KERN COUNTY SHERIFF'S OFFICE

Detentions Bureau
Policies and Procedures

TITLE: RADIATION SAFETY AND PROTECTION PROGRAM C-510

EFFECTIVE:	REVIEWED:	REVISED:	UPDATED:
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APPROVED BY: Detentions Bureau Chief Deputy Cindy Cisneros

REFERENCE: Title 10(10 CFR Part 20) – Code of Federal Regulations, Energy, Standards for Protection against Radiation; Title 21 (21 CFR 1020.40) – Code of Federal Regulations, Chapter 1, Subchapter J (Radiological Health); Title 17 (17 CCR) – California Code of Regulations, Public Health, Chapter 5, Subchapters 4 and 4.5; Canon/RadPRO Securpass Operator and Maintenance Manuals

POLICY

The Kern County Sheriff's Office is dedicated to all components of workplace safety. This policy establishes procedures to safeguard the health of Sheriff's Office employees, volunteers, visitors, and incarcerated people in the vicinity of a body scan device and to ensure compliance with the applicable federal and state regulations.

This policy is intended to provide an effective Radiation Safety and Protection Program which will reduce the risk of exposure related to the operation of x-ray based body scan devices. Each facility with an x-ray based body scan device will ensure that radiation safety procedures and guidelines are followed to ensure the safe operation of the unit(s).

DEFINITION(S):

- **Body Scan:** X-ray technology used to produce an image revealing the presence of contraband concealed on or inside of a subject.

- **Body Scan Device:** A stationary system for obtaining full height radiographic images of a person to detect any kind of weapons, explosives, drugs, precious stones and metals either concealed under the clothes, swallowed, or hidden in anatomical cavities of the human body (for example, drugs in capsules) without causing harm to the scanned person. (i.e., Canon RadPRO Securpass System).

- **X-Ray:** Also referred to as x-radiation, is a form of electromagnetic radiation similar to light but of shorter wavelength and capable of penetrating solids and of ionizing gases.

- **Radiation:** Radiation is the process in which energetic particles or waves travel through a medium or space. There are two distinct types of radiation; ionizing and non-ionizing. X-radiation is an ionizing radiation.

- **Radiation Survey:** Measurement of the X-radiation equivalent dose rate at the external surfaces of the body scan device, the personnel workstation(s), the boundaries of the working zone, and in adjacent rooms if applicable.

- **Exposure:** A term defining the amount of ionizing radiation that strikes living or inanimate material. The Federal Drug Administration (FDA) definition is found at 21 CFR 1020.40(b)(5).

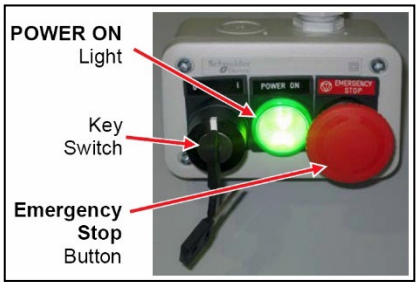
- **Dose:** The quantity of radiation or energy absorbed.

- **RSO:** Radiation Safety Officer.

Directive #1

The following provisions shall be adhered to by all staff:

- Upon becoming aware of any safety issues related to a body scan device, staff shall immediately press the emergency stop button at the operator's station and report their concerns to their supervisor, who will forward them to the section manager. The section manager will notify the Radiation Safety Officer.



- In the event of any emergency which may affect the body scanner's operation (fire, earthquake, other natural disaster, etc.), staff shall immediately press the emergency stop button at the operator's station of the body scan device to immediately stop the operation of the machine and notify their supervisor.

- Operators of a body scan device shall use it in a responsible manner, in accordance with this policy, and in accordance with the manufacturer's operating instructions.

- The operator's manual for each body scan device shall not be removed from the officer's workstation of each unit.

- No employee shall operate a body scan device without first successfully completing proper training.

- During operation of the body scan device, unauthorized persons (other than service personnel) are not allowed within the working zone, approximately two meters (approximately six and a half feet) out from each side of the base of the unit. The working zone shall be clearly marked on the floor around the unit. The device shall be considered operational while the red light on the unit is on.

- **Pregnant incarcerated people** shall not be scanned with a body scan device.

- Each body scan device shall be marked with the following symbols:

Attention! Refer to the operation documents!

Caution! Dangerous voltage.

- Each body scan device officer's workstation shall be marked with the following symbol:

Caution X-Ray

- The removal of any parts and the installation of any body scan device components shall be completed by a service engineer of the Virtual Imaging representative company and/or additional service contractors.

- Body scan device operator training consists of the following subject matter:

  - Design of the Scanner: purpose of the basic components, principles of the Scanner operation;

- Radiation and overall Scanner operation safety principles, history of X-ray, nature of X-rays, the X-ray Tube, Penetration and Absorption, Security X-ray Machines, X-ray scanners Features, Prohibited Items, Limitations of X-ray, Operating Procedures, and Health and Safety;

- Control of the Scanner: switching on, testing, data input, scanning and switching off;

- Principles of investigation of digital images: analysis (determination) of objects on the human body, using the mathematical filters, scaling, etc.;

- Malfunction diagnostics;

- Practice and knowledge testing.

Procedure A: Duties of the Radiation Safety Officer

The Lerdo Structural Maintenance Superintendent of the Detentions Bureau Incarcerated person Services Section shall serve as the Sheriff's Office Radiation Safety Officer (RSO).

The Radiation Safety Officer (RSO) will:

- Maintain the Radiation Safety and Protection Program and coordinate the safe operation of x-ray based body scan devices in compliance with applicable State and Federal regulations;

- Ensure that a State RHB 2364 form and a "Caution X-Ray" sign are posted at the officer's station of each body scanner installation and on the entrance doors leading into rooms containing body scanner devices;

- Ensure that a notice prohibiting the scanning of pregnant incarcerated people is posted at the officer's station of each body scanner installation;

- Ensure that a notice of emergency stop procedures is posted at the officer's station of each body scanner installation;

- Ensure that employees have access to the relevant State (Title 17) and Federal (Title 10) regulations regarding radiation. These regulations shall be available for staff review on the Sheriff's SharePoint intranet web site;

- Ensure all new or relocated radiation sourcing equipment operated by the Sheriff's Office within the Detentions Bureau is registered with the Radiologic Health Branch

of the California Department of Public Health (form number RH-2261);

- Ensure all radiation sourcing equipment operated by the Sheriff's Office within the Detentions Bureau is maintained and serviced in compliance with applicable State and Federal requirements;

- Arrange and schedule any needed repair or service for a body scan device upon being advised of any damage or malfunction;

- Retain any survey, service, inspection, and instrument calibration records for the lifetime of each body scan device;

- Ensure that the annual/biennial fee for each Body Scan Device is paid to the Radiologic Health Branch of the California Department of Public Health prior to the anniversary of the effective date of the license;

  Note: Title 17 of the California Code of Regulations, Section 30231, requires the annual/ biennial fee payment and mandates that failure to do so requires all usage of the Body Scan Device to immediately cease until such time that the fee and any late fees have been paid.

Procedure B: Duties of Section Managers

In each facility containing an x-ray based body scan device, the Section Manager or their designee, with the assistance and coordination of the Radiation Safety Officer, will:

- Report new x-ray emitting equipment to the RSO prior to its arrival at the facility;

- Report any movement or relocation of any x-ray emitting equipment to the RSO;

- Receive authorization from the RSO prior to allowing staff to operate any new x-ray emitting equipment;

- Notify the RSO upon becoming aware of any maintenance issues related to a body scan device;

- Notify the RSO immediately upon becoming aware of any safety issues related to a body scan device.

Procedure C: Canon RadPRO Securpass Body Scan Device Safety Features

Numerous safety features are built into the body scan device, which help minimize the exposure doses to which the personnel and persons being scanned could be exposed. These features include:

- X-ray generator enclosed in the X-ray protection case;
- System of slit diaphragms in the X-ray protection case, which provides a narrow fan-shaped X-radiation beam;
- X-ray protection shutter shutting off output of the X-radiation from the generator;
- Permanently connected additional X-ray filter;
- High-sensitivity digital X-ray converter;
- Built-in dosimeter for monitoring the stability of the operation of the X-ray generator;
- The **Stop** button (**Emergency Stop**), a red mushroom-shaped button mounted at the operators station, stops X-radiation output from the generator and halts movement of the platform;
- Red signal lanterns (on the device and at the operator's station), when ON indicates the generation of X-radiation and the beginning of platform movement;
- In case of Scanner malfunction, the X-ray protection shutter shuts off X-radiation output from the generator;
- If the X-ray protection shutter fails, high voltage to the X-ray tube shuts off;
- The SECURPASS software tests the Scanner when it is turned ON and during the scanning process. Error messages are displayed on the operator's monitor screen.

  Note: When the scanning cycle completes, the X-ray protection shutter shuts off the output of X-radiation from the generator.

Directive #2: Failure of Safety Features / Vendor Repair

The above safety features are required to be functioning to operate the system. Should any of these features become inoperable, the operator of the body scan device will:

- Shut down the body scan device and;
- Immediately notify his/her supervisor.

The supervisor will:

- Notify the section manager;
- Notify the Radiation Safety Officer, who will contact a contracted vendor to make any repairs as necessary.

  Note: Facility staff shall not attempt any repair on a body scan device.

Procedure D: Annual Servicing and Survey of Body Scan Devices

To ensure that Canon/RadPRO Securpass x-ray based body scan devices are operating within manufacturer specifications, the following calibration, maintenance, service, and survey shall be performed annually by a service engineer of the Virtual Imaging representative company and/or additional service contractors:

Calibration:

The service engineer will calibrate the x-ray system instruments to manufacturer guidelines, which shall comply with State and Federal standards.

- Each body scan device shall be calibrated during each annual service and survey and after any other servicing.
- The following components shall be calibrated:
  - The X-ray digital converter;
  - Scanner operation modes.

Inspections and Checks:

- External inspection of the Scanner, removing the dust and contaminants from the movable platform mechanisms and components, adjustment and restoration of the mechanical connections;
- Checking the condition of the system's interconnections, insulation of the main wires and high-voltage cables, and the resistance of the earth circuits;

- Opening the cases, inspecting the printed-circuit boards of the Scanner electronic components, rinsing the contacts of the boards' plugs (with alcohol), assembling and sealing of cases;

- Checking the serviceability of the operator's workstation personal computer;

- Checking the operation of the movable platform mechanisms and beam-limiting device shutter drive;

- Checking the Scanner operation.

Servicing:

- Tuning and testing the network protocols;

- Adjusting the Scanner;

- Controlling the Scanner resolution;

- Controlling the radiation dose rate at the personnel's workplaces;

- Servicing the X-ray generator;

- Servicing the operator's workstation personal computer.

Annual Radiation Survey:

The service engineer will perform a radiation survey that checks to ensure no radiation exposure to operators on each body scan device:

- Upon installation of a new unit;

- At intervals not exceeding one year;

- Upon relocation of an existing unit;

- Immediately following any service that could potentially increase the systems output.

Procedure E: Radiation Doses and Dosimetry Program

Safety of the Persons Scanned:

RadPRO Securpass scanners can be configured to operate at three (3) power settings. Those settings are labeled 'low', 'medium', and 'high'. Each power setting changes the corresponding radiation level of an individual scan between .25 µSv (low), .50 µSv (med), and .75 µSv (high). At each increasing level the resulting image is sharper and has more contrast and definition. By default, each machine is set to '**medium**'. A password is needed to alter this setting.

The number of times per year it is safe to scan any one (1) person is dependent on the power level setting:

- At '**low**' or .25 µSv per scan, it is safe to scan any one (1) person 1000 times per year as based on manufacturer/ vendor provided information.

- At '**medium**' or .50 µSv per scan, it is safe to scan any one (1) person 500 times per year as based on manufacturer/ vendor provided information.

- At '**high**' or .75 µSv per scan, it is safe to scan any one (1) person 333 times per year as based on manufacturer/ vendor provided information.

Directive #3: Radiation Dose Tracking and Scan Prevention

Upon initiating a body scan of an incarcerated person, the deputy operating the body scan device shall enter the booking number of the incarcerated person into the scanner software when prompted.

- The body scanner software tracks cumulative number of scans and the associated radiation dosage of each incarcerated person by their booking number on an annual basis to ensure that no more than 250 uSv is administered to each incarcerated person per year.

- In the event that a radiation dosage limit of 250uSv is reached in one year, the system will automatically prevent further scans of that incarcerated person.

When the system indicates the dosage limit has been reached for an incarcerated person, the deputy will send an email to the RSO (Structural Maintenance Superintendent) advising the following information:

- The name of the incarcerated person;

- The booking number of the incarcerated person;

- The housing location of the incarcerated person;

- A brief note indicating that the incarcerated person's annual radiation dosage limit has been reached.

Directive #4: Scanner Power Settings

Staff operating the scanner shall verify that it is set to **medium** and shall not change this setting without the approval of the RSO.

Safety for the Operator:

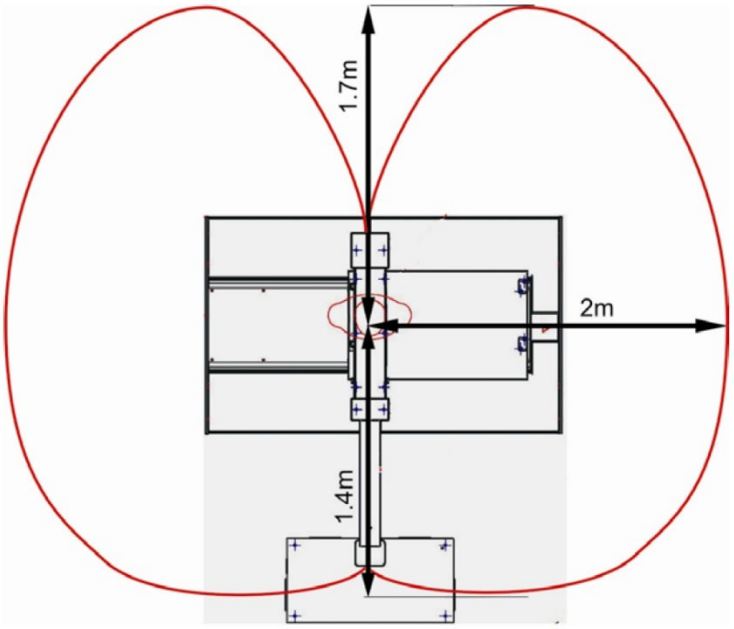
Within an unshielded perimeter of approximately two meters (approximately six and a half feet) from the Scanner, the maximum dose rate of the scattered radiation does not exceed 10 μSv per hour.

Safety for Bystanders:

For incidental or occasional bystanders, the level of exposure per day and year is negligibly low. However, based on vendor recommendations, the scanning/working zone, approximately two meters (approximately six and a half feet) out from each side of the base of the scanner, shall be clearly marked on the floor around the unit.

Radiation Leaks:

During scanning, the radiation leak dose rate must not exceed 0.5 μSv/h outside the (ion curve) area outlined in red below:



Procedure F: Daily System Check

During each shift, each staff member assigned to operate a body scan device will conduct a system check, as described below, of the device prior to use.

System Check:

The assigned operator of a body scan device for each shift will complete an initial status equipment and safety check prior to operating the device.

Staff completing a status equipment and safety check will:

- Inspect the device for obvious damage;
- Ensure all access panels are securely in place;
- Ensure all accessible (external) cable connections are secure;
- If the system is not already on, turn it on using the key switch (clockwise);
- Verify that the “POWER ON” light is lighted;

- Record the check in the post logbook.

If any damage or malfunction is found during a system check, staff will:

- Power the unit off;
- Notify their immediate supervisor who will notify the section manager;

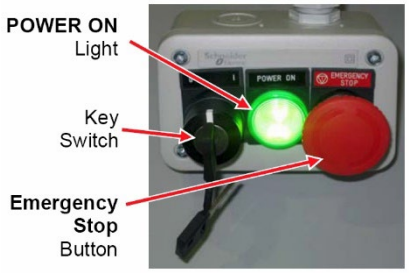
The section manager will:

- Advise the RSO that unit may need service or repair;
- Ensure that unit is not operated until appropriate service or repairs have been completed;
- If it is believed that the damage or malfunction may compromise the safety of any persons in the immediate vicinity of the device, the emergency procedures outlined in **Procedure G** will be followed.

Procedure G: Emergency Procedures

In the event of any emergency which may affect the body scanner's operation (fire, earthquake, other natural disaster, etc.), or upon becoming aware of any safety issues related to a body scan device, staff shall:

- Immediately press the emergency stop button at the operator's station of the body scan device;
- Completely power off the generator of the unit using the **key switch**;



- Notify the appropriate personnel accordance with **Procedure F**.

Note: In this context, an incarcerated person fight, riot, or other similar security issue is not considered an emergency for this procedure.

Note: If the control panel is not accessible or functioning, the main power breaker for the system must be shut off and/or the unit should be unplugged immediately.

If a situation occurs in which staff suspect possible exposure to excessive or dangerous levels of radiation while operating the body scan device (i.e., the red light indicating that x-rays are being emitted remains on, or remains on for longer than 7 to 10 seconds for each scan), **the operator will:**

- Immediately notify the shift supervisor.

The shift supervisor will:

- Assess the situation;
- If determined a risk, immediately contact the section manager and the RSO.

If it is suspected that there was a potential exposure to excessive or dangerous levels of radiation, the section manager will:

- Ensure that the use of the body scan device is immediately discontinued.

The RSO will:

- Schedule any needed service and a radiation survey on the identified body scan device;
- If it is deemed safe to do so, ensure that the body scan device is surveyed in the condition it was when it became suspect;
- Only clear the body scan device to return to normal operations if it is determined to be safe to do so by a service engineer of the Virtual Imaging representative company and/or other qualified service contractors:

If it is believed a radiation leak has occurred, the RSO will work with Virtual Imaging and/or their representative company in an attempt to ascertain the approximate exposure (radiation intensity) of the employee(s) involved. The employee(s) will be directed to seek immediate medical attention.

PROCEDURE H: PREGNANT STAFF MEMBERS

In the event that any female staff member, who is routinely assigned to a post in the same room where a body scanner is located, or a post in a room adjacent to a body scanner, becomes aware that they are pregnant, that staff member shall:

- Immediately notify their supervisor at the beginning of their next shift.

The supervisor shall:

- Immediately notify the Section Manager.

The Section Manager shall:

- For the remainder of the pregnancy, make arrangements for the pregnant staff member to be temporarily moved to another work area that is not in the same room or an adjacent room to a body scanner;

- Advise the Radiation Safety Officer (RSO) of the notification and any measures taken to accommodate the pregnant staff member.