Computer Forensics Project
IT 330

Tasin Naveed(Lead Investigator): 20%
Brandon Hunt: 20%
Philip Abedua: 20%
Mauricio Pereira: 20%
Dharmesh Patel: 20%

Executive Summary

Case: 20130406-19125
Nov 27, 2022
Location: Nuclear power plant in Lower Alloways Creek Township, New Jersey

Suspect: Mr. Alexander Makarov
400 Paramus Rd.
Paramus, NJ 07410

Details: Mr. Alexander Makarov was spotted with a quadcopter capable of video recording and trying to take pictures at the perimeter of the New Jersey nuclear generating stations in Salem County (the Salem and Hope Creek Generating Stations) where taking pictures is prohibited. When the guards confronted him, he sprayed a neuro-paralyzing agent. The police received information and took him to the custody. Police Primarily found he is involved with identity theft and was accused of being a Russian spy. A search warrant was issued and notified the forensics unit to search and analyze all the digital evidence found at his home for further investigation.

Objectives

- Determine possible reasons of violating “No Photos Allowed Zone”
- Obtain evidence demonstrating potential threats contained in the recording devices.

Case Correspondence

Nuclear power plant,
Lower Alloways Creek Township, New Jersey

Dear Forensic Investigator;

Recently we have encountered a man with a quadcopter(equipped with GoPro) and trying to take pictures at the perimeter of no photos allowed zone of our power plant station. He also sprayed a neuro-paralyzing agent to our security guard when they confronted him. Upon investigation by our security staff we found evidence of misuse and possible criminal activity. We have notified the police and they requested a forensic unit to take the digital devices as evidence. We would like you to advise us of your findings.

Attached is the police report regarding the suspect and the digital evidence seized. Please obtain copies of the evidence and evaluate them to determine if he involved in the arsons.

If you need any further information please contact our lead on this case, Richard Mendez, at rmendez@nppt.org or 360.555.2314.

Regards,

John Smith

Security Director

Case Correspondence

Lower Alloways Creek Police Department

From: Detective John Holmes, Counter-Espionage Unit
To: Computer Forensics Investigative Unit
Case: 20130406-19125

The Salem County Police Department is contacting you to request the assessment of digital evidence.

On November 27th, 2022, the Salem County Police Department conducted an investigation in the house of Mr. Alexander Makarov who is suspected of possible Russian spy conducting industrial espionage on US. Mr. Alexander Makarov was taken into custody after being questioned and is maintaining his innocence. Although some physical evidence was captured, the District Attorney does not feel that the evidence is strong enough to bring charges. Mr. Alexander Makarov is not providing any additional information on the advice of his attorney.

A quadcopter capable of video recording was seized at the spot. Further from his home a flash drive and hard drive also seized.

Please examine the provided forensic image of Mr. Alexander Makarov's hard drive and flash drive for evidence that could link him to industrial espionage against US.

Sincerely,

Detective John Holmes, Counter-Espionage Unit

Photography on Prohibited Property

- The foundation for prohibition of photography on private property is trespass.
- A photographer has the right to take photos of nearly anything. The only legal prohibitions relate to a few military installations and nuclear power facilities.
- After 9/11, it is illegal to photograph this building [or oil refinery, or dam, etc.]

Critical Infrastructure Security & Operations Officers
Tips in Responding to a UAS Incident

D irect attention outward and upward to attempt to locate individuals who are holding a controller or device (laptop, notebook, cell phone) and appears to be operating a UAS. Look at windows, balconies, rooftops, and open spaces. For special events, predetermine likely locations that would enable a person to control a UAS.

R eport incident to state or local law enforcement immediately and request a response if necessary. Execute organization's emergency response action plan if appropriate.

O bserve the UAS and maintain visibility of the device. Look for the direction of travel, damage to facilities, and individuals. NOTE: Battery life is typically 20-30 minutes.

N otice features and identify the type of device (i.e., Fixed-wing/Multi-rotor/Retail or Custom), size, shape, color, payload, video camera equipment, and activity.

E xecute appropriate security/emergency response action by maintaining a safe environment for the public and first responders in accordance with Federal, State, and local laws and regulations. Document event details including photos if possible.

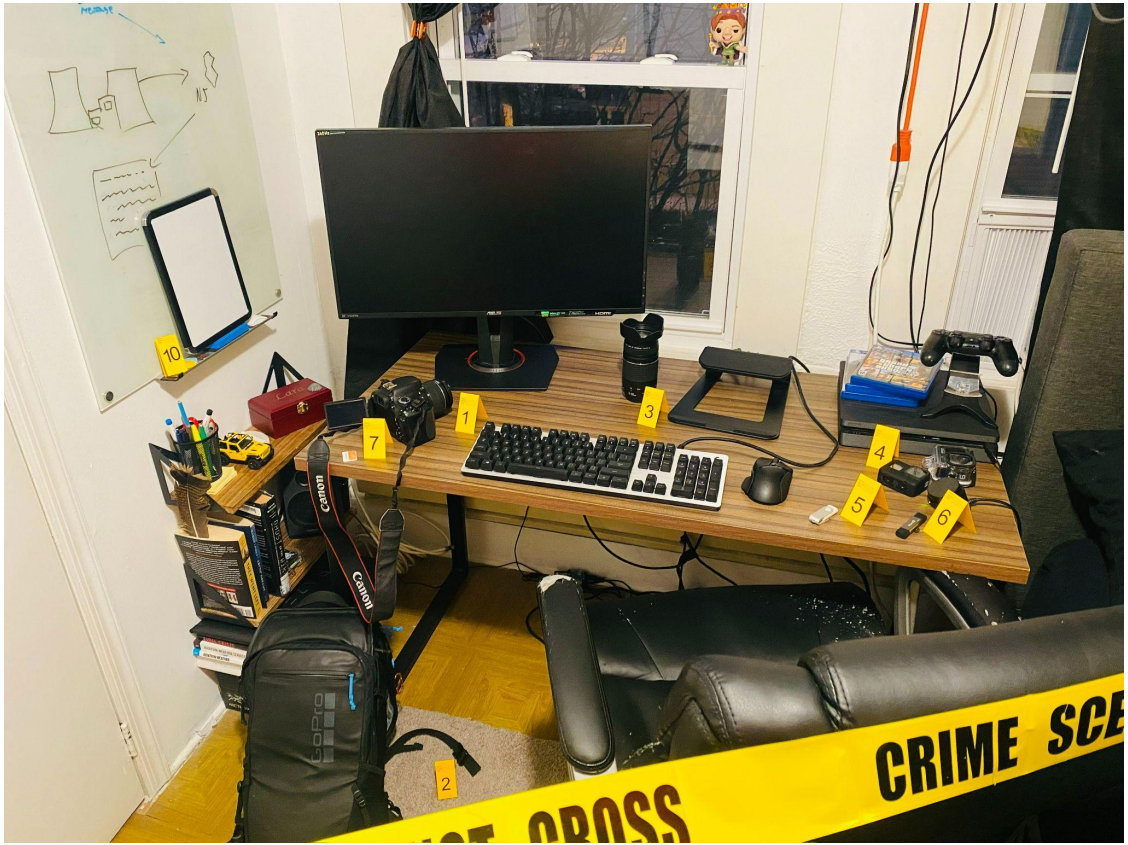
Seized Evidence (Mauricio Pereira)

Items that tell a story:

- No computer found on site
- **1 and 4** - Multiple cameras.
- **3** - DSLR advanced Zoom lens.
- **2 and 6** - Variety of camera accessories.
- **10** - Board notes and plans of Nuclear facility.

Evidence for digital investigation:

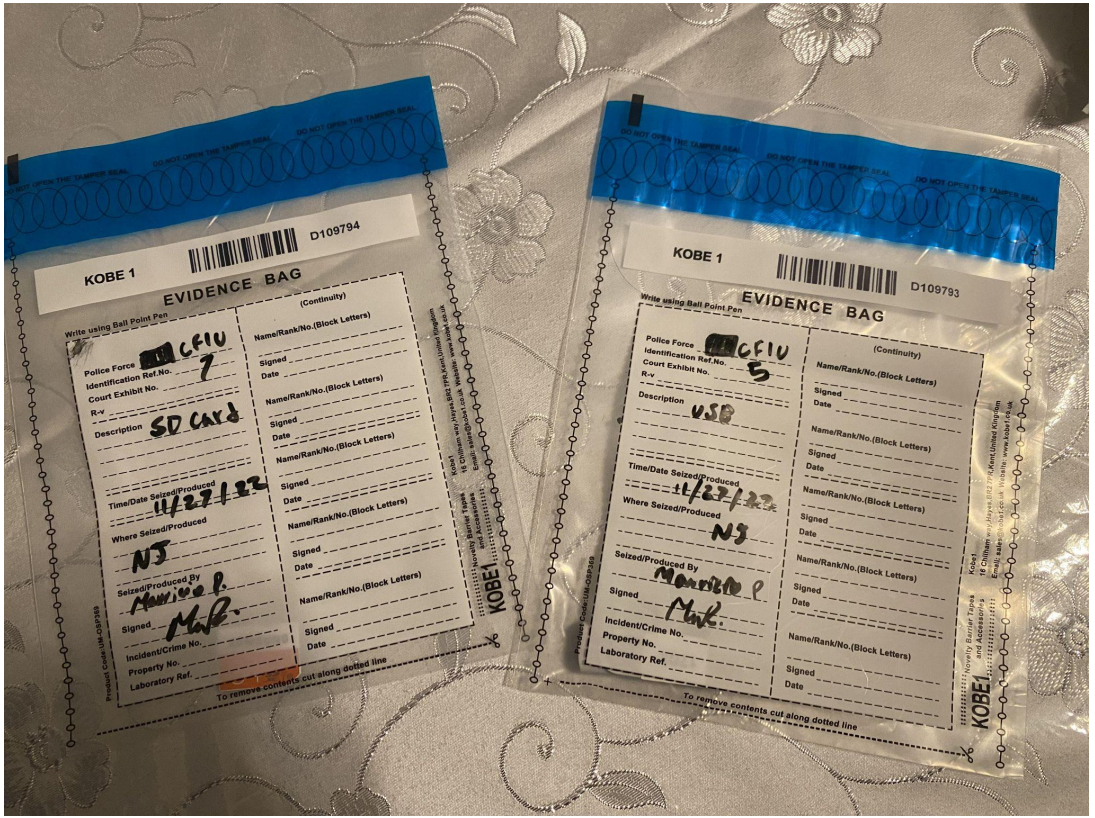
- **5** - USB Flash drive
- **7** - SD memory Card



Seized Evidence (Cont'd)

The evidence was placed in sealed bags along with their respective information:

- **Item 7**
  - **Description:** SD Card
  - **Date:** 11/27/22
  - **Department:** Computer Forensics Investigative Unit
  - **Location:** State of NJ
  - Officer signature
- **Item 5**
  - **Description:** USB Drive
  - **Department:** Computer Forensics Investigative Unit
  - **Date:** 11/27/22
  - **Location:** State of NJ
  - Officer signature



Search Warrant

AO 106 (Rev. 04/10) Application for a Search Warrant

UNITED STATES DISTRICT COURT

for the

District of New Jersey

In the Matter of the Search of *(Briefly describe the property to be searched or identify the person by name and address)* Suspects residence and all digital devices	)	Case No. 19125

APPLICATION FOR A SEARCH WARRANT

I, a federal law enforcement officer or an attorney for the government, request a search warrant and state under penalty of perjury that I have reason to believe that on the following person or property *(identify the person or describe the property to be searched and give its location)*:

The residence of Mr. Alexander Makarov (400 Paramus RD Paramus, NJ 07410) who is suspected of possible Russian spy conducting industrial espionage on the US.

located in the Salem County District of New Jersey, there is now concealed *(identify the person or describe the property to be seized)*:

Mr. Alexander Makarov lives in a gray fenced-off single-family house. All digital devices will be held to a search such as but not limited to, laptops, hard disks, SSDs, USBs, cameras, and phones.

The basis for the search under Fed. R. Crim. P. 41(c) is *(check one or more)*:

- ☑ evidence of a crime;
- ☐ contraband, fruits of crime, or other items illegally possessed;
- ☑ property designed for use, intended for use, or used in committing a crime;
- ☐ a person to be arrested or a person who is unlawfully restrained.

The search is related to a violation of:

Code Section	*Offense Description*
18 USC §798.	Disclosure of classified information
18 USC §794.	Gathering or delivering defense information to aid foreign government
18 USC §795.	Photographing and sketching defense installations

The application is based on these facts:

The suspect was trying to take pictures at the perimeter of the no photos allowed zone of the power plant station. The suspect sprayed a neuro-paralyzing agent.

- ☐ Continued on the attached sheet.
- ☑ Delayed notice of 5 days (give exact ending date if more than 30 days:) is requested under 18 U.S.C. § 3103a, the basis of which is set forth on the attached sheet.

TN
Applicant's signature

Tasin Naveed
Printed name and title

Sworn to before me and signed in my presence.

Date: 11/29/2022

JR
Judge's signature

City and state: Paramus, New Jersey

John Robert

First Responder Seizure Record(Philip A)

First responder seizure record indicating the nature of the equipment taken from the suspect's location.

Case No.	22455988/00002	Case Name	Alexander Makarov
Location of Seizure			
Full Address: Room No, Building, Address Line 1, Address Line 2, Address Line 3, Address Line 4, Post code	400 Paramus Rd. Paramus, NJ 07410		
Details of Evidence Seized			
Type: (E.g. computer, disk, paper etc)	Quadcopter, USB Flash drive, SD Memory	Where Located	Perimeter of NJ nuclear generating facilities
Make	DSLR Advanced	Model	Canon
Serial No:	C619820	Evidence Bag No:	41912
Acquisition Details			
Have you enquired of the owner any passwords used?		YES	NO
If yes to above please state passwords and how used.			
Was the equipment attached to a telephone line at the time of seizure?		YES	NO
Was the equipment switched on at the time of seizure?		YES	NO
If yes to above please state how equipment was switched off and secured.			
Has the equipment been switched on since being seized?		YES	NO
If yes to above please state the reason and the details of the person.			
Photos of exhibit taken (If so attach them)	YES / NO	Sketch produced (If so attach it)	YES / NO

Witness Signature (Forensic Analyst making seizure)			
Full Name:	Philip Abedua	Title:	Police Detective
Phone:	(973)444-6666	Department	Forensics Unit
Signature:	Philip Abedua	Date and time:	11/27/22 02:30pm
Witness Signature (Second signature only if required)			
Full Name:	N/A	Title:	N/A
Phone:	N/A	Department	N/A
Signature:	N/A	Date and time:	N/A

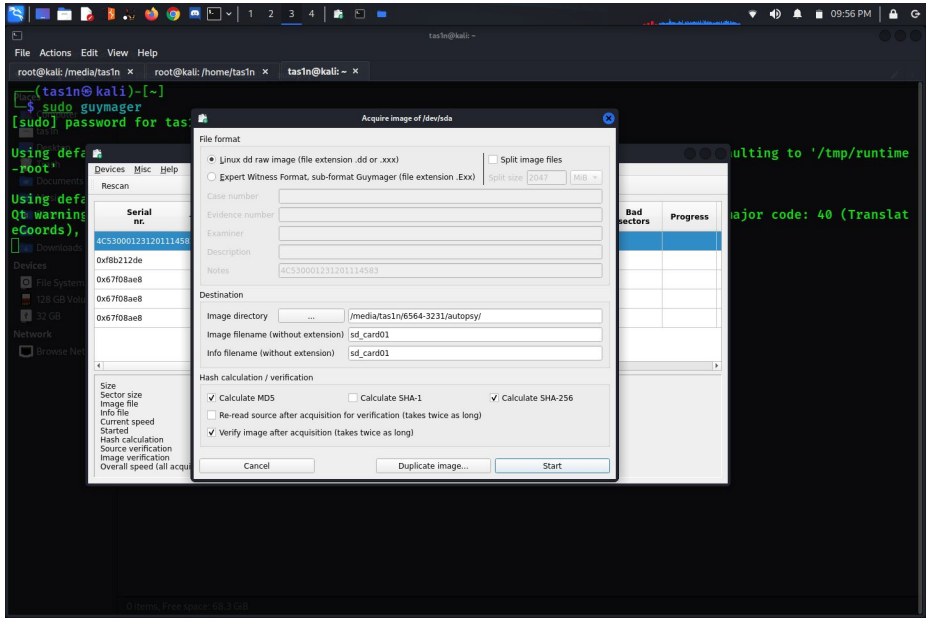
Chain of Custody Log(Dharmesh)

Incident Identification: 25437850-01035

Evidence Custodian: Brandon Hunt

Description of Item	Evidence ID:	Name for Logging Out & Signature	Date Item Received	Name of Person receiving Item back In	Date Item Received
Quadcopter	7425	David Anderson *D. Anderson*	Nov. 27, 2022	Brandon Hunt *Brandon H.*	Nov. 28, 2022
USB Flash Drive	6438	David Anderson *D. Anderson*	Nov. 27, 2022	Brandon Hunt *Brandon H.*	Nov. 28, 2022
SD Memory	5570	David Anderson *D. Anderson*	Nov. 27, 2022	Brandon Hunt *Brandon H.*	Nov. 28, 2022

Making dd image



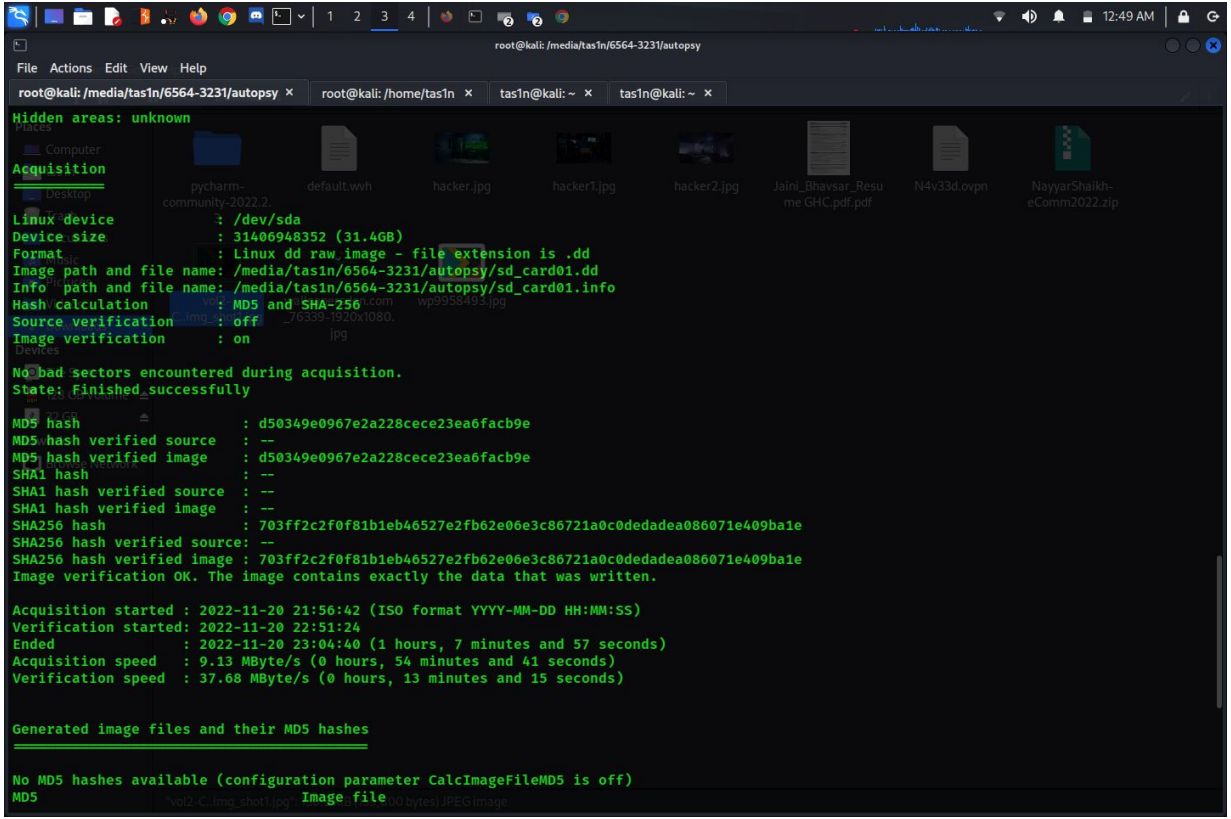
Used “guymager” for creating image

Size	31,406,948,352 bytes (29.3GiB / 31.4GB)
Sector size	512
Image file	/media/tas1n/6564-3231/autopsy/sd_card01.dd
Info file	/media/tas1n/6564-3231/autopsy/sd_card01.info
Current speed	
Started	20. November 21:56:42 (01:07:57)
Hash calculation	MD5 and SHA-256
Source verification	off
Image verification	on
Overall speed (all acquisitions)	

Enabled image verification to maintain the integrity

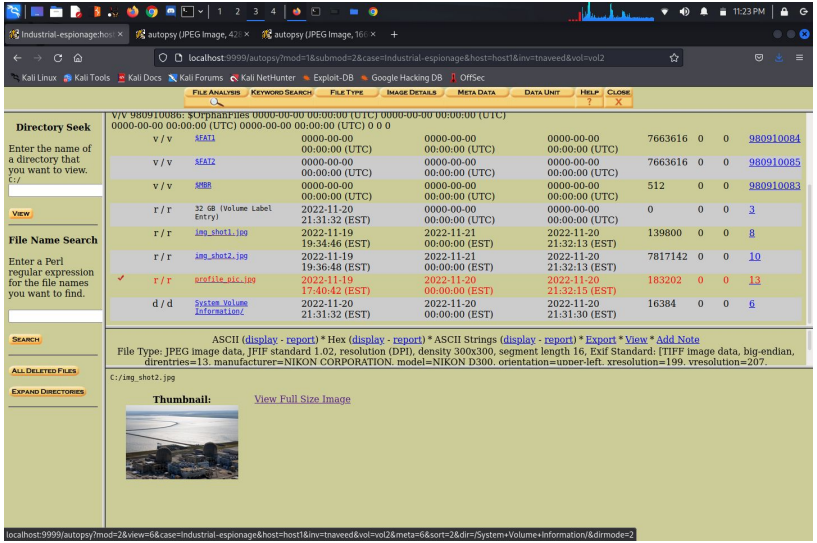
Hash Comparison

Verified MD5 and SHA256 hash prove that we have not compromised integrity of the evidence. It shows we have the same hash before and after of making dd image.

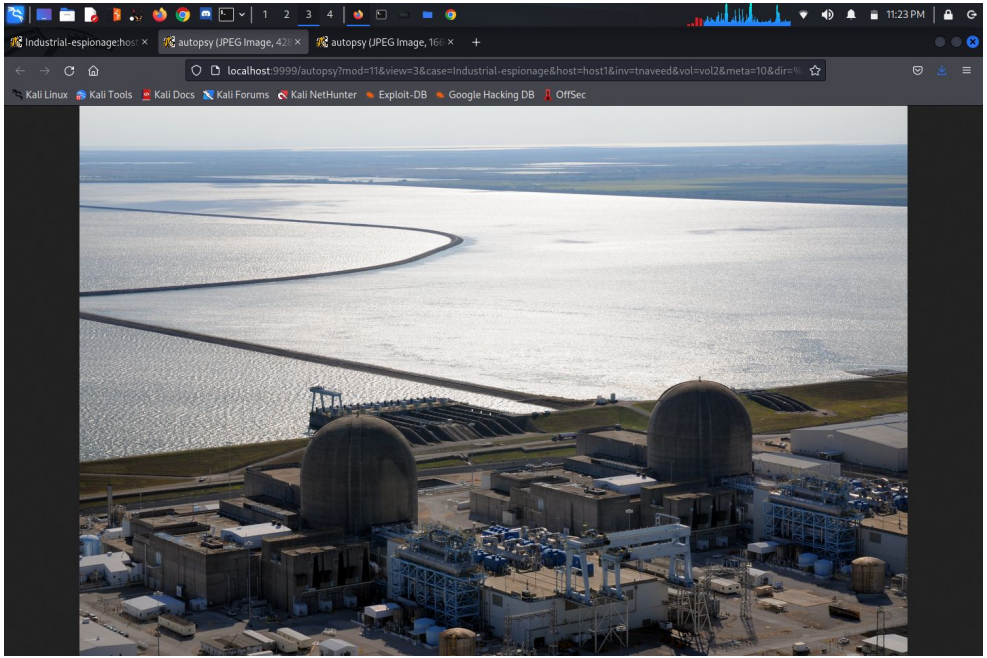


General Analysis

- At our first sight we have found some general footage of the plant. That gives an overview about the plant



Thumbnail view in autopsy



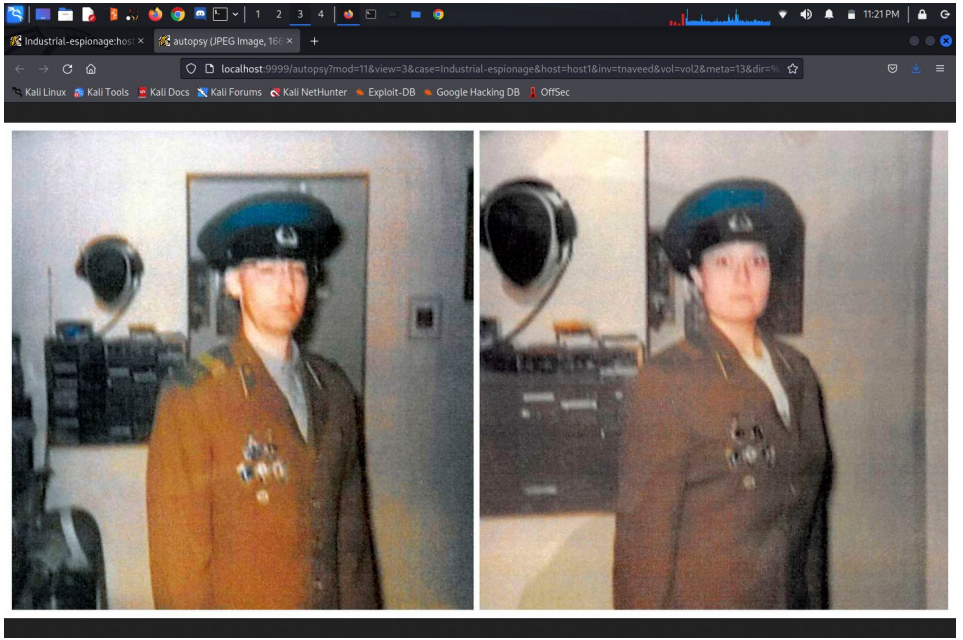
Larger View of the image

Findings with Autopsy

- We have found some deleted images as well by using autopsy. Among them on of the images set the red flag.

- This image shows he and his wife wearing KGB's uniform which indicates they are possibly involved with spying and industrial espionage.

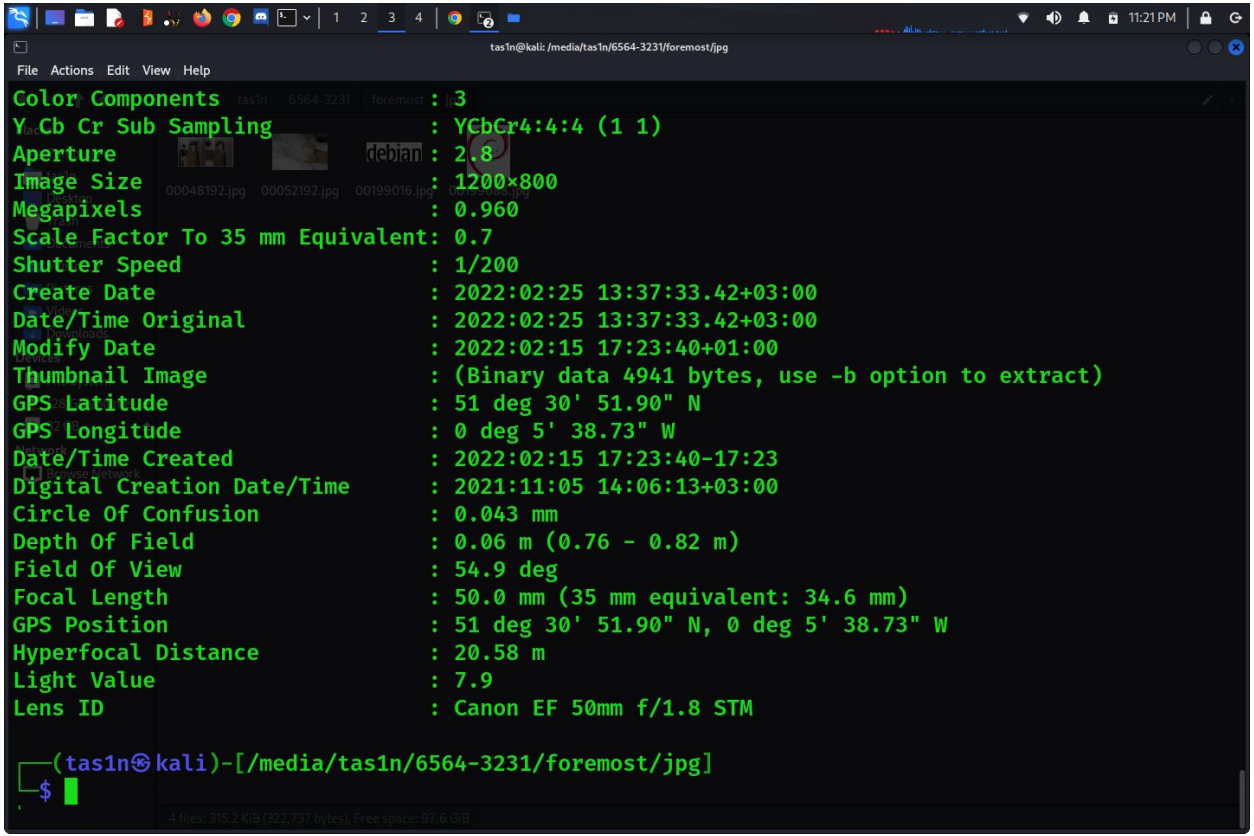
Thumbnail of deleted image



Full size image

Detailed Analysis

Used exiftool and the image had GPS Latitude and Longitude. And the gps position indicates the picture was taken somewhere in Russia.



Deleted Files

- Further we used Foremost tool for recovering specific types of files

```
┌──(root㉿kali)-[/home/tas1n]
└─# foremost -v -q -t pdf,jpg,png,docx -i /dev/sda1 -o /media/tas1n/6564-3231/foremost
Foremost version 1.5.7 by Jesse Kornblum, Kris Kendall, and Nick Mikus
Audit File

Foremost started at Mon Nov 21 22:30:00 2022
Invocation: foremost -v -q -t pdf,jpg,png,docx -i /dev/sda1 -o /media/tas1n/6564-3231/foremost

Output directory: /media/tas1n/6564-3231/foremost
Configuration file: /etc/foremost.conf
Processing: /dev/sda1
|------------------------------------------------------------------
File: /dev/sda1
Start: Mon Nov 21 22:30:00 2022
Length: 29 GB (31405899776 bytes)

Num      Name (bs=512)         Size      File Offset     Comment

0:      00048864.pdf         629 KB        25018368      (PDF is Linearized)
1:      00050144.pdf         654 KB        25673728      (PDF is Linearized)
2:      00051456.pdf         184 KB        26345472      (PDF is Linearized)
3:      00051936.pdf          43 KB        26591232
4:      00052032.pdf          69 KB        26640384
5:      00048192.jpg         178 KB        24674304
6:      00052192.jpg         124 KB        26722304
7:      00199016.jpg           8 KB       101896192
```

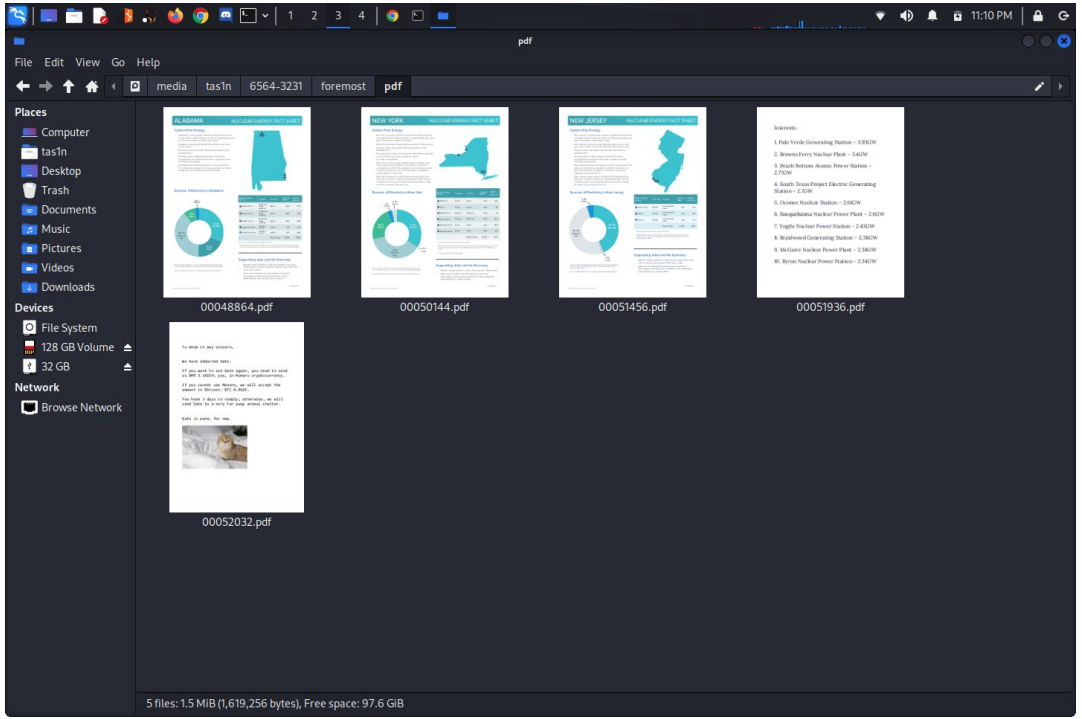
Recovering deleted files with foremost

```
19:     00199100.png          353 B       101939200       (16 x 16)
20:     00199104.png          299 B       101941248       (15 x 16)
21:     00199108.png          321 B       101943296       (15 x 16)
22:     00199112.png          344 B       101945344       (16 x 16)
23:     00199116.png           16 KB      101947392       (640 x 480)
*************************************************24:  09869992.png      1 KB       50534
35904     (48 x 48)
25:     09885892.png          209 B       5061576704      (36 x 108)
**26:   10420248.png            1 KB      5335166976      (96 x 40)
*********27:    12198938.png          62 KB       6245856256      (256 x 256)
**********************************************************************************************
**********************************************************************************************
**************************************************|
Finish: Mon Nov 21 22:52:18 2022

28 FILES EXTRACTED

pdf:= 5
jpg:= 4
png:= 19
-----------------------------------------------------------------

Foremost finished at Mon Nov 21 22:52:18 2022

┌──(root㉿kali)-[/home/tas1n]
└─#
```

Total 28 of files recovered

Relevant Findings Analysis

- We found pdf files contain names and information of employees.
- Found top 10 powerplant names listed as “interested”. Also some pdf had facts about different nuclear plants of different state.
- All these indicates the involvement of industrial espionage.



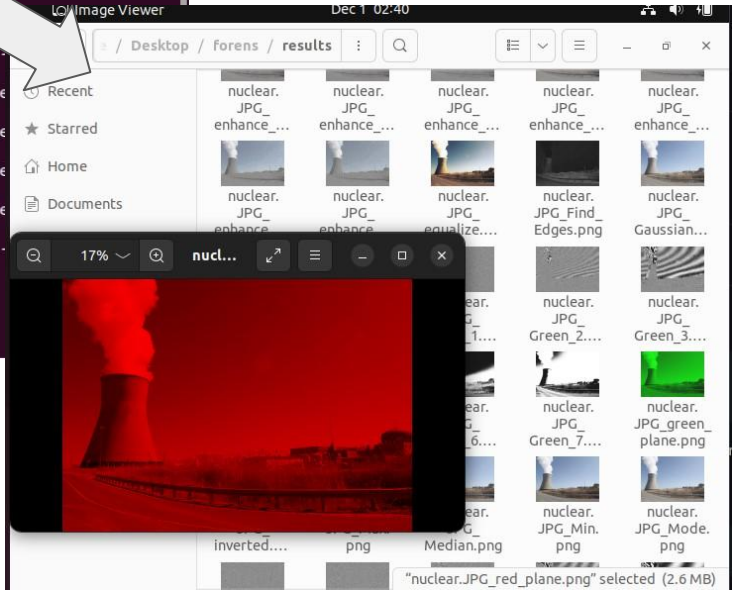
Analysis of Relevant Findings

One of the photos was tested for stenography.

StegoVeritas runs several tests on the file including application of filters to visualize stenography.

In this case, it was not visible but it did find something related to the StegHide tool as highlighted above.

```
root@test: /home/mauri/Desktop/forens
root@test:/home/mauri/Desktop/forens# stegoveritas nuclear.JPG
Running Module: SVImage
+------------------+------+
|   Image Format   | Mode |
+------------------+------+
| JPEG (ISO 10918) | RGB  |
+------------------+------+
Found something with StegHide: /home/mauri/Desktop/forens/results/steghide_bb2a
28385a4f424ae39ec68a50277310.bin
+---------+-----------------+-------------------------------------------------
-----------------------------------------+-----------+
| Offset  | Carved/Extracted | Description
                                          | File Name |
+---------+-----------------+-------------------------------
-----------------------------------------+-----------+
| 0xe8738 | Carved           | LZMA compressed data, propertie
ry size: 0 bytes, uncompressed size: 128 bytes | E8738.7z  |
| 0xe8738 | Extracted        | LZMA compressed data, propertie
ry size: 0 bytes, uncompressed size: 128 bytes | E8738     |
| 0xffde7 | Carved           | LZMA compressed data, propertie
ry size: 0 bytes, uncompressed size: 64 bytes  | FFDE7.7z  |
| 0xffde7 | Extracted        | LZMA compressed data, propertie
ry size: 0 bytes, uncompressed size: 64 bytes  | FFDE7     |
+---------+-----------------+-------------------------------
-----------------------------------------+-----------+
Running Module: MultiHandler

Exif
====
```



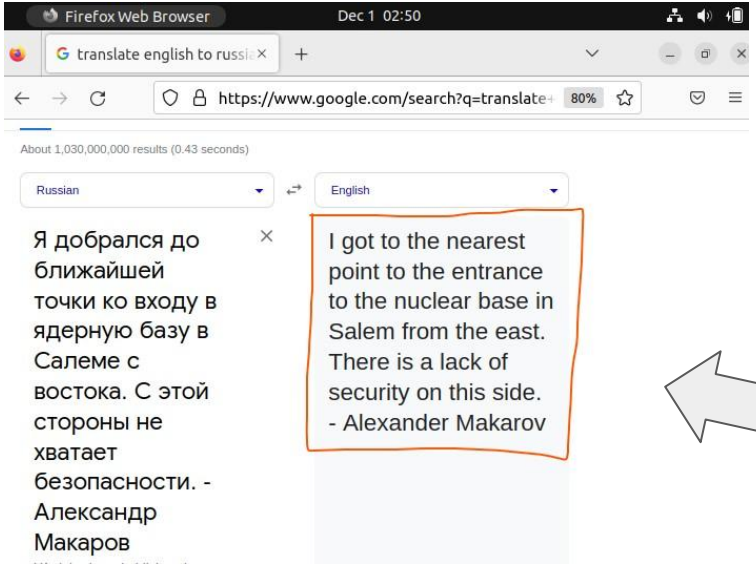
Analysis of Relevant Findings (Cont'd)

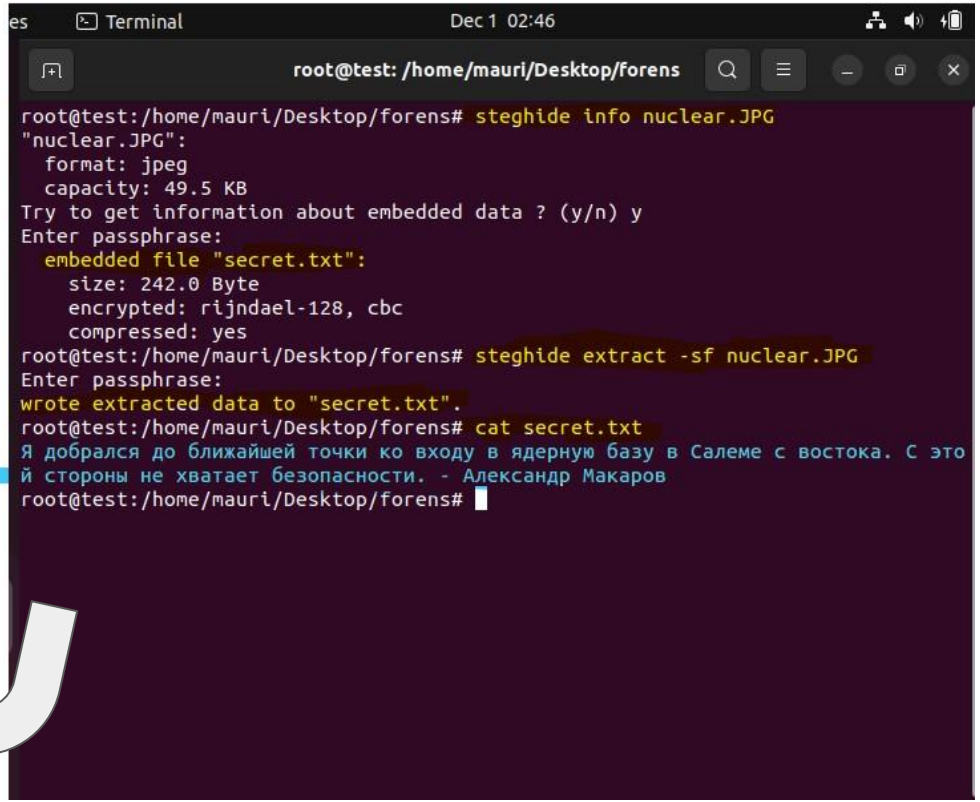
After StegOveritas results, stegHide was ran in attempt to extract the hidden information.

It indeed found an embedded file called "Secret.txt"

The Text file turned out to have a message written in Russian!

When translating the Russian text, It appears to have been a secret communication to the recipient suggesting that there was low security in that particular area.





Supporting Details

- The combination of the intention to hide questionable photos and the gps location coordinates recovered with exiftool suggests possible identity fraud
- The combination of the violation of the “No Photography Rule” and spraying a neuro-paralyzing agent suggests possible espionage
- The combination of several power plants labels as interested and the collection of employee’s and their information suggests possible industrial espionage

Investigative Leads

- Further investigation of digital storage mediums in possession of the suspect may be necessary to determine if there are photos of anything that is not allowed to be photographed
- Further investigation of digital storage mediums in possession of the suspect may be necessary to determine if the recovered photos were taken in Russia and how the suspect would’ve obtained these storage mediums
- Further investigation of digital storage mediums in possession of the suspect may be necessary to determine what the label “interested” means to the suspect
- Further investigation of the suspect's home may be necessary to determine if he/she had obtained the neuro-paralyzing spray legally

References

- https://steghide.sourceforge.net/
- https://exiftool.org/
- https://www.uscourts.gov/sites/default/files/ao106.pdf
- https://foremost.sourceforge.net/