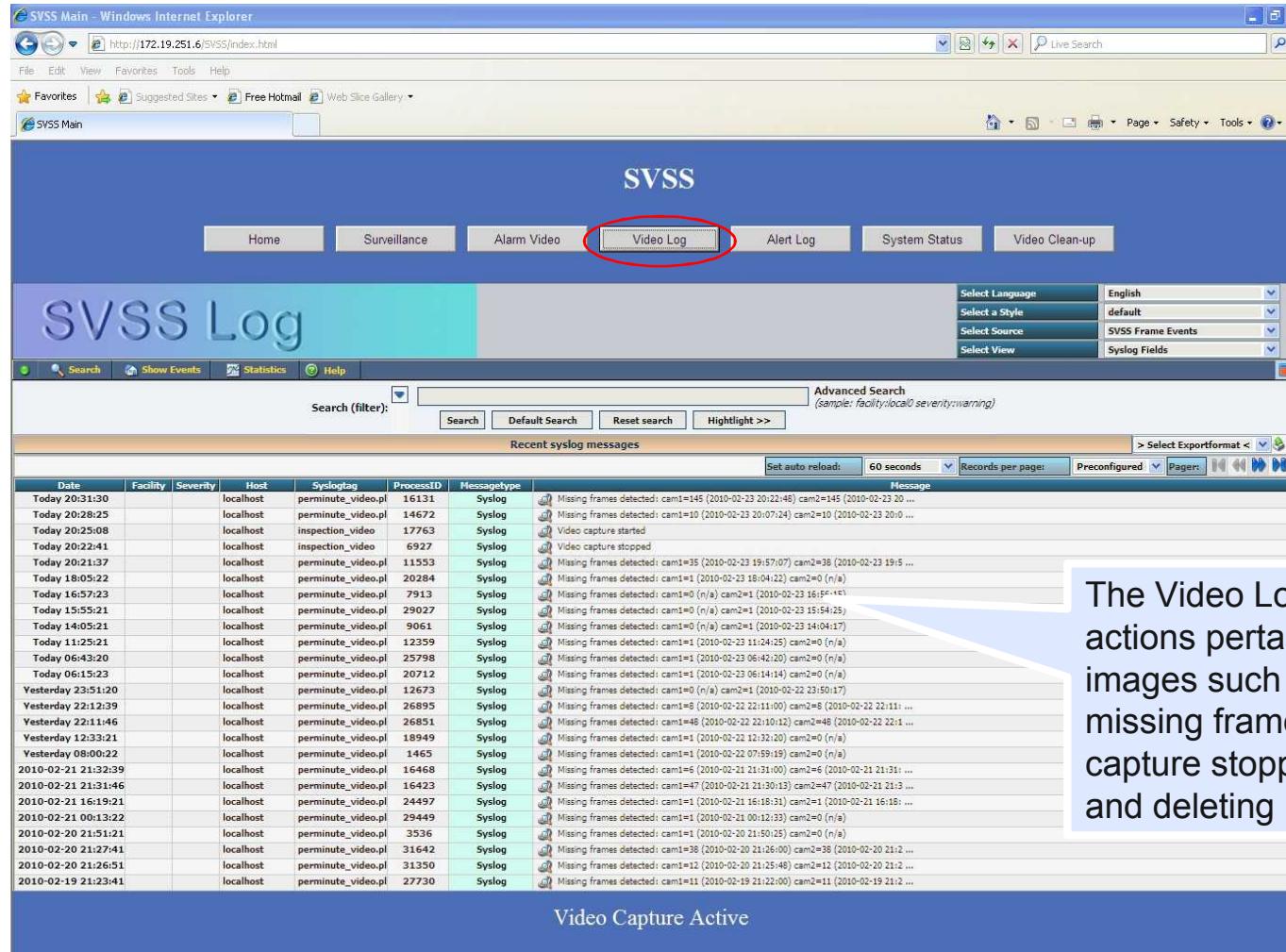
User Interface – Alarm Review



The screenshot shows a Windows Internet Explorer window displaying the SVSS User Interface. The title bar reads "SVSS Main - Windows Internet Explorer" and the address bar shows "http://172.19.251.6/SVSS/index.html". The menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar includes "Favorites", "Suggested Sites", "Free Hotmail", and "Web Slice Gallery". The main content area has a blue header with the text "SVSS". Below the header is a navigation menu with buttons for "Home", "Surveillance", "Alarm Video" (which is highlighted with a red oval), "Video Log", "Alert Log", "System Status", and "Video Clean-up". The main content area is titled "Alarm Videos" and displays a timestamp "February 23 2010 20:31:31". A large, semi-transparent white arrow points from the "Alarm Video" button in the menu to a callout box in the main content area. The callout box contains the text: "Links to the videos created from camera housing tamper alarms will be posted on the Alarm Video page." At the bottom of the main content area, the text "Video Capture Active" is visible.

Secure Video Surveillance System (SVSS)

User Interface – Video Log



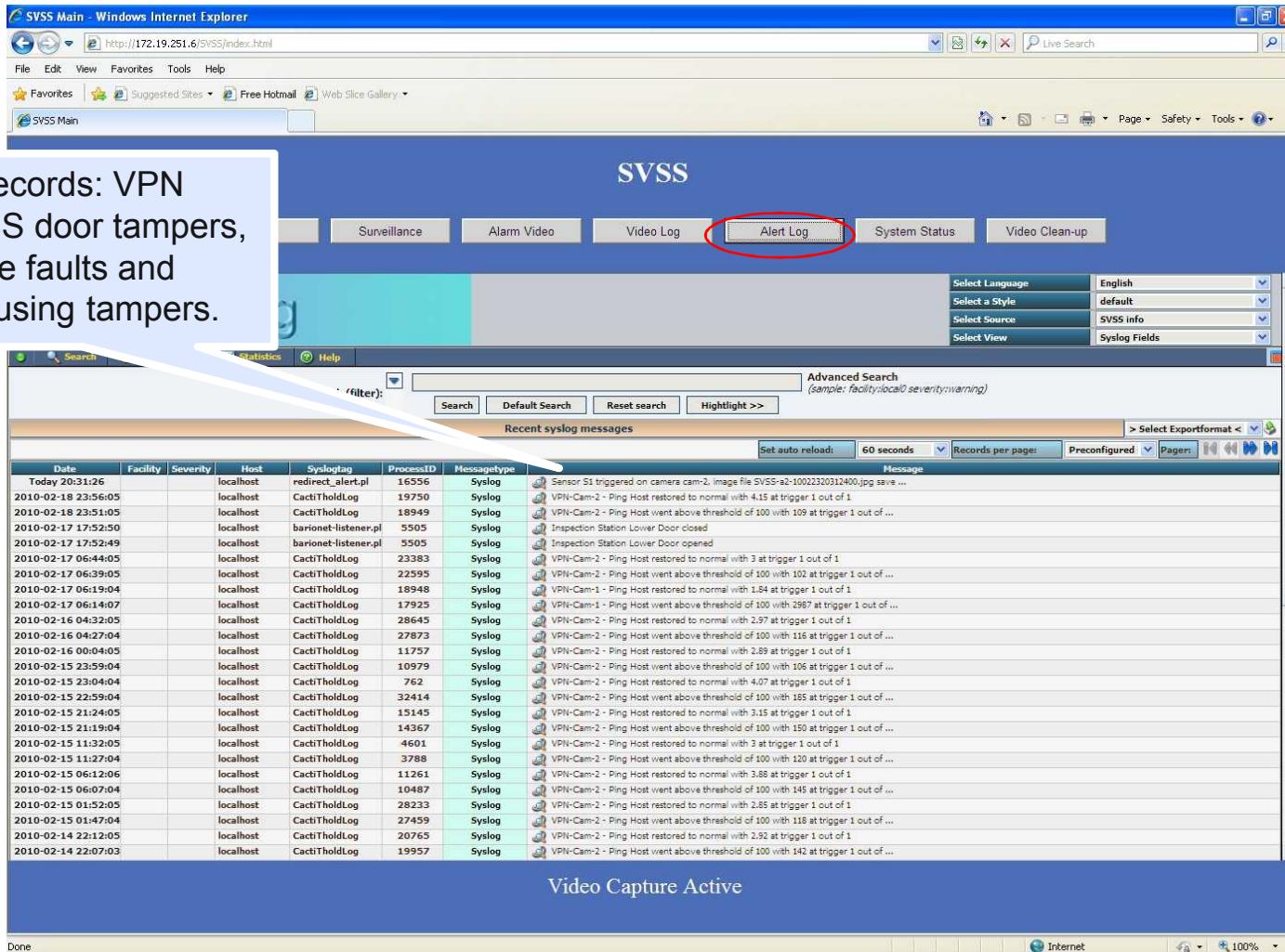
The screenshot shows the SVSS User Interface in a Windows Internet Explorer browser. The title bar reads "SVSS Main - Windows Internet Explorer" and the address bar shows "http://172.19.251.6/SVSS/index.html". The menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar includes Favorites, Suggested Sites, Free Hotmail, and Web Slice Gallery. The main content area has a blue header with the text "SVSS". Below the header is a navigation bar with buttons for Home, Surveillance, Alarm Video, Video Log (which is highlighted with a red oval), Alert Log, System Status, and Video Clean-up. To the right of the navigation bar are dropdown menus for Select Language (English), Select a Style (default), Select Source (SVSS Frame Events), and Select View (Syslog Fields). The main content area is titled "SVSS Log" and contains a table of "Recent syslog messages". The table has columns for Date, Facility, Severity, Host, Syslogtag, ProcessID, Message type, and Message. The table lists numerous entries, mostly from the "Syslog" type, detailing events such as missing frames detected, video capture started/stopped, and frame count changes. At the bottom of the content area, a blue bar displays the text "Video Capture Active".

The Video Log records all actions pertaining to the images such as: detected missing frames, video capture stopped/started and deleting of videos.

Secure Video Surveillance System (SVSS)

User Interface – Alert Log

Alert Log records: VPN pings, SVSS door tampers, temperature faults and camera housing tampers.

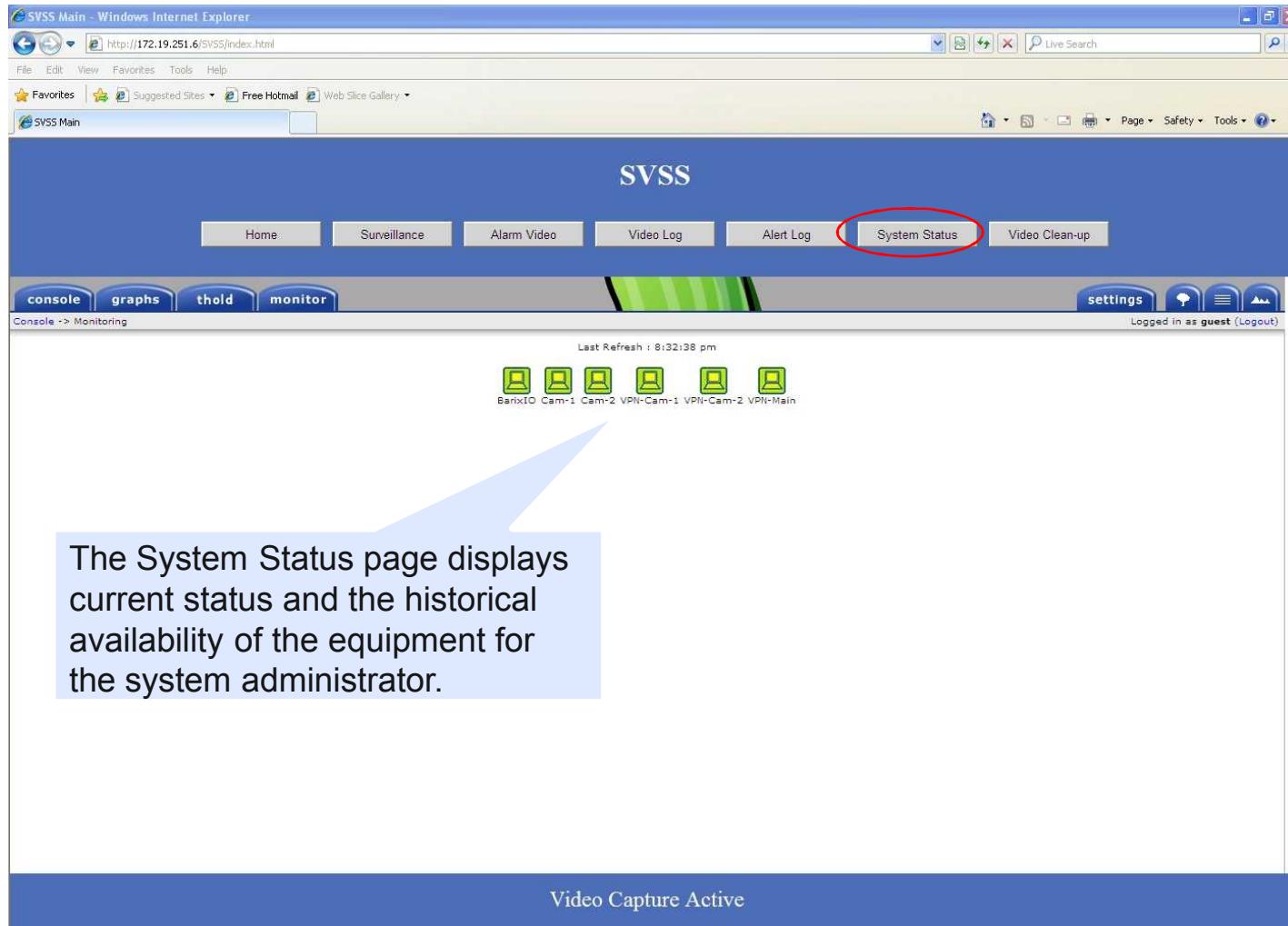


The screenshot shows the SVSS User Interface in a Windows Internet Explorer browser. The title bar reads "SVSS Main - Windows Internet Explorer" and the address bar shows "http://172.19.251.6/SVSS/index.html". The main window has a blue header with tabs: Surveillance, Alarm Video, Video Log, Alert Log (which is highlighted with a red oval), System Status, and Video Clean-up. Below the header is a toolbar with buttons for Select Language (English), Select a Style (default), Select Source (SVSS info), and Select View (Syslog Fields). The main content area is titled "SVSS" and shows a table of "Recent syslog messages". The table has columns: Date, Facility, Severity, Host, Syslogtag, ProcessID, and Message. The table lists numerous log entries from February 2010, including entries for sensor triggers, ping host restorations, and various system and camera status messages. At the bottom of the main window, a status bar says "Video Capture Active". The status bar also includes icons for Internet, 100%, and other system information.

Date	Facility	Severity	Host	Syslogtag	ProcessID	Message
Today 20:31:26	localhost	redirect_alert.pl	16556	Syslog		Sensor S1 triggered on camera cam-2, image file SVSS-a2-10022320312400.jpg save ...
2010-02-18 23:56:05	localhost	CactiTholdLog	19750	Syslog		VPN-Cam-2 - Ping Host restored to normal with 4.15 at trigger 1 out of 1
2010-02-18 23:51:05	localhost	CactiTholdLog	18949	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 109 at trigger 1 out of 1
2010-02-17 17:52:50	localhost	barionet-listener.pl	5505	Syslog		Inspection Station Lower Door closed
2010-02-17 17:52:49	localhost	barionet-listener.pl	5505	Syslog		Inspection Station Lower Door opened
2010-02-17 06:44:05	localhost	CactiTholdLog	23383	Syslog		VPN-Cam-2 - Ping Host restored to normal with 3 at trigger 1 out of 1
2010-02-17 06:39:05	localhost	CactiTholdLog	22959	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 102 at trigger 1 out of 1
2010-02-17 06:19:04	localhost	CactiTholdLog	18948	Syslog		VPN-Cam-2 - Ping Host restored to normal with 1.84 at trigger 1 out of 1
2010-02-17 06:14:07	localhost	CactiTholdLog	17925	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 2987 at trigger 1 out of 1
2010-02-16 04:32:05	localhost	CactiTholdLog	28645	Syslog		VPN-Cam-2 - Ping Host restored to normal with 2.97 at trigger 1 out of 1
2010-02-16 04:27:04	localhost	CactiTholdLog	27873	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 116 at trigger 1 out of 1
2010-02-16 00:04:05	localhost	CactiTholdLog	11757	Syslog		VPN-Cam-2 - Ping Host restored to normal with 2.89 at trigger 1 out of 1
2010-02-15 23:59:04	localhost	CactiTholdLog	10979	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 105 at trigger 1 out of 1
2010-02-15 23:04:04	localhost	CactiTholdLog	762	Syslog		VPN-Cam-2 - Ping Host restored to normal with 4.07 at trigger 1 out of 1
2010-02-15 22:59:04	localhost	CactiTholdLog	32414	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 185 at trigger 1 out of 1
2010-02-15 21:24:05	localhost	CactiTholdLog	15145	Syslog		VPN-Cam-2 - Ping Host restored to normal with 3.15 at trigger 1 out of 1
2010-02-15 21:19:04	localhost	CactiTholdLog	14367	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 190 at trigger 1 out of 1
2010-02-15 11:32:05	localhost	CactiTholdLog	4601	Syslog		VPN-Cam-2 - Ping Host restored to normal with 3 at trigger 1 out of 1
2010-02-15 11:27:04	localhost	CactiTholdLog	3788	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 120 at trigger 1 out of 1
2010-02-15 06:12:06	localhost	CactiTholdLog	11261	Syslog		VPN-Cam-2 - Ping Host restored to normal with 3.88 at trigger 1 out of 1
2010-02-15 06:07:04	localhost	CactiTholdLog	10487	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 145 at trigger 1 out of 1
2010-02-15 01:52:05	localhost	CactiTholdLog	28233	Syslog		VPN-Cam-2 - Ping Host restored to normal with 2.85 at trigger 1 out of 1
2010-02-15 01:47:04	localhost	CactiTholdLog	27459	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 118 at trigger 1 out of 1
2010-02-14 22:12:05	localhost	CactiTholdLog	20765	Syslog		VPN-Cam-2 - Ping Host restored to normal with 2.92 at trigger 1 out of 1
2010-02-14 22:07:03	localhost	CactiTholdLog	19957	Syslog		VPN-Cam-2 - Ping Host went above threshold of 100 with 142 at trigger 1 out of 1

Secure Video Surveillance System (SVSS)

User Interface – System Status



The screenshot shows the SVSS User Interface in a Windows Internet Explorer browser. The title bar reads "SVSS Main - Windows Internet Explorer" and the address bar shows "http://172.19.251.6/SVSS/index.html". The menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar includes Live Search and various navigation icons. The main content area is titled "SVSS" and features a navigation bar with tabs: Home, Surveillance, Alarm Video, Video Log, Alert Log, System Status (which is highlighted with a red circle), and Video Clean-up. Below the navigation bar are buttons for console, graphs, threshold, and monitor. The status bar shows "Console -> Monitoring" and "Logged in as guest (Logout)". The main content area displays a "Last Refresh : 8:32:38 pm" message and a row of six camera icons with labels: BarixIO, Cam-1, Cam-2, VPN-Cam-1, VPN-Cam-2, and VPN-Main. A blue callout box points to the "System Status" tab with the text: "The System Status page displays current status and the historical availability of the equipment for the system administrator." At the bottom of the page, a blue bar indicates "Video Capture Active".

The System Status page displays current status and the historical availability of the equipment for the system administrator.

Video Capture Active



Secure Video Surveillance System (SVSS)

User Interface – System Status

Questions / Discussion



SVSS **Software Architecture**

August 23, 2010



Secure Video Surveillance System (SVSS) Software Architecture

Software Functionality

- Image Acquisition
- Tamper Event Handling
- State of Health
- Logging
- User Interface



Secure Video Surveillance System (SVSS) Software Architecture

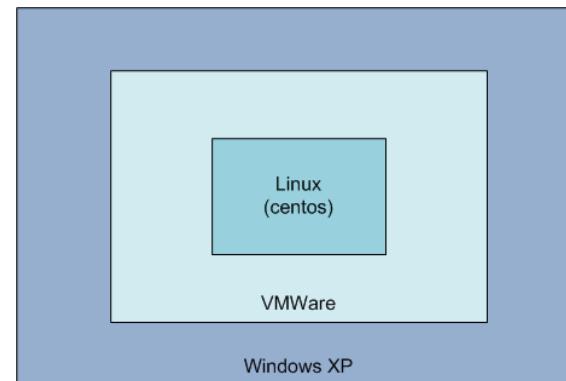
OS Components

● Windows

- User Interface

● Linux

- Camera interface
- Tamper event handling
- AVI construction
- Apache / PHP
- State of Health





Secure Video Surveillance System (SVSS) Software Architecture

Image Acquisition

- **Periodic images**

- Cameras send to linux ftp server
- Daemon script monitors FTP directories
- Once per minute, JPEG images are composed into one-minute AVI
 - camera images synchronized and displayed side-by-side
 - missing frames are logged
- Cleanup process runs once a minute to delete JPEG and AVI files



Secure Video Surveillance System (SVSS) Software Architecture

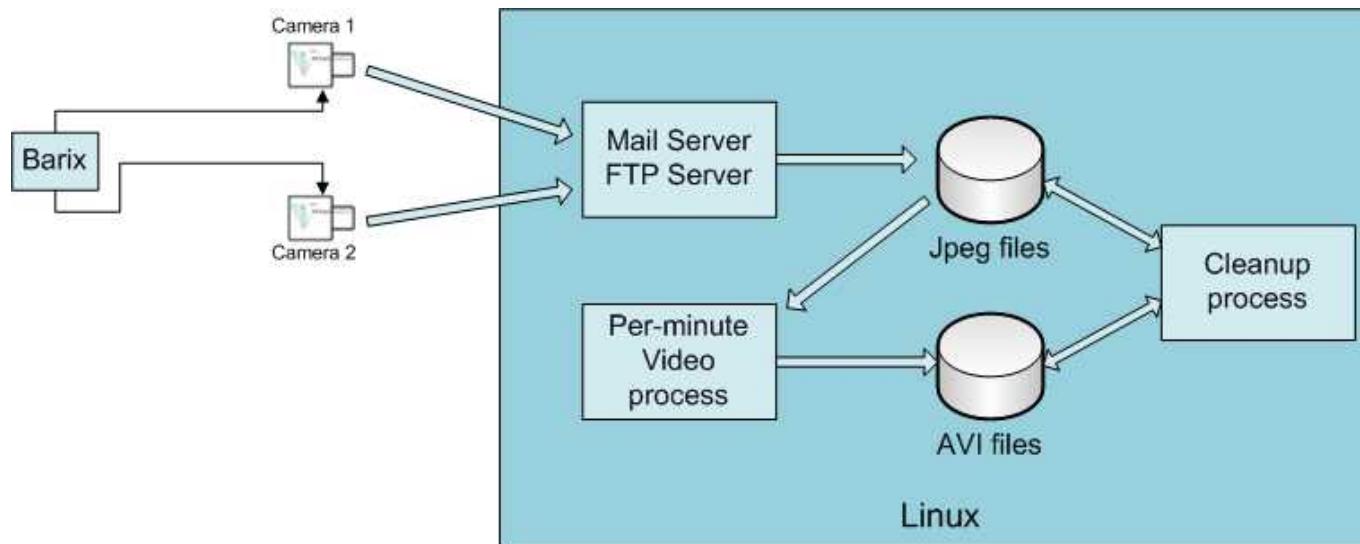
Tamper Event Handling

- **Tamper events**

- Tamper wired into cameras – cameras send email to linux
- sendmail mail alias invokes script that generates SNMP event
- Daemon script traps SNMP event and builds AVI of event video

Secure Video Surveillance System (SVSS) Software Architecture

Camera and Tamper Interface

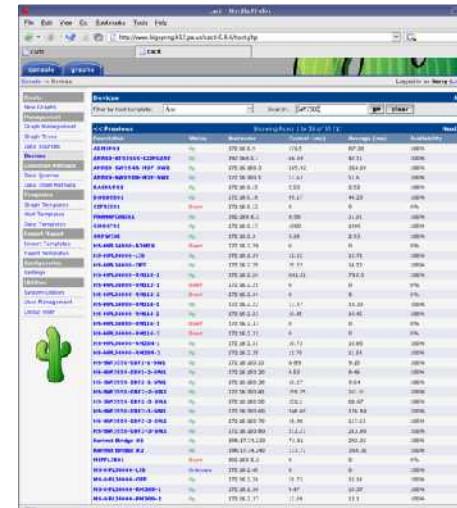
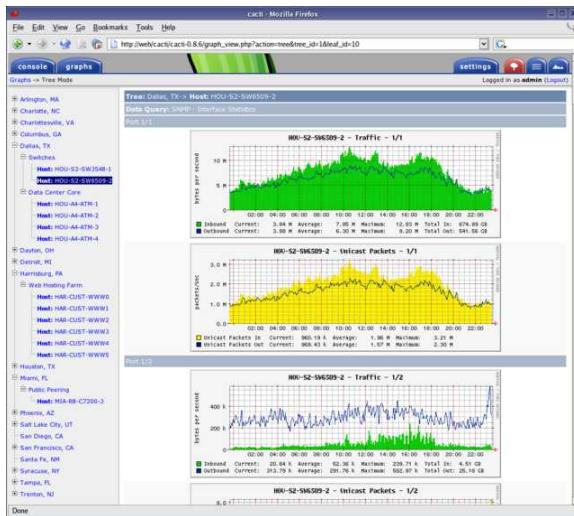


Secure Video Surveillance System (SVSS) Software Architecture

State of Health

•Cacti (www.cacti.net)

- Monitors component connectivity, system events
- mysql for data storage
- Apache web interface for user display





Secure Video Surveillance System (SVSS) Software Architecture

Logging

- **Linux syslog**

- standard unix/linux logging mechanism
- used by processing scripts and daemons
- supports categories (i.e. script name) and priorities

- **phpLogCon (www.phplogcon.org)**

- web interface to syslog and SNMP trap data
- allows users to browse system events
- SVSS user interface separates out video log from other log entries



Secure Video Surveillance System (SVSS) Software Architecture

User Interface

- **Browser-based user interface – Internet Explorer**
- **PHP pages served by Apache in linux VM**
- **Inspection video**
 - PHP code stops/starts linux ftp server
 - Inspection video is created on the fly
 - PHP code concatenates 1-minute AVI files to cover requested period
- **Freeware video viewer displays AVI when complete**
 - Media Player Classic Home Cinema (mpc-hc.sourceforge.net)



Secure Video Surveillance System (SVSS) Software Architecture

Questions / Discussion



Secure Video Surveillance System (SVSS)

Issues



Secure Video Surveillance System (SVSS) Issues

- Occasional missing inspection images
 - Linux system timing glitch
- Cameras can drain UPS battery beyond recovery
 - Solution - Remove battery and charge with trickle charger



Secure Video Surveillance System (SVSS)

Questions/ Discussion