

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK**

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CHEVRON CORPORATION, :
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 Plaintiff, : Case No. 11 Civ. 0691 (LAK)
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 v. :
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 STEVEN DONZIGER, et al., :
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 Defendants. :
 :
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WITNESS STATEMENT OF JAMES I. EBERT, Ph.D.

I, JAMES I. EBERT, hereby declare under penalty of perjury pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. I am the Chief Scientist at Ebert & Associates, Inc., which provides expert legal testimony, scientific exhibits, research and consulting using spatial and photographic evidence in the areas of environmental litigation, land and water rights disputes, criminal forensics, and the management of cultural resources.

2. I was retained by Gibson, Dunn & Crutcher, LLP ("Gibson Dunn") on behalf of Chevron Corporation ("Chevron") in this case to opine on the ability to accurately count pits from aerial photographs in the record in the Lago Agrio litigation against Chevron. Both the Ecuadorian judgment issued in that case and the Cabrera report recite the same number of 880 pits ~~and claim to have independently reached that number~~ by reviewing aerial photographs.



Summary of Expert Opinion

3. The Ecuadorian judgment ~~claims that former Judge Zambrano~~ determined there were 880 pits requiring remediation "proven through aerial photographs certified by the Geographic Military Institute which appear throughout the record." The Cabrera report indicates that same number of 880 pits requiring remediation, after filtering out certain pits identified as associated with Petroecuador. It is my expert opinion, to a reasonable degree of certainty, that it is impossible that the authors of the Ecuadorian judgment and the Cabrera report independently reached the same 880 pit count by use of aerial photography. Rather, I conclude, to a reasonable degree of certainty, that the 880 pit count in the Ecuadorian judgment must have been based on what is in the Cabrera report, rather than any independent attempt to assess aerial photographs in the record.

Background and Qualifications

4. I have a BA in Anthropology from Michigan State University, and an MA and Ph.D. in Anthropology from the University of New Mexico. I am an anthropologist, an archaeologist, and a forensic scientist, and in each of these professional areas I make intensive use of the scientific methods and techniques of photogrammetry, photo analysis, digital imaging and image processing, and digital mapping technologies. I have more than 30 years of experience applying these methods and technologies to analyze, measure and map details of crime and accident scenes, archaeological sites, and aspects of the interaction of the environment and cultural use of the landscape through time, using historic aerial and other photographs. I am certified as a Photogrammetrist by the American Society of Photogrammetry and Remote Sensing [ASPRS].

5. Photogrammetry is defined by the ASPRS, our professional organization, as “the art, science and technology of obtaining reliable information about physical objects and the environment, through processes of recording, measuring, and interpreting imagery and digital representations of energy patterns derived from noncontact sensor systems.” Photo analysis is the process of identifying objects and conditions in aerial photographs and determining their nature, origin, meaning and significance.

6. In forensic or environmental cases, I use these scientific approaches and techniques to extract information from aerial and terrestrial photographs, as well as other historic data, such as maps and documentary evidence, to elucidate and substantiate the cultural activities and processes that are the causes of environmental damage at such sites as dumps, mines, airports, industrial sites and other human activity areas of legal concern.

7. I have provided expert testimony in court on 31 occasions between 1980 and the present on the use of photogrammetry, photo analysis, digital imaging and image processing, and digital mapping technologies as applied to forensic investigations, analyses, and reconstructions of crime, fire, and accident scenes, human land and resource use, and past and present human activities through time at environmentally relevant sites. This includes the identification, mapping and analysis of surface spatial patterning and conditions resulting from petroleum exploration, drilling, and recovery.

Principles of Aerial Photo Analysis

8. Aerial photo analysis, which falls under the scientific field of photogrammetry, requires the understanding of data sources and their limitations, as well as extensive professional experience and training in the use of complex technologies to

analyze and identify objects and activities on the ground from aerial photographs. I, for example, have more than 30 years' experience using these complex technologies to analyze aerial photographs.

9. Aerial photographs employed by photogrammetrists are almost always vertical photos, taken along a straight flight line from an aircraft with cameras pointed directly down. The camera is triggered at intervals along the flight line, which ensures that there is nominally a 60% overlap between successive photo frames. Two images that overlap in this way are called a stereo pair. Viewing one side of a stereo pair with one eye, and the other side of the stereo pair with the other eye, provides the analyst with stereo aerial images. This, in turn, allows the analyst to view the image as a 3-dimensional terrain, using either optical viewing methods (stereoscopes) or digital viewing on computers. Stereo images are indispensable in cases like the present one, which requires the analyst to distinguish pits and other low places from features such as trees, vegetation or man-made objects such as structures or tanks. A two-dimensional image does not provide the analyst the ability to distinguish such features as accurately.

10. In today's photogrammetry, the digital use of stereo aerial images confers considerable advantages over optical stereo viewing. This is because image processing methods can be used to bring out details of interest in digital images, and also because one can magnify small details in digital images to a far greater degree than with optical stereoscopes.

11. Making useful stereo digital images requires high resolution scanning from either original film negatives, or film or paper contact prints made from them. One way of

viewing stereo images on a computer is by compiling anaglyphs, which is accomplished by merging the two images that make up a stereo pair into a single color image. We used this method in our analyses in this case.

12. The principal film used for taking black-and-white aerial photographs is panchromatic, which renders images in varying shades of gray. To analyze oil pits, black-and-white photographs are largely disfavored because water and other liquids universally appear as black in positives made from panchromatic negatives. This makes it impossible to distinguish between water and other liquids (for instance crude oil) solely from panchromatic positive aerial photographs. Rather, if black-and-white photographs are used, determinations regarding the contents of pits should be made with the benefit of on-the-ground investigation.

Unreliability of the Photographs in the Record

13. As part of my review, I examined the various documents that contained aerial photographs in the record of the Lago Agrio litigation in Ecuador. I looked in the Cabrera report and Anexos containing photographs, the Hidden Pits Report, the Judicial Inspection Reports' aerial photographs, and other various expert reports that contained aerial photographs.

14. The Ecuadorian judgment states that there are 880 pits requiring remediation based on examination of aerial photographs in the record. ~~Specifically, the Ecuadorian judgment states that the 880 pit figure was "proven through aerial photographs certified by the Geographic Military Institute which appear throughout the record, analyzed together with the official documents of Petroecuador submitted by the parties and especially by the~~

~~expert Geraldo Barros.” (Ecuadorian judgment, page 125 [translated]). That statement was then expanded upon in a “clarification” issued on March 4, 2011: “it is emphasized that, as explained in the judgment, the Court analyzed the various aerial photographs that form a part of the record and that were certified by the military Geographic Institute. The Court found this method appropriate since all of the photographs are from before 1990, and cannot reflect the existence of pits constructed after Petroecuador assumed the operations.”~~ (Clarification, page 15 [translated]).

15. Anexo E to the Cabrera report was the primary source in the record that used aerial photographs to map pit locations and count specific pits. However, these aerial photo scans are monoscopic (i.e., not in stereo), of low resolution, and all were black-and-white panchromatic images. Using such aerial photo scans would make it difficult for even an experienced photogrammetrist to identify and map pits. Given that the Ecuadorian judgment does not describe any expertise, special training, or technology that former Judge Zambrano had in interpreting aerial photographs, it is practically impossible for Judge Zambrano to have accurately interpreted the aerial photo scans in the record. The low quality of many of the Cabrera report scans magnify the problems identified above with respect to the interpretation of aerial photographs generally, as well as the identification of oil pits more specifically.

16. Furthermore, the photographic analysis required for a trained photogrammetrist to make even a cursory identification of pits would be a lengthy and challenging process. It would take months for a trained expert such as myself to thoroughly examine and interpret all of the photographs in the record in an effort to identify pits. For a

layperson with no training in photogrammetry to identify and count pits in this set of photographs would take an extraordinarily long time.

17. Indeed, as stated above, the field of photogrammetry is not an exact science, but rather involves human interpretation and judgment. It takes years of experience and training to have the judgment necessary to accurately and professionally interpret aerial photographs of high quality. Even two highly trained photogrammetrists reviewing the same set of photographs in the record would not find the same number of crude oil pits. Yet, I understand that filtering Anexo H-1 of the Cabrera report to exclude certain entries after Petroecuador assumed operations of the oil fields yields a pit count identical to the pit count in the Ecuadorian judgment (880). (*See* Spencer Lynch Expert Report, dated August 29, 2013). Given the difficult nature of aerial photographic interpretation, this coincidence cannot be the product of chance.

18. In my expert opinion, it is impossible that the author of the Ecuadorian judgment and the author of the Cabrera report could independently review the hundreds of aerial photographs in the record and reach the exact same conclusion that there are 880 pits requiring remediation. Thus, I conclude to a reasonable degree of scientific certainty that the 880 pit count in the Ecuadorian judgment is based on the information in the Cabrera report rather than an independent analysis of the aerial photographs in the record.

Errors in the Interpretation of Pits

19. Examples of errors in aerial photographic interpretation in the Cabrera report demonstrate why it is not possible that the author of the Ecuadorian judgment and the

author of the Cabrera report reached the same result by interpreting the photos independently.

20. Below are two illustrative examples of errors I found in the Cabrera report analysis. I compared the image interpretations of the Instituto Geografico Militar (IGM) aerial photos in Anexo E with higher quality scans of the same aerial photographic and satellite images and Geographic Information Systems (GIS) data. These examples show how errors can be made when interpreting even relatively clear features in aerial photographs. The likelihood that an independent reviewer of the aerial photographs would have made these exact same errors is essentially zero.

21. For example, a 1985 IGM aerial photograph of Shushufindi 33 Well Site from Anexo E of the Cabrera report shows three alleged pits bounded with colored lines (see top photo in Figure 1 below). However, a review of an enlargement from a higher quality scan of the same IGM photo (#44409) shows a tree and its shadow have clearly been identified as “Pit 3” (see bottom photo in Figure 1 below).

Figure 1: Shushufindi 33 Well Site

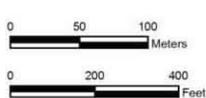
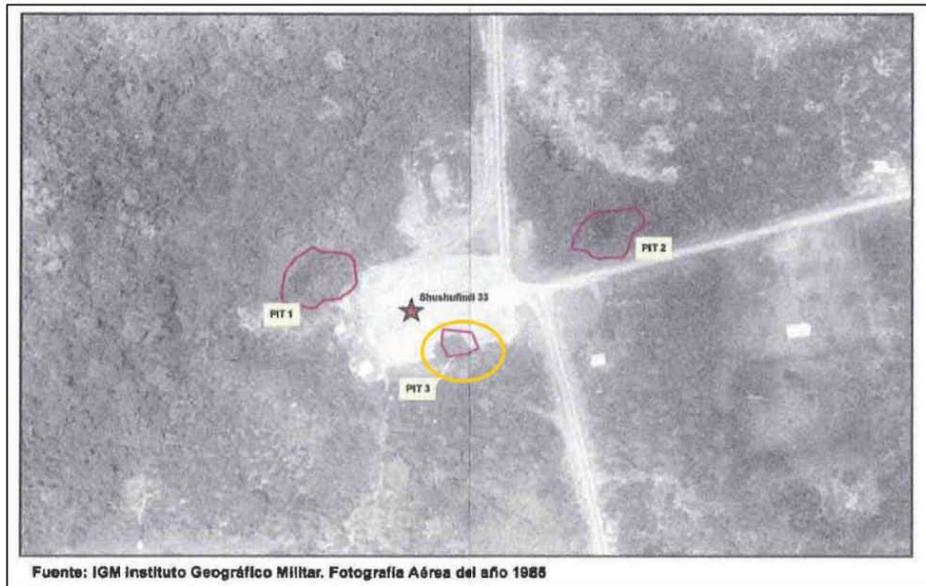


Figure 1
Shushufindi 33

N ↑	Aerial Photo Date	E A & associates <small>Planning and Mapping Public Works</small>
	10-09-1985	
	444409_v1.M	
	Mapped by: JIE	

22. Similarly, a 1985 IGM aerial photograph of the Sacha Sur Station well site from Anexo E of the Cabrera report purports to identify pits (see top photo in Figure 2 below). However, a much higher quality scan from the same 1985 aerial photograph (IGM

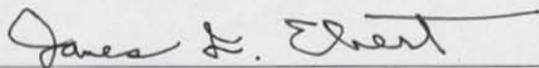
#45121) shows that “Pit 4” is an above-ground tank with a dark shadow (see bottom photo in Figure 2 below).

Figure 2: Sacha Sur Station



23. In my expert opinion, it is impossible that the author of the Ecuadorian judgment and the author of the Cabrera report could independently review the hundreds of aerial photographs in the record and reach the exact same conclusion that there are 880 pits unrelated to Petroecuador requiring remediation. Thus, I conclude to a reasonable degree of scientific certainty that the 880 pit count in the Ecuadorian judgment is based on the information in the Cabrera report rather than an independent analysis of the aerial photographs in the record.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on October 3, 2013.



James I. Ebert, Ph.D.